MANAGING THE HEALTH CARE MARKET IN DEVELOPING COUNTRIES: A CASE STUDY OF SELECTIVE CONTRACTING FOR HOSPITAL SERVICES IN SOUTH AFRICA

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ABSTRACT

This thesis examines the prospects for market type reforms within the public health systems of developing countries, through a study of the impact of contracting out of the provision of rural district hospital services in South Africa. The research objectives were to assess the impact of these contracts on hospital and local health system efficiency, to analyse the determinants of efficiency, and to determine the necessary conditions for efficiency gains from contracting out. Three contracted out hospitals, under contract to a single for-profit contractor, were each matched with a public and a private for-profit hospital, and the relative efficiency of these hospitals was assessed using step down unit cost analysis, data envelopment analysis, and a multi-dimensional assessment of quality of care. The structure of the contracts and the contracting process, organisational management structures and systems, and the extent of competition for the contracts, were also evaluated.

These analyses demonstrate that the contracted out hospitals are able to produce most outputs of comparable quality at lower cost, primarily due to more efficient utilisation of staff resources, and to superior management structures and systems. However, when the government's total costs are taken into account, including contract prices and transactions costs, contracted out services appear more costly than those produced in public hospitals, indicating that the contractor is able to capture most of its superior production efficiency in profits, and that these contracts result in some efficiency losses. Poor contract design is also shown to result in some systemic efficiency problems. These results are shown to be attributable to the government's poor ability to design, negotiate and monitor contracts, as well as to the absence of competition or contestability. These findings suggest that contracting out has the potential to generate significant efficiency gains, but only where certain critical conditions are in place, including government capacity to design, negotiate and monitor contracts, and some level of contestability or competition for the contracts. Where these conditions are absent, contracting out of hospital services is unlikely to generate efficiency gains, and may result in efficiency losses.

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GLOSSARY

AHA	American Hospital Association
CI	Confidence Interval
CRS	Constant returns to scale
CSSD	Central Sterilising Department
DoH	Department of Health
DEA	Data Envelopment Analysis
DHA	District Health Authority
DMU	Decision making unit
EN	Enrolled nurse
ENA	Enrolled nurse assistant
FTE	Full-time equivalents
FTEE	Full-time employee equivalents
GYN	Gynaecological
HO	Head Office
ICA Audit System	Audit system for evaluating peri-natal mortality
ICU	Intensive care unit
LOS	Length of stay
LR	Logistic regression analysis
MCH	Maternal and child health
MIS	Management Information System
N/A	Not applicable
NCP	Nursing Care Plan
NFP	Not-for-Profit
NGO	Non government organisation
NHS	National Health Service
NQOC	Quality of nursing care
NVD	Normal Vaginal Delivery
OECD	Organisation for Economic Cooperation and Development
OPD	Outpatients Department or Outpatient (as in OPD visit)
PHC	Primary health care
PPIP	Peri-natal Problem Identification Programme
RA	Ratio analysis
RCC ratio	Recurrent to capital cost ratio
SAIMR	South African Institute for Medical Research
SANTA	South African National Tuberculosis Association
SQOC	Structural quality of care
TB	Tuberculosis
TCC	Total contract cost
TE	Technical efficiency ratio
TPA	Transvaal Provincial Administration
VAT	Value Added Tax
VRS	Variable returns to scale
WWU	Workload weighted units

GLOSSARY OF MEDICAL TERMS

Acute respiratory distress	Episode of severe respiratory difficulty, possibly leading to respiratory failure
Baumanometer	Equipment for measurement of blood pressure
Bowel obstruction	Blockage of part of the bowel, often a complication of abdominal surgery
Calcific valvular disease	Hardening of valves of the heart, usually following infection.
Disseminated intravascular coagulation	Severe disorder of blood coagulation usually following severe infection or major trauma
Eclampsia	Severe hypertension and convulsions during delivery
Failed assisted delivery	Failed attempt to use either forceps of vacuum apparatus to assist in final stage of delivery
Histology	Microscopic examination of tissue samples
Maternal mortality	All deaths occurring within 1 month of childbirth
Peri-natal mortality	All deaths occurring within 2 weeks of birth, and where birthweight above 1000g
Peritoneal lavage	Procedure in which the abdominal cavity is irrigated to treat or avoid infection
Peritonitis	Inflammation of the abdominal cavity
Post partum haemorrhage	Bleeding from uterus after delivery
Puerpural sepsis	Infection of the uterus or pelvic region following childbirth
Pulmonary embolism	Blood clot in the lung, often a complication of surgery

Pyelonephritis	Infection of the kidneys
Pyrexia	Fever
Secondary suturing	Repeat suturing of surgical wound, following infection or dehiscence
Septicaemia	Generalised infection
Splenomegaly	Enlarged spleen
Strangulated hernia	Hernia which involves obstruction of a portion of the bowel
Testicular infarction	Irreversible damage to testicular tissue due to interruption of blood supply
Third degree tear	Severe tear in vaginal wall following vaginal delivery
Typhoid fever	Serious bacterial infection caused by the bacterium S. Typhi
Wound dehiscence	Separation of a surgical wound, usually due to infection
Wound sepsis	Infection in a surgical wound

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CHAPTER ONE: INTRODUCTION

Recent health policy debates in both developed and developing countries have been strongly influenced by a trend towards 'marketisation', involving the selective introduction of a range of market mechanisms within the rubric of the public health system (Hurst 1991, Saltman and von Otter 1996, Mills 1995, Saltman 1995, McPake and Ngalande Banda 1994, World Bank 1993, OECD 1992, Mills 1997). This is in part attributable to new trends in public sector management in many parts of the world (Walsh 1995, Moore 1996), as well as to accumulating evidence of the failure of health care systems throughout the world to meet key objectives of efficiency, equity and responsiveness to users (Birdsall and James 1992, World Bank 1993, Mills 1995, Bennett, Russell and Mills 1996). 'Marketisation' proposals and reform programmes have varied widely in terms of their scope, the components of the health system they address, and the specific mechanisms they rely upon. At their most ambitious, reforms have aimed to create full 'internal markets' within the health sector, with competition in either or both the funding and supply of health care. Less ambitious reforms have aimed at introducing more limited market elements, such as contractual relations between purchasers and providers.

Reforms of this kind have been debated and, in some cases, implemented in numerous developed countries, including the majority of OECD states (OECD 1992, Saltman 1995). Some of the better known instances of reforms which have been debated and in many cases implemented in the last 5 years include those in the United States (Iglehart 1993, Ellwood, Enthoven and Etheredge 1992), the UK (Great Britain Department of Health 1989, OECD 1992, Le Grand 1994), the Netherlands (van de Ven 1989), Sweden and Finland (Saltman and von Otter 1992, von Otter and Saltman 1991, Annel 1995; Diderichsen 1995) and New Zealand (Borren 1993, Ashton 1995).

While no middle or low income developing countries have to date implemented large scale structural reform along these lines, there are several reasons to believe that such an approach to policy reform will become increasingly relevant in the foreseeable future. The health systems of several middle income developing countries currently feature

limited market elements, such as selective contracting (i.e. public sector purchasing of specific services from either public or private providers). This occurs in some social insurance systems in Latin America and Asia (McGreevey 1990, Briscoe 1989, Kim 1987, Griffin 1990, De Geyndt 1990), and in several other countries in which public sector provision dominates, but where some services are contracted out to private sector providers (Price, Masobe and Booysen 1993, McPake and Ngalande Banda 1994, Bennett 1991, Chandiwana and Chiutsu 1993, Cruz and Zurita 1993, Bennett and Mills 1993). In the Latin American context, Colombia is currently introducing more extensive reforms based on the introduction of a split between purchasers and providers, while Mexico is considering similar reforms (Gonzales-Sedano 1995, Mills, Hongoro and Broomberg 1997). Chile is also considering proposals to increase competition at the primary health care (PHC) level, by allowing private providers to participate in publicly funded provision (Jiminez 1993, Jimenez de la Jara and Bossert 1995). Similarly, most of the countries of the former Soviet bloc and Eastern Europe, including the Russian Federation, are experimenting to a lesser or greater extent with reforms of this kind (Robinson and Le Grand 1995, Sheiman 1995).

In Africa, Zambia has begun to implement proposals which envisage extensive decentralisation of management authority, and a purchasing role for district health authorities (Bennett, Russell and Mills 1996), while South Africa is considering the introduction of provider competition in the delivery of publicly funded PHC services (Department of Health, Republic of South Africa 1996), and already has extensive experience with selective contracting (see below). In several other countries (e.g. Ghana, Malawi, Tanzania, Zimbabwe and Nepal, Rwanda, Swaziland, South Africa) the public sector implicitly contracts with private (usually not-for-profit) providers, such as churches or other NGOs, to deliver health services, and meets all or some of their costs of doing so through subsidies and grants (Gilson, Adusei, Arhin *et al.* 1997, Green 1987, Gilson, Dave Sen, Mohammed *et al.* 1994, Hospital Strategy Project Consortium 1996a).

Numerous other developing countries also contract out the delivery of a range of clinical and non-clinical support services (Mills 1995, Mills, Hongoro and Broomberg

1997, Bennett, Russell and Mills 1996, McPake and Ngalande Banda 1994). Finally, there is emerging evidence of a significant shift towards policies of this kind among influential donors and agencies in international health, which is likely to add impetus to such reform initiatives (Mills 1995, World Bank 1993, Cassels 1995, Kutzin 1995).

Despite the extensive debate and literature on these reforms, they have for the most part been advocated and implemented in the absence of systematic data on their actual costs and benefits in practice. As discussed in some detail in Chapter 2, there remains very limited information, from either developed or developing countries, on the impact of marketisation reforms on the efficiency of providers and of the health system more generally, on equity and other social objectives, as well as on the costs of these reforms.

This study was intended to address this information gap in a limited way, and to make some contribution to the systematic analysis of these approaches to health service delivery, through a case study of selective contracting for hospital services by government authorities in South Africa. This introduction provides the background to the case study; it begins with a brief review of the policy context for health care reform in South Africa, with a specific focus on the potential role of selective contracting or other forms of 'marketisation'. It then provides more detailed background on relevant aspects of the South African health sector, and on the current extent of selective contracting for hospital services. It concludes with an outline of the research framework applied here, and of the structure of the thesis.

1.1. The policy context for health care reform in South Africa

There are several imperatives driving health care reform in South Africa, some of which are unique to the South African context, while others are common to other developing and, in some cases, developed countries. Specific features of the South African context include the profound impact of apartheid policies on health care over the past 5 decades, and the relatively recent political transition. Apartheid policies led to massive inequities in resource distribution between race groups, geographic regions and components of the

health care system, as well as to severe fragmentation and duplication of the health services, due to the effects of the 'homelands'[1] policy. As a result, the new authorities have inherited a legacy of poorly organised, inefficient and unresponsive health services (de Beer and Broomberg 1990, McIntyre and Dorrington 1990).

The recent political transition has seen the installation of a new government which was voted in by a large majority, and the development of nine new provinces (incorporating the former 'homelands' and provinces) each with their own health administrations. Not surprisingly, these changes have been accompanied by very strong popular expectations of substantial improvements in health service delivery, and both politicians and health service bureaucrats currently feel pressure to deliver tangible improvements. These trends are reflected in the intense and urgent health policy debate which began some time before the political transition, and has since gained substantial momentum (African National Congress 1994, Department of Health, Republic of South Africa 1996, Hospital Strategy Project Consortium 1996b).

The ability of the South African government authorities to respond to these pressures is however seriously constrained by a number of problems, many of which are common to many developing countries (see Chapter 2 for further discussion). These include severe and growing financial resource constraints, shortages and maldistribution of key personnel resources, especially doctors and managerial staff, and severe inefficiencies within existing public bureaucracies (Hospital Strategy Project Consortium 1996b). These factors have led to an increasing recognition that public sector resources may be insufficient to meet total health sector needs in the country, and this has, in turn, led to a search for mechanisms by which private health sector resources might be harnessed to the ends of national health priorities (Department of Health, Republic of South Africa 1996).

The key mechanism envisaged here is that of selective contracting by the public sector, for services provided by either for-profit, or not-for-profit private providers. While

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1 This refers to the apartheid policy of creating independent or quasi-independent 'homelands' in specific regions of the country, for the purposes of removing the majority of the black population from so called 'white areas'.

selective contracting is currently limited to the hospital sector, recent policy proposals envisage extending this approach to the delivery of primary health care (PHC) services (Department of Health, Republic of South Africa 1996). This approach has been proposed for a number of related reasons, in addition to the general factors outlined above: firstly, it is argued that outside contractors may be able to provide a similar or higher quality service at a lower cost than the government, due to some combination of economies of scale, and greater production efficiency resulting from competition, expertise or technology. Secondly, contractors have capacity and resources not available to the government; for example, the public sector faces a major shortage of skilled medical staff, and contracting is seen as a mechanism for drawing medical staff currently in the private sector into public service. Contractors are also believed to have greater expertise in the delivery of highly specialised services, such as equipment maintenance, management of specialised hospitals, or blood transfusion and pathology services. Finally, private providers may allow government authorities to overcome critical capital constraints on the development of needed facilities.

In addition to proposals on selective contracting, a recent review of the hospital system has proposed extensive decentralisation of management authority in public hospitals, and the introduction of 'performance contracts' (see Chapter 2) between public hospitals and government authorities. As discussed further below, these approaches have been given specific impetus by South Africa's uniquely extensive experience with selective contracting in the health sector, as well as by its well developed private health sector. It is also likely that these debates have been influenced by international trends in health policy, particularly in the UK, Europe and the US, since consultants from these two countries have played significant roles in recent policy initiatives in the country.[2]

These observations thus suggest that various forms of contracting already play an important role, and can be expected to become increasingly prevalent in the organisation of South Africa's health sector. For these reasons, South Africa provides something of a

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2 The European Union has seconded several consultants on a long term basis to the Department of Health in South Africa. In addition, two senior consultants from the UK and the US served as advisors in a recent, high level policy making process - the Committee of Inquiry into a National Health Insurance System.

natural laboratory for evaluating the impact of this approach to delivering health services in a developing country context.

1.2. The role of selective contracting in South Africa's health care system

This section provides some background on South Africa's hospital system and the role of selective contracting within that system. In addition to information on the publicly funded and operated hospital system, it provides some detail on the private hospital sector, including both not-for-profit and for-profit hospitals, with some focus on the latter group, due to the inclusion of three such hospitals in this study.

In 1995, South Africa had 392 publicly owned and operated hospitals, comprising 112,979 beds (Hospital Strategy Project 1996b). These hospitals provide care for approximately 83% of the total population of 42 million (Health Systems Trust 1996), the remainder using private hospitals (see below). These hospitals are grouped into district, regional and central hospitals, based on the range of services they provide, and the level of expertise available within the hospital. District hospitals, which represent the public hospitals included in this study, provide a basic range of in-patient and out-patient services, and are usually staffed by general practitioners. These hospitals have traditionally been located in rural areas, as is the case with the hospitals in this study, although the government health authorities are intending to designate several formerly regional hospitals in the cities as district hospitals (Department of Health, Republic of South Africa 1996). As described in more detail in Chapter 7, these hospitals are organised on the traditional lines of a public bureaucracy, with hospital management enjoying extremely limited authority, most of which is held at the centre, and with the majority of employees, including medical staff, being full-time salaried public servants.

Alongside the public hospital system is a well developed private hospital sector, comprising both for-profit and not-for-profit institutions. In 1996, the for-profit sector comprised a total of 255 hospitals, comprising 21,160 beds, the majority of which

belonged to large hospital companies, with the residual being owned by individual shareholders or smaller companies (van der Merwe 1997). All of these hospitals operate on a fee-for-service reimbursement basis, and cater almost exclusively for the approximately 17% of the population which has access to private health insurance. Medical staff working in these hospitals are not employed by them, but are instead affiliated to one or more hospitals, implying that the doctor has a surgery within or close to the hospital, and refers and treats his patients in the hospital concerned. Affiliated doctors are also shareholders in the hospitals to which they are attached. The patterns of service provision in these hospitals differ substantially from those in public hospitals, due to the fact that majority of users of these hospitals are relatively affluent, and due to the use of a fee-for-service reimbursement mechanism, which results in a bias towards high patient turnover, short hospital stays, and a strong emphasis on surgical and other technology intensive procedures (Broomberg, Chetty and Masobe 1992).

The not-for-profit hospital sector comprises two main groups, both of which operate on the basis of what may be termed 'implicit contracts' (see Chapter 2) with the government, in that they receive the majority of their operating budgets from public funds, and provide services to uninsured patients. The first of these is the South African National Tuberculosis Association (SANTA), which owns and operates 22 hospitals for the treatment of patients with severe Tuberculosis (TB), comprising a total of 1938 beds and an annual budget of R72.8 million, and which receives 100% of its operating expenditure from the various government authorities (Hospital Strategy Project Consortium 1996a). The second group- the so called 'province-aided hospitals'- comprises 50 autonomous acute care hospitals with a total of 3193 beds, and annual expenditure of R1.52 billion. These were often established by religious orders, but are now run by independent Boards of Trustees. They provide care to a mix of insured and indigent patients, and generally receive 90% of their operating budget from public funds (Hospital Strategy Project Consortium 1996a). It is interesting to note, in the light of the policy developments described above, that the South African government authorities are now attempting to shift these 'implicit contracts' onto a more formal footing, with detailed, formal contracts being negotiated with SANTA, and with discussions along these lines proceeding with the province-aided hospitals (Ntsaluba 1996).

Over and above these well developed examples of implicit contracting, South Africa has extensive and long-standing experience of more formal selective contracting for both non-clinical and clinical services provided by a range of for-profit and not-for-profit private sector providers (Price, Masobe and Booysen 1993, Hospital Strategy Project Consortium 1996a). The extent and value of these contracts in 1995 is illustrated in Table 1.1.

Table 1.1: Overview of contracts for hospital services in South Africa (1995)

	No. of Contracts	Total Value (Rand million)	% Total Hospital Budget
Clinical			
Hospital Management	106	502.3	4.1%
Laboratories	9	236.4	1.9%
Blood Services	7	143.2	1.2%
Personnel	1	13.7	0.1%
Other*	4	16.3	0.1%
Total	**127**	**911.9**	**7.6%**
Non-Clinical			
Waste Removal	9	7.2	0.06%
Clinical Maintenance	99	3.3	0.02%
Gardening	18	3.9	0.03%
Security	152	28.0	0.2%
Pharm. Distribution	2	68.2	0.5%
Patient Transport	2	7	0.05%
Laundry	5	1.8	0.01%
Catering	53	97.1	0.08
Total	338	216.4	1.8%
Overall Total	**467**	**1128 million**	**9.4%**

Note: This table does not include contracts for equipment maintenance which number in their thousands and account for substantial expenditures.
Differences between row figures and row totals are due to rounding.
*: Includes contracts for emergency patient transport, and home oxygen supplies.
Source: Hospital Strategy Project Consortium 1996a.

The table indicates that in 1995, government authorities let 467 contracts with a total annual value of approximately R1.13 billion per year, equivalent to 9.4% of total

hospital expenditure at that time.[3] 20% of the total expenditure was spent on 338 contracts for a broad range of non-clinical services, while the remaining 80%, equivalent to R912 million, was spent on 127 contracts for a similarly broad range of clinical services. Further examination of the contracts for non-clinical services indicates the major expenditures in this category are on catering, pharmaceutical distribution, and security services, together accounting for 92% of expenditure on non-clinical services, with the remainder being spend on a range of other services, including waste removal and cleaning, equipment maintenance, gardening services, transport and laundry services.

Table 1.1 also shows that clinical contracts were awarded for a number of different services of varying degrees of complexity. The most important category here is for hospital management services, for which there were 106 contracts, valued at R502.3 million in 1995. Other important contracts include those for pathology services and provision of blood products, while there were also a range of smaller expenditures on contracts for provision of nursing and other personnel, as well as emergency transport services and home oxygen supplies.

The hospital management services category includes the two sets of 'implicit contracts' discussed above, as well as contracts with Lifecare Special Health Services (Pty) Ltd (Lifecare), a for-profit hospital management company, which holds the three contracts reviewed in this study. Table 1.2 indicates that in 1995, Lifecare held 33 hospital management contracts, comprising a total of 15,239 beds, and covering hospitals for long term and acute psychiatric patients (10,251 beds in 15 hospitals), TB patients (3,061 beds in 8 hospitals), frail care patients (1,319 beds in 8 hospitals) and the three district hospitals (comprising 608 beds) included in this study. The contracts between the South African government authorities and Lifecare take three main forms: the first are "build, operate and transfer" contracts, in which the contractor is required to fund the building of the facility, in return for which it obtains a long term management contract, at the end of which the ownership of the facility passes back to the government. The

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3 These contracts are specifically for services rendered, and exclude all purchases of goods, supplies and equipment.

second are 'management contracts' in which the contractor manages publicly owned facilities, while the third category consists of contracts in which the contractor provides services out of its own facilities or facilities leased from a third party. 'Build operate and transfer contracts' were used in two of the hospitals studied here, while a management contract was used in the third. These two contract types are discussed in more detail in Chapter 6.

Table 1.2: Hospital management contracts held by Lifecare

	Psychiatric	TB	Frail Care	Acute District	Total
Hospitals	15	8	8	3	34
Beds	10,251	3,061	1,319	608	15,239
Value of contract (R millions)	141.3	66.2	31.7	37.7	276.9

Source: Hospital Strategy Project Consortium 1996a

These data therefore bear out the observation that selective contracting of both clinical and non-clinical services plays a vital role in the delivery of publicly funded hospital services in South Africa. Despite this long-standing and varied experience with selective contracting, and its important current and potential future role in South Africa, there has to date been no formal evaluation of the impact of contracting on efficiency or other health sector goals. In addition to contributing to international experience and understanding of these issues, this study was therefore also intended to address an important gap in the information required by policymakers in South Africa.

1.3. Research framework

This section outlines the research framework used in this study. It begins with a summary of the objectives of the study, then briefly reviews the methodology, including some background on the hospitals included in the study, and a review of the analytic

approaches used. A full description of the methodology of the study is provided in Chapter 3.

1.3.1. Study objectives

Against the background of extensive use of selective contracting in the absence of systematic evaluation of its costs and benefits, the main objective of this study was to assess the relative efficiency of contracted out[4] and directly managed public hospitals, as well as the determinants of any observed differences in efficiency. Efficiency was broadly defined here to include assessments of both unit costs, technical efficiency[5] and quality of care. On this approach, contracted out hospitals would be judged more efficient if they were able to produce services of similar quality at a lower total cost to those produced in the public sector, or services of higher quality at similar total costs. In this context, total cost to the public sector was defined to include both the contract price and any transactions costs incurred by the public sector, including costs of negotiating and monitoring the contract (see Chapter 2 for a definition and further discussion of transactions costs).

More specifically, the study aimed to:

i. Compare the production efficiency of contracted out and directly provided services, including hospital utilisation patterns, production costs and quality of care.

ii. Assess the overall efficiency of contracting out, by comparing the total costs (including the contract price, transactions costs and any other costs) faced by the public sector in contracted out versus directly managed public sector hospitals.

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4 Contracting out refers to a specific form of selective contracting, in which providers outside of government are awarded contracts. See Chapter 2 for further discussion of this and other forms of selective contracting.

5 Technical efficiency refers to the efficiency of use of inputs in the production of outputs (see Chapter 2 for a more detailed definition).

iii. Explain the impact of contracting on both production efficiency and overall contractual efficiency, and compare this with the effects of direct public sector provision, by examining the individual and collective effects of specific determinants of efficiency, including:
   - the nature of the contract and the contracting process
   - competition
   - hospital ownership and managerial motivations
   - the nature of the relationship between public purchasers and contracted hospitals, including the extent of transparency in the contractual relationship, and the extent of decentralisation of management authority
   - management structures and systems at hospital and administrative levels

iv. Determine the necessary conditions for successful implementation of selective contracting for hospital services, and the feasibility and applicability of extending these arrangements in South Africa and in other developing countries.

1.3.2. Overview of methodology

1.3.2.1. Study hospitals

At the time of the study, two former 'homeland' governments, Gazankulu and Ciskei, had let contracts with Lifecare for the provision of acute, district hospital services in three hospitals, Matikwana and Shiluvana (both in Gazankulu) and Hewu (in the Ciskei)[6], and all three of these hospitals were included in the study. These hospitals are typical, medium sized, rural district hospitals (varying in size from 170 to 250 beds), providing a range of basic medical, surgical and obstetric care to in-patients and outpatients, and functioning within the public sector rural district health system. Further details on the history and nature of the contracts in force at each hospital are provided in Chapter 6.

Each of the contracted out hospitals was matched with a public sector hospital, using size, service-mix, and geographical proximity as matching criteria. As shown in Table 1.3, the public hospitals selected were Letaba Hospital (matched with Shiluvana), and

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6 The Gazankulu homeland was incorporated into the Northern Province after the election of the new government in 1994, while the Ciskei was incorporated into the Eastern Cape Province. The study hospitals are thus now controlled by the health departments of these two provincial administrations.

Tintswalo Hospital (matched with Matikwana), both of which were also under the control of the Gazankulu government at the time of the study, and Bisho Hospital (matched with Hewu), which was under the control of the Ciskei government.[7] All three of these hospitals are also typical rural district hospitals, offering a similar range of services to the contracted out hospitals, although all are somewhat larger than the latter hospitals, varying in size from 287 to 322 beds.

As also shown in Table 1.3, each pair of hospitals was also matched with a private for-profit hospital, in order to allow additional assessment of the independent effects of ownership structure on efficiency. The selection of the matching private for-profit hospitals was based on geographical proximity only, since these hospitals differ substantially from the other hospitals in respect of service-mix. Two of the private hospitals, Pietersburg Private Hospital (matched with Shiluvana and Letaba) and Nelspruit Private Hospital (matched with Matikwana and Tintswalo) belong to one private hospital company, HospiPlan (Pty) Ltd., while the third- St. Dominics (matched with Hewu and Bisho) belongs to another, larger private hospital company, Afrox (Pty) Ltd. These hospitals are located in towns in relatively close proximity to the rural areas in which the other matched hospitals are located. All three are typical for-profit private hospitals catering to insured patients on a fee-for-service reimbursement basis, as described above. Chapter 4 provides more detail on the size, structure and patterns of service provision of the study hospitals.

Table 1.3: Study hospitals, grouped by geographic area

	Northern Province (formerly Gazankulu/ Northern Transvaal)	**Northern Province** (formerly Gazankulu/ Eastern Transvaal)	**Eastern Cape** (formerly Ciskei)
Contracted out	Shiluvana	Matikwana	Hewu
Public sector	Letaba	Tintswalo	Bisho
Private-for-profit	Pietersburg Private Hospital	Nelspruit Private Hospital	St. Dominics

7 As with the contracted out hospitals, these hospitals are now under the control of the health departments of the Northern Province (Tintswalo and Letaba) and the Eastern Cape (Bisho).

1.3.2.2. Analysis

A number of analytic approaches were used to meet the study objectives. Production efficiency was measured using a combination of detailed unit cost analysis, analysis of the costs of treating four specific tracer conditions,[8] and analysis of technical efficiency using a variety of hospital utilisation statistics, as well as Data Envelopment Analysis (DEA), a non parametric, linear programming technique. Quality of care, also a component of production efficiency, was assessed using a multidimensional approach, including evaluation of structural quality of care (SQOC), the process of nursing care, and evaluation of the outcomes of care in samples of cases of the same four tracer conditions used in the cost analysis. Total contract costs[9] were assessed using the information obtained in the cost analysis, into which contract prices and other transactions costs were incorporated. Information on the contracts, the contracting process, and other determinants of efficiency were obtained in interviews with hospital and administrative officials from the relevant hospitals, hospital companies and government departments. Full details of the methods used in each of these approaches are discussed in Chapter 3.

1.4. Structure of the thesis

Chapter Two: Literature review. This chapter reviews the recent literature on the theory and experience of marketisation reforms in developed and developing countries, with a specific focus on the applicability of these reforms to developing countries. While reviewing these reforms broadly, it focusses specifically on selective contracting since this is the focus of the empirical work undertaken here.

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8 Four tracer conditions - normal vaginal deliveries, caesarean sections, hernia repair and appendectomy cases - were included in the cost and quality of care analyses in an effort to address the problems of comparing hospitals in the face of differences in case-mix and severity. These issues are discussed further in Chapter 3.

9 Production costs refer to the total costs incurred in producing hospital services, while total contract cost refers to the total cost faced by the government in purchasing contracted hospital services, including the contract price and all transactions costs. These definitions are discussed in more detail in Chapter 3.

Chapter Three: Methodology. This chapter provides a detailed description of the methods used in the various analyses which comprise this study. Further details and methodological instruments are provided in several appendices.

Chapter Four: Results - Performance statistics, cost analysis and data envelopment analysis. The chapter begins with a brief utilisation profile of the study hospitals, followed by the results of the analysis of hospital utilisation statistics. It then presents the results of the general and tracer cost analyses, including the unit production costs, and a comparison of total contract costs with public sector production costs, as well as the results of the DEA analyses.

Chapter Five: Results - Evaluation of quality of care. This chapter presents the results of the evaluations of various aspects of quality of care. It begins with the evaluation of structural aspects of quality of care, followed by the evaluation of the quality of nursing care, and of the quality of clinical record keeping, and then presents the results of the evaluation of the outcomes of care in the tracer conditions.

Chapter Six: Results - Analysis of contracts and the contracting process. This chapter presents the results of an analysis of the contracts and the contracting process in the three contracted out hospitals, and examines the historical reasons for the emergence of different contractual models, as well as the impact of these on efficiency.

Chapter Seven: Results - Analysis of management structures and systems, and the role of hospital ownership. This chapter reports the results of the interviews which examined the management structures and systems in place in each of the groups, the impact of these on hospital efficiency, as well as the relationship between hospital ownership structures, motivations and efficiency.

Chapter Eight: Discussion. This chapter integrates the findings of the various components of this study in order to address the study's research objectives. It begins with an integrated analysis of the various components of efficiency, followed by an

analysis of the individual and combined impact of the various determinants of efficiency.

Chapter Nine: Conclusions, policy implications and research priorities. This chapter examines the key conclusions of the study in relation to the study objectives, as well as the policy implications of these conclusions, and suggests future research priorities.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

As outlined in Chapter 1, numerous developed and developing countries are currently debating or implementing reforms aimed at varying degrees of 'marketisation' of their publicly funded and operated health care systems. The ambitious and often radical nature of these reforms raises a series of questions regarding their feasibility and potential effects, the answers to which will be crucial before informed policy decisions can be taken. This literature review focusses on these questions in the context of developing countries. It begins with a discussion of the current policy context and the consequent objectives and mechanisms of these reforms. It then examines the main features of current reform initiatives, and explores in some detail their theoretical rationale and the available empirical evidence on their impact. It concludes by highlighting a number of critical questions raised by the review, some of which this study attempts to address.

Although these reforms are examined broadly, the review highlights one specific dimension of 'marketisation', namely selective contracting, which involves public sector purchasing of services from either public or private providers. This focus follows firstly from the specific empirical work undertaken for this study, and secondly, from the fact that more limited reforms such as selective contracting are more likely to be implemented in developing countries than the more comprehensive 'marketisation' reforms envisaged in developed economies (Mills 1995, Mills 1997). While most of the comments and conclusions emerging from this review may be applicable throughout the health care system, the review focusses mainly on hospital services, again due to the specific content of the empirical work undertaken in this study.

2.2. The policy context of 'marketisation' reforms

The last decade has witnessed a dramatic re-evaluation of the structure and functions of government in relation to the delivery of public services (Walsh 1995, Jackson and Price 1994, Mills 1995, Moore 1996). A central tenet of the new thinking, termed the 'new public management' (Hood 1991, Moore 1996), is that the traditional organisational form of the public sector, hierarchical bureaucracy, is inherently inefficient, and that the introduction of various market mechanisms will substantially enhance the efficiency of public service delivery. Two main schools of thought underpin this analysis: the first, property rights theory, contends that the main source of inefficiency in the public sector is the weakening of property rights, so that decision makers face few incentives to allocate resources efficiently. This is contrasted with the incentives facing entrepreneurs or shareholders in the private sector (Mills 1997). The second critique of the public sector, argued by 'public choice' theorists, is that the politicians and bureaucrats who control public bureaucracies cannot be assumed to be acting in the public interest, since they are more likely to serve their own interests, or those of powerful interest groups (Walsh 1995).

In response to these analyses, the 'new public management' envisages the use of market mechanisms to generate appropriate price and demand signals, and to effectively weaken the influence of politicians and professionals over public service delivery, thus ensuring that these services are more responsive to market signals and to customers (Walsh 1995, Jackson and Price 1994, Moore 1996). It is also argued that private organisations can bring the advantages of functional specialisation, as well as speed and flexibility in adjusting to changing factor prices, technology and demand conditions (McCombs and Christianson 1987, Mills 1997). A central theme of this thinking is thus the view of the state as being responsible for enabling or ensuring service delivery, rather than for direct delivery of services itself, except in certain identifiable circumstances (Vining and Weimer 1990, Moore 1996).

Since health care constitutes a major component of public services in most countries, it is not surprising that these new trends in public sector management have substantially

influenced health policy debates (Mills 1995, Bennett, Russell and Mills 1996). Health sector reform has also been stimulated and influenced by several important trends within health systems themselves, including often widespread inefficiencies, growing demands for the extension of consumer choice and influence, and increasing tension between limited resources and increasing demands on health care systems (Robinson and Le Grand 1995).

Over the past few decades, the health care systems of most OECD countries have achieved and maintained a relatively high degree of macro-economic efficiency, delivering comprehensive care of a reasonable standard to whole populations at relatively low cost (OECD 1992, Kings Fund Institute 1989). However, these systems are now widely perceived to exhibit both technical and allocative inefficiencies.[10] In the UK National Health Service (NHS), for example, specific problems that have been identified include lack of flexibility of local management due to over-centralisation, domination of the resource allocation process by providers, rigid control over the capital spending process and poor management information systems (Le Grand 1991, Kings Fund Institute 1989, OECD 1992, Akehurst, Brazier and Normand 1988, Enthoven 1991). Similar problems have been identified in several other OECD countries (OECD 1992, Boufford 1991).

The health care systems of most developing countries face a very similar set of problems, as well as inequities in resource distribution, poor responsiveness to the needs of users, and poor quality of care (Birdsall and James 1992, Griffin 1989, World Bank 1993, Mills 1995, Bennett, Russell and Mills 1996). Some of the causes of these problems, including rigid, overcentralised and poorly functioning bureaucracies, and domination of the health care system by medical professionals, are similar to those in developed countries. However, developing countries also face a number of unique problems, including severe shortages of skilled managerial staff and severe resource

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10 Technical or X efficiency refers to the efficiency of use of inputs in the production of outputs. A producer would be regarded as X-efficient if a maximal quantity of outputs (of given quality) are produced at a given level of inputs, or when a given output is achieved with the minimum possible quantity of inputs. Allocative efficiency refers to the overall efficiency of allocation of resources from a societal point of view. In the case of hospital services, X-efficiency would be concerned with how well the hospital does what it does, whereas questions of allocative efficiency would relate to whether the hospital ought to be doing what it is doing.

constraints, which have aggravated the problems outlined here (Mills 1995, Bennett, Russell and Mills 1996).

Further analysis of the relationship between public bureaucracies and these various problems suggests that problematic incentives faced by various agents within the health sector play a key role. Some of these are inherent in the large bureaucracies that characterise public health systems, which undermine management autonomy, responsibility and accountability, and create a profound lack of information and transparency of information (OECD 1992, Saltman and von Otter 1992, Mills 1995, Bennett, Russell and Mills 1996). Others are attributable to methods of reimbursement, such as salaries, which are common to several public health systems (Ron, Abel-Smith and Tamburi 1990, Bodenheimer 1993).

A subset of these incentive problems are, however, specific to the integration of the functions of financing and provision of health services within large public monopolies. One major consequence of this arrangement is a lack of awareness of the resource implications of allocation and consumption decisions, and a consequent failure to use explicit efficiency criteria in making such decisions. On the financing side, this leads to resources being allocated to provider institutions on the basis of historically determined global budgets, rather than on the basis of explicit efficiency criteria such as the needs of the population served and/or the costs of provision. Similarly, providers face few incentives to focus on efficient production, since the use of global budgeting systems encourages managers to focus on the use of inputs, rather than on efficient production of outputs (OECD 1992, Barnum and Kutzin 1993, Newbrander, Barnum and Kutzin 1992). This budgeting system may also create an `efficiency trap', in which efficient hospitals are penalised for their efficiency through reductions in subsequent budgets.

These problems are often aggravated by the dominance of health professionals who seldom use explicit efficiency criteria in the hospital resource allocation process (Enthoven 1991, Culyer 1990, Mills 1995). The existence of a monopoly situation on the provider side may itself aggravate inefficiency, even in the absence of a profit motive. In this case, the lack of financial pressure gives clinicians or managers the

'managerial slack' to take utility maximising decisions which may unnecessarily increase costs. Examples would be expenditure on high technology equipment or buildings for their prestige value (Culyer 1990).

While these causes of inefficiency have characterised public health systems in developed and developing countries for some decades, environmental factors of more recent origin have aggravated their effects. These include increased demand pressure on the health services, resulting from a combination of demographic and epidemiological change, technological progress and changes in perceptions and expectations of public services (Saltman and von Otter 1992, Frenk 1993, Lewis, Sulvetta and La Forgia 1991), and increasingly severe financial resource constraints. As will be obvious, the balance and significance of these factors differs between developed and developing countries. In the latter case, the increased demand problems posed by the emerging epidemiological and demographic transition are of particular relevance (Omran 1971, Mosely, Jamison and Henderson 1990), as are the resource constraints imposed by poor economic growth and the introduction of macro economic stabilisation policies in several countries (Lee 1991, Sahn and Bernier 1993, Bennett, Russell and Mills 1996). In many developing countries, these problems have been aggravated by poor governance, including unstable political environments and the lack of an effective legal and regulatory framework (Bennett, Russell and Mills 1996).

2.3. Objectives and mechanisms of reform

While there have been diverse responses to these various problems, it is nevertheless possible to identify a number of common objectives and mechanisms in most health care reform initiatives. A critical common feature is the desire to address the multiple problems identified here while still retaining the perceived efficiency and equity advantages of public health systems, including maintenance of tight central control over global expenditure, provision of universal access to care, and maintenance of a central role for public policy in determination of need and resource allocation (OECD 1992, von Otter and Saltman 1992). A key consequence of these multiple commitments has

been the perception that there should be a maintenance or assumption of public monopoly of the *financing* of health care while the *provision* of services might be made more efficient through exposure to some element of market forces (Culyer 1990, Chernichovsky 1993, Chernichovsky 1995).

The efficiency and equity arguments for retaining a public monopoly of health care financing have been well rehearsed (Culyer 1990, Bennett 1991), and will only be briefly summarised here.[11] From an efficiency perspective, public monopoly facilitates efficient resource allocation by overcoming the problems of individual consumer ignorance, by allocating sufficient resources to the production of public goods, and by ensuring that resources are allocated in accordance with public policy, rather than on the basis of willingness or ability to pay, or other criteria. It also facilitates the attainment of efficiency through overall control of expenditures, the achievement of lower costs through monopsonistic purchasing power, and economies of scale in administration, as well as generally lower administration costs than in the case of multiple insurance or other financing agencies (Bodenheimer 1993, Abel-Smith 1985, Evans 1986). Public monopoly of finance also safeguards equitable resource allocation, again by ensuring that such allocations are determined by public policy, and by avoiding adverse selection and other risk selection failures inherent in private health insurance markets (Culyer 1990).

In light of these arguments, it is not surprising that that there is a strong consensus that 'marketisation' reforms have much greater potential as an allocation mechanism on the provider side of the health care system (Saltman 1994, Saltman and von Otter 1996), and that of 25 OECD countries currently experimenting with health care reform, only the United States and the Netherlands have focussed efforts on introducing competition on the financing side of the system (Saltman 1995). There is also mounting evidence that Dutch efforts to create managed competition within the health insurance market

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[11] While maintenance of public financing has been a common theme in most reforms, its virtues are still the subject of some debate, with some economists arguing that public finance should be restricted to the funding of public and quasi-public goods only (Birdsall and James 1992).

have been unsuccessful, and that they are having negative consequences for equity and in other areas (de Roo 1995).

Within the broad constraints of a public monopoly of financing, a second critical objective is to change the incentive structures for key actors in the health care system. In this context, a key mechanism is the creation of a split between purchasers and providers of health care, and the establishment of some form of contractual relations between these two entities. The basic model underlying most initiatives thus comprises a public or quasi public (e.g. social or national health insurance) agency acting as a purchaser of health services, the contracts for which are awarded to a range of providers, with or without some element of competition. This replacement of hierarchy with a network of contractual relations between purchasers and providers is argued to meet the objective of altered incentive structures in various ways: firstly, politicians and political influence are removed from the process of producing health services. This allows managers on the provider side to focus on producing efficiently without undue interference from the political level, while also allowing politicians to focus on their tasks of setting policy and strategy, and to incorporate a diverse range of interests in doing so. Several reform proposals go further in enhancing the autonomy of management at provider level, for example through the creation of fully independent hospitals under the control of Boards of Trustees, as with hospital trusts in the UK NHS reforms (Smee 1995).

Secondly, the problems of provider domination of the resource allocation process are addressed by the increased power of purchasers in the system (Saltman and von Otter 1996). Thirdly, the establishment of contractual relations, with or without provider competition, is argued to force purchasers to be explicit in their resource allocation decisions, as well as to force providers to respond to explicit goals and targets, thus introducing transparency into the resource allocation process (Culyer 1990, Bennett, Russell and Mills 1996).

Interestingly, Robinson and Le Grand (1995) argue that the purchaser-provider split can be seen as a mechanism to resolve two conflicting imperatives of health care reform - the decentralisation of authority to lower levels of the system, and the need for increased

central control to enhance efficiency, both of which are themselves responses to the increasing tension between limited resources and a more demanding public. In a developing country context, an additional objective of these reforms in some countries is to draw private providers into the provision of publicly funded services, thus overcoming supply constraints in some areas (Bennett and Ngalande-Banda 1994, Kutzin 1995, Department of Health, Republic of South Africa 1996).

The analytic similarity of most reform initiatives notwithstanding, it is important to recognise that variations in structural details may be critical. Variations in factors such as which subsectors are exposed to competition, the nature of incentive structures and systems of monitoring and control may produce substantially different models, with different effects on efficiency and other parameters (von Otter and Saltman 1992). von Otter and Saltman (1991, 1992) have suggested some useful distinctions which capture some of these variations. One of these is the balance between market competition and regulation. Most proposals fall somewhere between what they term `planned' and `regulated' markets. `Planned' markets involve the relatively limited use of market mechanisms within a framework of public financing and production of health services. Constraints on the market might cover exclusion of private providers, and reliance on non price mechanisms to balance supply and demand. In `regulated' markets, on the other hand, greater reliance is placed on market mechanisms, with government regulation imposed only in order to prevent recognised market failures. Here, the market may be opened to private providers, and the price mechanism is a critical tool for balancing supply and demand.

Another distinction is based on the source of power in the resource allocation process. In one model (termed `manager led'), power resides with a purchasing agency mandated to purchase care from competing providers on behalf of the populations they represent. This model thus implies an explicit trading relationship between the financing/purchasing agency and providers. In a second model (`patient led'), patients have the power over resource allocation since they make choices among providers competing for public market share, with financial allocations following patients. In this

model, there is no explicit trading between public purchasers and providers, and purchasers play a passive role.

This variable range of proposals and programmes has been accompanied by a range of overlapping terminology. Le Grand (1991) uses the term 'quasi-markets' to capture the fact that while market forces have replaced bureaucratic allocation mechanisms, there remain crucial supply and demand side deviations from normal market mechanisms. Other terms include, 'managed competition' (Enthoven 1991, Enthoven 1988), 'provider markets', and 'internal markets'. This review will use the more general term 'marketisation' to cover the full spectrum of reforms under discussion here.

2.4. The theory of 'marketisation' reforms

Proponents of 'marketisation' reforms argue that they will address most of the problems outlined above, and specifically that they will enhance efficiency, and consumer choice and influence over health services. This section reviews the theoretical arguments behind these broad claims, and then evaluates the available empirical evidence. It focuses particularly on issues of efficiency, with equity issues being explored to a more limited extent.

Analysis of the efficiency arguments for 'marketisation' reforms reveals three distinct, though linked claims. The first is that the replacement of direct, hierarchical management structures by contractual relationships between purchasers and providers will promote increased transparency of prices, quantities and quality in trading, as well as managerial decentralisation, both of which will enhance efficiency. The second is that these reforms will promote increased competition among providers, and that the increased level of competition will in turn enhance supply side efficiency. The third, usually implicit, claim is that the overall benefits of these reforms will outweigh the potentially substantial costs involved in their creation and maintenance.

2.4.1. Contracting and efficiency

Public sector contracting for the provision of health services may take several forms (Walsh 1995, Bennett, Russell and Mills 1996, Mills 1995). Contracts may be awarded competitively, or through direct negotiation with designated providers. In addition, contracts may be open to different types of bidders: 'internal contracting' refers to contracts between public purchasers and public providers only, as occurs in the UK internal market. This term is also applicable to the introduction of explicit 'performance contracts' on a non-competitive basis between government authorities and autonomous public hospitals, a policy which is currently being debated and/or implemented in many developing countries (McPake 1996, Bennett, Russell and Mills 1996, Cassels 1995, Mills 1997). 'Competitive tendering' (or market testing) differs from internal contracting, in that it opens up competition for the contract to both private and public providers, while 'contracting out' refers specifically to the use of private providers.

'Contracting out' itself may take several forms (Mills 1995, Bennett, Russell and Mills 1996): contracts may be with for-profit or not-for-profit providers, and they may be let for clinical or non-clinical support services; variations are also based on the extent of the provider market envisaged, which may range from the development of a comprehensive provider market, at one extreme, to the more limited application of selective contracts for designated services, on the other. Variations may also be based on the ownership of the assets involved in service delivery. For example, the hospital may remain in public ownership, in which case a hospital management contract would be let, or the assets may be owned by the private providers. Alternatively, 'build, operate and transfer' contracts, as described above, may be used.

Contracting by the public sector is argued to impact on efficiency in two main ways: firstly, through the incentive effects of the contract, and secondly, by promoting transparency in trading, and decentralisation of managerial responsibility. Although these factors are closely related to one another, they are discussed separately here for purposes of clarity.

2.4.1.1. The incentive structure of contracts

There is an extensive literature on the theory of contracts, and of particular relevance here, on the 'principal-agent' problem (Ross 1973, Stiglitz 1989, Harris and Raviv 1979, Hart 1989, Lazear 1989, Guesneri 1989, Ledyard 1989). This refers to the design of compensation mechanisms (contracts) which will induce an employee (the 'agent') to act in the interests of the employer (the principal), when the principal has imperfect information about the actions of the agent. Imperfect information can take several forms: it may concern actions of the agent which are not observable by the principal (hidden actions), or knowledge available to the agent, but not the principal (hidden knowledge), such that even where the agent's actions could be observed, the principal may not be in a position to know whether these are appropriate. Finally, even where the principal has sufficient information to observe and interpret the agent's actions, these may still not be verifiable by an outside party, such as a court of law, thus rendering disputes hard to resolve (Guesneri 1989, Stiglitz 1989). Since payoffs to principals and agents are different, agents are likely to exploit these information problems for their own advantage. Information problems thus allow for opportunism on the part of agents, and the central focus of 'principal-agent' theory is thus the design of contracts which will minimise such opportunism, and maximise the extent to which the principals interests are satisfied. Such contracts have been termed 'incentive compatible' (Ledyard 1989).

Public purchasers of health services, and particularly hospital services, face all three types of imperfect information outlined here, since the quantity and quality of outputs are usually difficult to observe, interpret and verify (Akehurst, Brazier and Normand 1988, Culyer, Maynard and Posnett 1990, Tatchell 1983, Soderlund 1993). As a result, such purchasers face serious problems of potential opportunism by profit (or quality or quantity) maximising providers (Bartlett 1991, Propper 1992b). Under these circumstances, purchasers[12] may adopt different contractual strategies aimed at minimising opportunism and thus maximising provider efficiency (Propper 1992b). One

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12 For the purposes of this discussion, purchasers are assumed to be concerned with maximising the quantity of services purchased within a fixed budget, and to be significantly concerned about the quality of those services.

is to attempt to specify contracts as completely as possible, although the complexity of health care services suggests that this would be extremely difficult to achieve with any accuracy (Walsh 1995, Robinson and Le Grand 1995). Another is to undertake detailed monitoring of provider compliance with all aspects of the contract, although this would again be both difficult and costly to achieve in the health care setting because of the complexity of the services involved. Both of these strategies therefore imply high transactions costs (the costs involved in writing contracts, and in monitoring their implementation) for both purchasers and providers. Aside from causing substantial system-wide inefficiency (and potentially undermining the efficiency gains from contracting), high transactions costs may also reduce the number of providers (and especially small providers) willing to bid for contracts, since most of these would be unable to sustain the transactions costs involved.

Purchasers may also rely on a range of other mechanisms to ensure contractor compliance, although none of these are entirely satisfactory, and in practice, various combinations are generally applied (Walsh 1995). For example, contractors could post performance bonds or guarantees, although it is unlikely that these would compensate a public purchaser for poor performance by a contractor. Purchasers could also attempt to ensure that contractors have a good reputation which is at risk if compliance is poor, and/or that contractors share similar values to those of the purchaser (although this is likely to occur only where not-for-profit contractors are involved). Finally, purchasers may resort to the sanctions specified in the contract, although this route too is fraught with difficulty. For example, it may be rational for a contractor to accept a financial penalty since this may be 'cheaper' than full compliance; it may also be difficult to ascertain the level of damages suffered by the purchaser and to prove liability, and the costs of litigation or of administering penalties may be very high. Experience in the UK and the US also demonstrates that purchasers are reluctant to terminate contracts because of the additional expenditure and effort involved in re-letting the contract (Walsh 1995).

There are thus trade-offs between constraining provider opportunism, transactions costs and the maintenance of an adequate level of competitive bidding, and efficient contracts

will contain incentives which provide a balance between these factors. Mechanisms open to purchasers in seeking this balance include choices over which services to contract out, the mechanics of the bidding process, and the design of the contract itself (Propper 1992b).

The appropriate design of contracts will vary with the contractual situation, and will depend on a number of factors, the most important of which are the *distribution of risk* in the transaction between purchasers and providers, and the *attitudes of the two parties to risk* (Propper 1992b, McAfee and McMillan 1988). For purchasers, the major determinants of risk are the predictability of total costs and the observability of quality of care. For providers, on the other hand, major determinants are the predictability of costs, and the extent to which revenue can be guaranteed (Bartlett 1991, Propper 1992b). From the purchaser's perspective, therefore, the ideal contract would place the provider at some financial risk (thus ensuring attention to productive efficiency), while also ensuring that adequate attention is paid to quality of care.

One of the key elements of contract design is therefore the reimbursement mechanism employed. Retrospective reimbursement at full cost (as occurs in fee-for-service payment) places full risk on the purchaser (who has to meet all costs, without being able to predict these in total) and none on the provider (who is guaranteed a return above full costs). Prospective payment systems, on the other hand, place varying degrees of risk on the provider as well as the purchaser. The use of a fixed fee per case, or per patient day, for example, allows purchasers to predict total costs to some extent, and places providers at risk of financial losses should costs overrun those fixed by the contract (Propper 1992b, Donaldson and Gerard 1993).

Other factors affecting the distribution of risk include the scale of investment required on the part of providers, the duration of the contract, the process of contract review and renewal, the nature of services for which contracts are let, and the method of contract specification (Propper 1992b, Bartlett 1991, Walsh 1995, Mills 1997). Providers face greater risks when they are required to make substantial capital investments in order to participate in the contract, particularly when there is asset specificity (i.e. assets have

only one specific use), as is the case with hospital services. These risks could be reduced by breaking up the contract into several smaller ones, each requiring smaller investments by providers. This might also have the advantage of increasing the number of small bidders competing for the contract. However, it would also substantially increase transactions costs for the purchaser. An alternative method of reducing the scale of the investment risk for providers is through the use of asset leasing contracts, in which public sector assets are effectively leased to private providers. This is the nature of the contract used in the self-governing trust hospitals in the UK (Propper 1992b). Another advantage of this approach is that efficiency can be increased through competitive bidding for management contracts, in which inefficient managers can be replaced at the next round. The disadvantage of this approach is that the scope and distribution of contracted services are limited by the availability of public sector hospitals.

Investment risk to providers could also be reduced by offering longer contract periods, and/or by undertaking less frequent and less stringent performance reviews. In these situations, providers would be assured of a longer period of returns on their investment prior to a further bidding round, and would face lower transactions costs in meeting review requirements. Purchasers would also incur lower transactions costs, but they would also face increased risks of poor quality, coupled with delays in terminating contracts of poorly performing providers. The limitation of contract scope, for example, to those services with more predictable costs, and in which output quality was relatively easily observable would reduce risk for both purchasers and for providers. This is likely to be rare for most hospital services, although chronic care services meet these requirements to some extent.

Finally, purchasers have the option of specifying contracts in terms of specific outcomes required, or less specifically, in terms of activities or outputs to be undertaken or produced, or in terms of methods or inputs to be used (Walsh 1995). In the health care setting, contracts are very unlikely to be based on detailed specification of outcomes, because of the difficulty of specifying and measuring these, and because this would substantially shift risk to the contractor.

The responses of both parties to a contract will depend on their attitudes to risk. Much of the literature assumes that government purchasers are risk neutral (since they are large, and capable of risk spreading), and that providers are risk averse (Propper 1992b, McAfee and McMillan 1988). If this were the case, the number of bidders could clearly be increased by a contract design which distributed all or most of the risk to the purchaser. This would have the effect of increasing competition, which would itself countervail the tendency towards opportunism (McAfee and McMillan 1988). Propper (1992b) however argues that the assumption of risk-neutral government purchasers in the health sector is incorrect in many cases, and cites the UK NHS, in which District Health Authorities (DHAs) operate on a decentralised (and limited) budget, and are held politically accountable, rendering them risk averse. Walsh (1995) corroborates this view, citing evidence from contracts for social services in the UK, in which risk averse government purchasers have insisted on tightly specified, fixed price contracts, which have resulted in them paying higher than efficient prices. In a managed health care market, both purchasers and providers are likely to be risk averse to some extent, with providers likely to be somewhat more so. In these circumstances, contracts which share risks will be most efficient.

The complexities of efficient contract design are well illustrated by the different forms of contract currently utilised within the UK NHS. In the early years of the NHS reforms, the majority of contracts were `block contracts', in which purchasers paid hospitals a fixed annual fee, in return for which the hospital agrees to provide access to a defined range of services for all those within the purchaser's district. Despite substantial efforts to specify detailed block contracts, these are necessarily incomplete and therefore open to opportunism. They also pose a high degree of risk to the provider, since levels of demand are hard to predict. Although this provides an incentive for efficient performance, it may deter risk averse providers from entering into the contract without the payment of some premium to cover the risk.

'Cost per case' contracts involve payment of a specified amount for particular cases, and are used for cases not covered by block contracts. While these involve more detailed

specification than block contracts, they remain incomplete to some extent, and information asymmetry still allows for some degree of provider opportunism. This form of contract also involves a substantial shift of risk to the purchaser, since it is difficult to predict the total volume of services that will be demanded, and therefore total costs to the purchaser, while the provider is assured of having all costs met plus a margin above this (Bartlett 1991). These forms of contract have now largely been replaced by so called 'sophisticated block contracts', which link activity and unit prices, based on projections of both. In this case, departures from target activity levels trigger defined actions, such as data validation or re-negotiation, and the risks of higher than planned activities are shared between both parties (Raftery, Robinson, Mulligan *et al.* 1996).

This analysis of the application of contracting in the health care setting clearly illustrates the complexity of ensuring efficient contractor performance, while at the same time minimising transactions costs. In response to this, several analysts have applied Williamson's (1985) analysis of markets and hierarchies to address the fundamental question of whether a contract based market structure is in fact the appropriate organisational form for the health sector (Bartlett 1991, Robinson and Le Grand 1995). Williamson (1985) argued that under conditions of uncertainty, bounded rationality, opportunism, asset specificity and small numbers, transactions costs may be so high that market transactions may become inherently inefficient, and that internalisation of transactions within some form of hierarchy may be more efficient. Several authors have argued that most of these conditions do apply to public sector contracting for health services, suggesting that an extensive, contract-based market in health care may incur such high transactions cost as to be less efficient than existing public sector bureaucracies (Robinson and Le Grand 1995, Walsh 1995, Bartlett 1991, Raftery, Robinson, Mulligan *et al.* 1996).

The inappropriateness of both classical markets and hierarchies to management of public services, including health care, has led to arguments for a shift towards an alternative contracting model, which relies on long term, trust based relationships captured in what are termed 'soft' or 'relational' contracts (Walsh 1995, Raftery, Robinson, Mulligan *et al.* 1996, Robinson and Le Grand 1995, Saltman and von Otter

1995). This approach recognises that the relationship between the contracting parties is an 'iterative game' in which contracts involve a sharing of rights, duties and obligations, and in which both parties share the same fate.[13] Since trust is higher under these circumstances, the risks of opportunism are substantially reduced, as is the need for detailed contract specification and monitoring (Stiglitz 1989). As a result, transactions costs are substantially reduced. Long term, trust based contracts also have the advantage of being self-enforcing, thus overcoming the problems of relying on the courts or other sanctions to enforce compliance (Walsh 1995). Taken together, these arguments suggest that relational contracts of this kind may be the ideal way to find the appropriate balance between market forces and administrative methods in ensuring contractor compliance (Saltman and von Otter 1996, Annel 1995).

There is in fact fairly extensive evidence that relationships of this kind do emerge in contracts for social and health care services, corroborating these theoretical analyses. An analysis of several contracts for social services in the US found clear evidence of the emergence of long term relationships, the consequent decline of competitive bidding, and a decreasing importance of price as a criterion of contract allocation after the initial contract round (Propper 1992b, McCall 1987). More specifically, in the case of human services, the evidence suggests that incumbent contract holders win most renewed contracts, with renewal often being automatic, and with new entrants competing only for new contracts (Propper 1992b, Schlesinger, Dorwart and Pulice 1986, DeHoog 1985). Similar patterns have been observed in the process of selective contracting for hospital services in the states of California and Arizona in the US (Propper 1992b, McCall 1987).

There is also evidence of increasing reliance on long term 'soft contracts' in several of the OECD health care systems in which these reforms have been implemented (Saltman and von Otter 1995). In the UK, for example, there is now fairly strong evidence that active competition is being supplanted by long term, co-operative relationships, as a result of geographic monopolies, high transactions costs, and the instability and

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13 By contrast, 'discrete contracts' involve an instantaneous and once-off exchange of rights and obligations, with no ongoing relationship.

problems caused by market forces (Ham 1996a, Raftery, Robinson, Mulligan *et al.* 1996). This is well illustrated by the increasing dominance of the 'sophisticated block contract' described above, which is a good example of a relational contract, since it does not specify contract terms in great detail, instead relying on *ex post* collaboration and continuing negotiation between the parties to ensure a mutually satisfactory outcome (Raftery, Robinson, Mulligan *et al.* 1996). These developments parallel those in the private sector, in which there are numerous and increasing instances of long-term, co-operative relationships between purchasers and suppliers (Walsh 1995). Interestingly, recent evidence from the UK also suggests the emergence of some elements of 'spot purchasing' by GP fundholders, although this is argued to pose a risk of fragmentation of the market (Ham 1996b).

While long term 'relational contracting' appears to address several of the problems created by discrete or 'hard contracts' within a market environment, it has certain requirements for success, and also raises further problems of its own. Firstly, this approach requires an appropriate context or social framework in which socially sanctioned behavioural norms and standards of conduct apply. Without this environment, it will be difficult for purchasers to trust providers sufficiently to enter into this form of contract (Walsh 1995). Critically, this approach to contracting also has the potential to undermine the advantages sought from a competitive bidding process, and risks creating either monopolistic or duopolistic competition, and dependency on a single provider (Propper 1992b, Robinson and Le Grand 1995). In this situation, the supplier will no longer face incentives to perform efficiently, and may return to exploiting the contract.

In response to these problems, it has been argued that contestability, the threat of market entry, rather than actual competition, should ensure efficient performance by the contractor (Baumol, Panzar and Willig 1982, Culyer 1990, Robinson and Le Grand 1995, Ham 1996a). On this argument, competition occurs 'for the market' at the periodic re-negotiation of the contract, rather than on a continuous basis 'within the market' (Robinson and Le Grand 1995). In this situation, contestability requires the real threat that the incumbent contractor will be replaced at the next round, should

performance be sub-optimal, or should a more efficient bidder emerge (Ham 1996a). There are however substantial capital barriers to entry into the market, particularly in the case of hospital services, and these might undermine the potential contestability of the market. Robinson and Le Grand (1995) argue that this specific problem can be addressed through the use of hospital management contracts, in which the assets remain in public ownership, although this solution assumes an adequate supply of hospital management capacity to create competition, which may not always be the case. Despite these concerns, a recent survey of contracting patterns among DHAs in the UK NHS showed that each authority has an average of 3.6 main contracts, suggesting a fairly substantial degree of contestability within the market (Raftery, Robinson, Mulligan *et al.* 1996). Issues relating to hospital competition and its effects on efficiency are discussed in more detail below.

The reliance on contestability rather than competition also raises questions as to price setting and quality regulation within the market. Where active competitive bidding occurs at regular intervals, market prices should be efficient, and the threat of competition should ensure adequate quality standards. In the absence of competition, and particularly in the face of monopoly supply, it will however be more difficult to be sure that prices and quality standards are at efficient levels. This suggests that some form of public regulation will still be required to ensure efficiency. In this situation, Robinson and Le Grand (1995) suggest that some form of 'yardstick competition' could be used as a key regulatory mechanism. This might take the form of regulating prices in line with the industry average (or some other norm), encouraging contractors to produce more efficiently than the norm. Such an approach also suffers problems, however, including the fact that contractors may face special problems (or may argue that they do), the potential for collusion, and the risk that quality will decline as contractors maximise profits in a fixed price environment.

Over and above the fundamental problem of balancing incentives for efficiency and transactions costs, some analysts have pointed to a further set of problems emerging from the complex networks of contractual relations found in some of the more comprehensive 'marketisation' reforms. Walsh (1995), for example, argues that the

nexus of contracts required to ensure efficient delivery of complex public services may be so detailed and complex that it comes to resemble an hierarchical system in its functioning. Similarly, Propper (1995) argues that the UK internal market is currently characterised by multiple, overlapping principal-agent relationships, in which ownership of assets and the rewards accruing from them are not clear, resulting in lack of clarity and a weakening of efficiency incentives.

2.4.1.2 Contracting and transparency in trading

In addition to its incentive effects, contracting has been argued to enhance hospital efficiency through increased transparency in prices, quantities and quality of services (Culyer, Maynard and Posnett 1990, Maynard 1991). In theory, increased transparency should apply on both the purchaser and the provider side of the market. On this view, purchasers are expected to take greater account of prices, quality, and other value for money criteria (as well as population need) than would a financing authority that simply allocated annual budgets to directly managed providers. Similarly, providers having to compete for contracts are more likely to be aware of input-output relationships, costs, prices and quality than would directly managed providers operating within a fixed budget.

Information problems may, however, pose substantial obstacles to these theoretical benefits of contracting. Existing information may be inadequate to promote efficient trading (and may even worsen the efficiency of resource allocation), and the transactions costs of obtaining the necessary level of information may be prohibitive. The difficulties of assessing hospital output have already been discussed, and most health care purchasers and providers in non market systems also have little information on costs and prices.

There is some debate as to the level of accuracy in pricing that is necessary to enable trading to proceed. In the context of the NHS reforms, for example, it has been argued that broad estimates of prices are sufficient to allow trade, and that, in any event, the

introduction of trading will generate increasingly accurate cost and price information over time (Robinson 1990). However, where prices do not accurately reflect the opportunity costs of resource use, trading may in fact produce distortions in resource allocation (Robinson 1990). There are several reasons, in addition to lack of information, which suggest that hospital prices will deviate from the true opportunity costs of the resources consumed in producing their outputs. These include general problems of market failure, such as externalities and monopoly or oligopoly in the hospital sector (see below). These latter problems suggest that hospitals in a market environment may therefore be able to set prices above efficient levels, necessitating the use of a range of price control mechanisms, such as yardstick competition discussed above, although these mechanisms themselves have high transactions costs (Robinson 1990, Ferguson and Posnett 1990). As argued above, health care markets appear to be characterised by a tendency towards long term purchaser-provider relationships rather than repeated rounds of competitive bidding, and this trend also undermines the claim of increased transparency of trading in a contract based system .

These arguments suggest that it may not be accurate to isolate transparency of trading *per se* as an independent cause of increased efficiency within health care markets. Instead, it is arguable that the beneficial effects of transparency are themselves contingent on a range of the necessary conditions for efficient markets (Propper 1992a). On this point, Sappington and Stiglitz (1988) argue that decentralised production of welfare services will only be more efficient than direct government production under specific conditions, including competition between suppliers, definable outputs for which consumer valuations are derivable, and relatively low transactions costs in determining what is being produced. As has been argued above, it is not clear that managed health care markets meet these conditions.

As with several of the other issues discussed in this review, there remains relatively limited empirical evidence on these issues. In the context of the UK NHS reforms, there is some evidence that the introduction of the internal market has brought about substantial changes in both purchaser and provider behaviour, many of which can be regarded as contributing to increased transparency (Ham and Heginbotham 1991, Kings

Fund College 1993, Appleby, Little, Ranade *et al.* 1992, Ham 1992, Bartlett and Le Grand 1994, Ham 1996a, Ham 1996b). On the purchaser side, this includes increased efforts to translate concepts of health gain into feasible purchasing strategies, requiring information on costs, quality and effectiveness of services, as well as population needs. Provider behaviour has also seen substantial changes as hospitals have had to attach prices (and hence costs) to their outputs. Bartlett and Le Grand (1994) argue that these changes have been more profound in the case of hospital providers, with purchasers lagging behind. Other data however suggests that transparency of trading remains somewhat limited since purchasers continue to have relatively poor access to accurate information on costs and patient flows, and that as a consequence, purchasing remains relatively unsophisticated (Mills 1995, Walsh 1995).

2.4.1.3. Contracting and decentralisation of managerial authority

Simple decentralisation of managerial authority from the centre to the provider level, without the introduction of purchaser-provider contracts, has been a central feature of health care reforms in both developed and developing countries over the past few decades (Mills 1990c, Bennett, Russell and Mills 1996, Kutzin 1995, McPake 1996, Walsh 1995, Mills 1995, Barnum and Kutzin 1993, World Bank 1994). The main arguments in favour of decentralisation of authority are that managers with the appropriate levels of authority and power will act more efficiently, since they will have a better understanding of local needs and local factor costs, and freed of bureaucratic restrictions, they will be more likely to innovate, and to adapt to local conditions (Smee 1995). Despite substantial experience with these reforms, Mills (1995) notes that it remain unclear what conditions and actions are required to ensure success, and points out several obstacles to the success of these measures, including government reluctance to hand over control, the risk that lines of authority become blurred, and increased informational and administrative requirements. One general lesson which has emerged is that decentralisation of specific sets of powers without substantial changes in the power relations between the provider level and the centre tend to be ineffective, with the

intended provider autonomy often being subverted by the centre (Bennett, Russell and Mills 1996, Walsh 1995).

In this context, the introduction of a formal purchaser-provider split and contractual relations can be seen as genuinely shifting a significant level of authority to providers, and thus as providing the basis for increased provider efficiency. Walsh (1995) argues that in the UK NHS reforms, the establishment of full Trust status for hospitals was a necessary condition for real decentralisation of authority, and that without this, the reforms would have been ineffective. In reviewing the experience of the UK hospital Trusts thus far, Smee (1995) observes that Trusts appear to have made only limited use of their increased freedom to set local employment conditions and to manage their human resources, although there is evidence of more efficient use of capital resources, as well as substantial experimentation and change in management structures, and in the range and quality of services offered. Importantly, he also argues that Ministers and the NHS Executive have found it difficult to reconcile devolved authority with the demands of parliament and the media, and have consequently been drawn into a range of operational issues.

In the context of developing countries, the decentralisation of management authority has taken the form of the granting of autonomy to selected public hospitals, sometimes accompanied by the introduction of 'performance contracts' between the government and the hospitals (Mills 1995, Bennett, Russell and Mills 1996, McPake 1996). A study from Tunisia suggests some efficiency gains from these measures (World Bank 1993), but there remains very limited evidence as to the general impact of these reforms (Mills 1995). Where contracts are with private providers, as occurs in the UK (Raftery, Robinson, Mulligan *et al.* 1996), the US (Walsh 1995), as well as in many developing countries (Green 1987, Gilson, Dave Sen, Mohammed *et al.* 1994, Hospital Strategy Project Consortium 1996a), providers inherently have a much higher degree of managerial authority, and it would be useful to compare the performance of these providers with those of publicly owned contractors. The very limited evidence on this issue is discussed further in the section on hospital ownership and efficiency below.

2.4.2. Competition and efficiency

As discussed above, competition, or at least contestability, appears to be a necessary condition for the achievement of efficiency gains through contracting. In fact, competition on the provider side of the health care system is more broadly considered to be a central feature of 'marketisation' reforms, on which much of the claims of increased efficiency are based. In theory, increased competition between providers is argued to increase technical efficiency on the supply side, and through that, allocative efficiency within the system. Whether or not this can be achieved will depend on two distinct questions; firstly, whether it is in fact possible to create and sustain provider competition; and secondly, whether such competition actually does enhance provider efficiency. These questions are examined in the following sections, with specific reference to hospitals, rather than to the PHC component of health care systems.

2.4.2.1. Can marketisation create and sustain hospital competition?

The question of whether and how hospital competition can be created and sustained may be examined from both a theoretical and an empirical perspective. In theoretical terms, one approach is to examine the conditions pertaining in the market, and to assess these against the theoretical requirements for competition. From an empirical point of view, it is possible to assess the presence and extent of hospital competition, provided that the relevant markets can be satisfactorily defined, and that the necessary data are available.

The theoretical requirements for perfect competition are strenuous, and include the presence of fully informed, utility maximising consumers, numerous profit maximising providers, and freedom of entry to, and exit from the market. The evidence suggests that, with some exceptions, these are unlikely to be met within most public, or even private hospital sectors, nor within health systems more generally (Donaldson and Gerard 1993, McGuire, Henderson and Mooney 1988, Bennett 1991). Consumers of health care (whether individuals or collective purchasers) seldom possess complete

information, and face prohibitive search costs in obtaining relevant information. This is particularly pertinent in the case of hospital services, in which the quality of output is very difficult to observe (Propper 1992b). This creates a significant asymmetry of information between purchaser and providers, which interferes with the emergence of competition (as well as with other aspects of market functioning) in several ways. The information advantage may allow hospitals to reduce competition by segmenting the market through product differentiation (Light 1992, McLaughlin 1988). As noted above, the high level of uncertainty on the part of purchasers also means that it is in their interests to enter into long term fixed relationships with one more providers, further undermining competitive pressures.

Competition between hospitals is also limited by constraints on entry to and exit from the market. Entry is constrained by high start up costs and sunk costs, as well as regulatory barriers, while a range of non-market, political pressures and concerns with continuity of care and accessibility may prevent hospital closure, even where market conditions suggest that this should occur (Culyer 1990, Maynard 1991, Akehurst, Brazier and Normand 1988, McPake and Ngalande Banda 1994). These barriers to entry and exit might in theory be overcome by the exploitation of existing spare capacity in the hospital sector, by the creation of additional capacity, or by switching other capital assets to and from hospital production. In most countries, however, these are only theoretical solutions, since hospital systems do not often have significant spare capacity, except in some limited areas (Akehurst, Brazier and Normand 1988, Culyer, Maynard and Posnett 1990), and the high degree of asset specificity of most hospitals prevents the switching of assets to and from hospital production.

It is also widely accepted that a certain minimum size is required for hospital viability, and in addition, hospitals are likely to enjoy geographical monopolies, particularly outside densely populated urban areas (McPake and Ngalande Banda 1994, Akehurst, Brazier and Normand 1988, Culyer, Maynard and Posnett 1990). All of these factors tend to favour the emergence of monopoly, or forms of monopolistic or oligopolistic competition, rather than perfect competition, between hospitals in most countries (Propper 1992b). In attempts to contain costs and to constrain the negative effects of

monopoly power in the hospital sector, government regulations, including licensing requirements and price controls, often further inhibit competition.

It thus seems clear, at least from a theoretical perspective, that conditions approximating perfect competition are unlikely to be achieved in the hospital sector in most countries. As noted above, it has been argued that it is not so much genuine competition, as contestability, that is required in order to achieve efficiency gains. Some economists have also argued the need for a distinction between long run competitive equilibrium, and a competitive process, in which the market is moving towards a situation of full competition. On this view, the competitive process itself will enhance efficiency, notwithstanding the persistence of elements of monopoly (Ferguson and Posnett 1990).

Empirical efforts to assess the presence and extent of hospital competition have largely focused on the US market, where several of these studies have demonstrated relatively low degrees of concentration, and hence a high degree of competition in some hospital markets (Noether 1988, Frech and Woolley 1992, Chirikos 1992, Culyer and Posnett 1990). Evidence from early phases of implementation of the UK reforms is somewhat contradictory. Research on the potential for hospital competition suggests that hospitals may face a degree of competition under market conditions (Robinson, Appleby, Little *et al.* 1993, Appleby, Smith, Ranade *et al.* 1994, Bartlett and Le Grand 1994), and some studies have demonstrated evidence of emerging competition (Bartlett and Le Grand 1994, Appleby, Smith, Ranade *et al.* 1994). However, other authors have described an emerging pattern of bilateral monopoly, with provision dominated by one local hospital supplier (Bartlett and Le Grand 1992), and, as cited above, more recent empirical evidence suggests that the UK internal market is characterised more by contestability than by actual competition (Ham 1996a, Raftery, Robinson, Mulligan *et al.* 1996). Early evidence from the introduction of a purchaser-provider split in 15 Russian regions also shows that these reforms have failed to create competition between hospitals, except in one or two areas (Sheiman 1995).

2.4.2.2. Does competition between hospitals promote efficiency?

Competition between hospitals is argued to increase technical efficiency in several ways. Under competitive conditions, hospitals theoretically face incentives to innovate and to adopt lowest cost production methods since only the most efficient among them will survive, the others being forced out of the market. As this process continues, efficient hospitals should also be able to exploit spare capacity in the system, as well as economies of scope and scale. In addition to these improvements in technical efficiency (which is essentially a static concept), competition is also argued to improve dynamic efficiency, which refers to the ability of providers to innovate in response to changing environments (Culyer 1990, Akehurst, Brazier and Normand 1988, Maynard 1991, Shiell 1991).

While it is probable that the behaviour of hospital providers in a market environment will be substantially different from directly managed public hospitals, there are some important theoretical reasons to doubt that competition will unambiguously improve hospital efficiency. The first of these concerns the complexity of hospitals as organisations, and of health care markets, and the resulting uncertainty about hospital behaviour within a market environment. A second issue concerns the information advantage possessed by hospitals, and their consequent ability to respond to competitive pressures in inefficient ways, should this be in their interests. A third, and in this case confounding problem, is that a range of factors including ownership and methods of reimbursement may exert independent effects on hospital efficiency, as well as influencing the responses of hospitals to the market environment. This section explores these various issues.

2.4.2.2.1. Hospital behaviour under market conditions

A review of the literature suggests that there is currently no consensus on appropriate models of hospital behaviour, and that theoretical work on these issues remains underdeveloped. McGuire (1985), and McGuire *et al.* (1988) attribute this to

weaknesses in the general theoretical understanding of the economic 'firm' (and, in particular, discretionary behaviour of firms), as well as to some specific characteristics of hospitals and of hospital markets. The first of these is the diverse nature of the 'agent' under consideration. Hospitals differ so widely in terms of scale, functional definition, outputs and ownership structures that is probably not feasible to seek a general theory of the hospital as a 'firm'. A second feature is the dominance of non market linkages within the health sector, and the consequently limited role played by prices in resource allocation. Examples of such relationships include the so called 'agency' relationship between clinicians and patients, and the relationship between hospital managers and government in publicly funded health care systems.

These problems have several crucial consequences for attempts to predict hospital behaviour. The first is that market roles may be allocated across more than one relevant actor within the 'firm', explaining the difficulty of identifying the relevant decision maker within the hospital. A second consequence is that the boundaries of the 'firm' may not coincide with the legal or organisational entity of the hospital, so that two or more 'firms' may co-exist within the hospital, or 'firms' may extend beyond the boundaries of the hospital, through integration with other actors in the sector. Thirdly, there is no consensus on the motivations of decision makers within the hospital 'firm' (McGuire 1985, McGuire, Henderson and Mooney 1988, Bartlett and Le Grand 1994).

The lack of consensus on appropriate models of hospital behaviour is compounded by the narrow focus of most modelling efforts, which have generally examined only private hospitals in the US context, and have yet to address some of the complexities of public sector hospitals in both developed and developing countries. As a result, it remains very difficult to predict the effects of marketisation reforms on the performance of hospitals with any confidence (Bartlett and Le Grand 1994, Le Grand 1991, McGuire, Henderson and Mooney 1988, Robinson 1990).

At this stage, there remains very limited empirical evidence on these issues. Some initial work on the UK NHS suggests the potential for conflict between clinicians and managers in responding to market incentives, confirming the theoretical predictions of

the co-existence of multiple 'firms' within the hospital. One study of initial experience in clinical trading illustrates the difficulties encountered by hospital managers in convincing consultants to take on the additional workload implicit in a new contract (Robinson 1990, Ranade, Appleby and Middlemas 1989).

2.4.2.2.2. Price and non price competition

The complex and heterogeneous nature of hospital services means that both individual and collective purchasers of hospital care face significant levels of uncertainty in their transactions with hospitals, and this lack of transparency may permit inefficient hospital behaviour, where this is in the interests of the relevant hospital agents. Donaldson and Gerard (1993) regard this response as a form of moral hazard. One critical manifestation of this problem is the ability of hospitals to respond to competitive pressures by competing, either on the basis of price (as the theory of competition would predict) or on the basis of quality (as perceived by patients and/or doctors) - so called 'non price competition'.[14]

Empirical data from the US strongly suggests that hospitals engage in non price competition in competitive markets (Robinson and Luft 1987, Woolley 1990, Chirikos 1992, Culyer and Posnett 1990, Luft, Robinson, Garnick *et al.* 1986, Frech and Woolley 1992, Noether 1988, Salkever 1978, Joskow 1980, Robinson and Luft 1985). It is however important to recognise that this response is contingent on factors such as market structure and hospital reimbursement methods (Culyer and Posnett 1990,

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14 Frech and Woolley (1992) describe three major theories of hospital competition, each of which posits different explanations for the relationship between the degree of concentration in hospital markets and price and non price competitive behaviour. The first, which they term traditional anti-trust theory, holds that increased competition in hospital markets is associated with price competition, lower quality-adjusted prices and narrowing of price-cost margins. The redundant resources theory, attributed to Salkever (1978), argues that hospitals view doctors as primary decision makers in the movement of patients, and as a result, compete on quality (non-price) terms to attract doctor-induced referrals. On this view, increased concentration would lead to reduced non price competition, and reduced costs (and perhaps quality), but no change in price competition, so that prices of quality adjusted days and price cost margins would be expected to remain constant with changes in concentration. The increasing monopoly theory, argued by Stiglitz (1987) regards consumer information and search costs as primary determinants of the effects of competition. On this view, increasing competition is associated with higher search costs (since there are more hospitals), and results in reduced search efforts. This reduces price elasticity of demand at the individual hospital level, and allows prices to rise, reducing price competition, and allowing wider price-cost margins.

Noether 1988, Culyer and Posnett 1990). On the demand side of the market, for example, low price elasticity of demand for health care (which usually results from consumers facing low or zero cash prices), and consumer ignorance predispose to non-price competition. Similarly, supply side conditions such as the presence of profit maximising hospitals, and weak incentives for hospitals to reduce costs (as occurs, for example, in a retrospective fee-for-service reimbursement system, or in a system of global budgeting with soft budget constraints), will also encourage non-price competition.

Where purchasers face harder budget constraints, competitive pressures may however generate genuine price competition. This is borne out by some more recent US data, which show that price competition does in fact occur in highly competitive markets, usually alongside some element of non price competition (Noether 1988, Chirikos 1992, Frech and Woolley 1992, Robinson 1990, Culyer and Posnett 1990, Robinson and Luft 1988, Melnick and Zwanziger 1988, Zwanziger and Melnick 1988).

There remains to date very little systematic evidence from other OECD countries on the impact of competition on hospital costs. In the UK, the evidence that does exist indicates that early Trust hospitals were a self-selecting group with lower unit costs than non trust hospitals across a wide range of outputs (Bartlett and Le Grand 1992, Bartlett and Le Grand 1994). There is some evidence, however, that the introduction of GP fundholding has resulted in better prices and quality of care than that obtained by DHA purchasers, although it is difficult to assess whether this is due to superior purchasing by fundholders or to competition between hospitals, or some combination of both (Smee 1995, Ham 1996b).

While non price competitive responses clearly increase health care costs, their effects on quality of care, and on overall efficiency of resource allocation, are less clear. The following section examines the relationship between competition and quality of care.

2.4.2.2.3. Hospital competition and quality of care

The efficiency implications of non price competitive behaviour is a matter of some debate. Pauly (1988) argues that increased costs represent a response to consumers' preferences for higher quality of care, so that non price competition is in fact consistent with efficient resource allocation. McClaughlin (1988), on the other hand, argues that non price competition results in prices above long run minimum costs, and in excess capacity, thus representing a loss in efficiency. Where hospitals are profit (or quantity) maximising, competitive pressures may also create incentives to reduce the costs of inputs (through reduction of intensity, quality or both), perhaps at the expense of quality of services. An alternative response is to engage in a range of cost-shifting practices which may indirectly reduce quality of care while maximising financial margins (or volumes) for the hospital. Examples of this latter practice include the problems of low cost patient selection, and premature discharging of patients from hospital.

The evidence on these issues is once again somewhat ambiguous. There is fairly strong evidence from the US that hospitals have responded to competitive (and other cost containment) pressures by reducing average length of stay (LOS) (Culyer and Posnett 1990, DesHarnais, Kobrinski and Chesney 1987, Morrisey, Sloan and Valvona 1988, Sager, Easterling, Kindig *et al.* 1989). There is also some evidence of decreasing use of highly expensive hospital resources, such as intensive and coronary care units (DesHarnais, Kobrinski and Chesney 1987).

Evidence on the impact of these factors on quality of care (as measured by patient outcomes) is scant and ambiguous. The study demonstrating reduced use of intensive care units showed no change in in-patient mortality or re-admission rates (DesHarnais, Kobrinski and Chesney 1987). However, other studies have demonstrated positive correlations between in-patient mortality and intensity of market competition, as well as other aspects of cost containment (Culyer and Posnett 1990, Shortell and Hughes 1988). However, as Culyer et al (1990) note in commenting on this and other data, in-patient mortality is an incomplete measure of patient outcome in this instance, since it cannot discriminate between changes in case-mix, severity, changes in length of stay, or

changes in resource use during in-hospital care. Further research, and in particular, evidence on post discharge mortality, is required before conclusions on the relationship between competition and quality of care can be assessed.

There is also very limited data on these issues from other parts of the world. Early evidence from experimental reforms in 15 Russian regions demonstrates lower LOS, and a general reduction in the demand for hospital services, but this effect appears to be due to the introduction of purchasing by polyclinics, rather than to the effect of competition *per se*. The authors also note that the impact of these changes on quality are unclear, and express some concern that quality may be compromised due to too great a reduction in hospital admissions (Sheiman 1995). There is also early evidence from the UK (Smee 1995, Walsh 1995) and Sweden (Annel 1995) that hospitals have responded to the reforms by becoming more responsive to the needs of users and purchasers, resulting in innovative changes in service delivery, which might be argued to represent an improvement in at least one dimension of quality. It is not possible, though, to attribute these effects to competition per se, since they could be due to several other features of the reforms, including explicit contracting.

2.4.2.2.4. Overview of effects of competition on hospital efficiency

In summary, the empirical data on the effects of competition on hospital efficiency present a mixed, and somewhat ambiguous picture. Most commentators observing the overall impact of competition on the efficiency of the US hospital sector argue that it has failed to meet its objectives (Robinson 1990, Evans 1986), although Evans (1986) concedes that this may be attributable to the particular conditions pertaining in US hospital markets, rather than to competition itself. Another explanation advanced for the failure of competition to enhance overall hospital efficiency is the ability hospitals to subvert the competitive process for their own ends. This may occur through several of the mechanisms described earlier (cost shifting via biased selection or discharge practices, market segmentation, induced demand for services), and importantly, through manipulation of regulatory procedures imposed to manage the competitive environment

(Light 1992, Stigler 1971). Light (1992) explains the failure of competition on the basis of its inability to address a series of embedded inefficiencies in the health sector more generally. Pauly (1988), as noted earlier, takes a different view, arguing that competition is not intended to reduce overall system costs, but to enhance allocative efficiency through increased consumer choice, and to increase technical efficiency of individual hospitals.

Despite this mixed evidence, it is probably safe to say that under particular (and fairly restrictive) conditions, including a high degree of competition, the presence of budget constraints on hospitals and consumers, and the use of appropriate reimbursement mechanisms, competition may be expected to generate some degree of price competition, and consequent efforts to reduce in-hospital resource consumption. These conditions should thus increase technical, and hence allocative efficiency to some extent, although the possibility of worsening outcomes would undermine this. In the absence of these conditions however, competition is likely to generate non price competition, increasing the costs of production without necessarily enhancing quality of care, thus worsening both allocative and technical efficiency.

The interaction of market structure and hospital efficiency thus needs to be recognised as a complex one, in which the degree of competition is only one variable, which may itself be partly endogenous. Other relevant variables include the management and organisational structure of hospitals and the hospital system, the availability of information on hospital output and quality, budget constraints on the demand and supply sides of the market, and hospital reimbursement mechanisms. These conditions are likely to vary substantially both within and between countries.

As noted earlier, evaluations of the relationship between market incentives and hospital efficiency may be confounded by the effects of other important determinants of hospital behaviour. One of these, hospital reimbursement mechanisms, has already been discussed. Others are discussed in the following section.

2.4.3. Hospital ownership and other determinants of hospital efficiency

Another important determinant of hospital efficiency is the nature of hospital ownership, and linked to this, the managerial motivations associated with different ownership structures. Most research on these issues has focussed on comparisons of the efficiency of public and private hospitals, and aim to test the hypothesis that privately owned hospitals are more efficient than their public sector equivalents. Private hospitals may either be for-profit, or not-for-profit (e.g. owned by communities or by non government organisations (NGOs)), and consequently, the question of motivation may be as important as ownership per se in determining efficiency. In theory, private providers are argued to be more efficient than their public sector counterparts because of their increased managerial flexibility, particularly in respect of human resources, and their superior management structures and systems. On the other hand, in the context of a contractual environment, it has been argued that contracts with not-for-profit providers may be more efficient than those with for-profit providers since not-for-profit organisations are more likely to be motivated to ensure good quality of care, are less likely to behave opportunistically, and are therefore more suitable to the development of the long term, trust based relationships discussed above (Gilson, Adusei, Arhin *et al.* 1997). A counter-argument to this is that that profit maximising providers will pay more attention to production efficiency than will their not-for-profit counterparts.

Once again, the bulk of evidence on these issues emerges from the US, where studies have compared for-profit private hospitals with not-for-profit community owned hospitals. In that context, recent reviews suggest that for-profit hospitals tend to have higher treatment costs than not-for-profit hospitals, even after adjustment for case-mix, size and other potential confounders[15], with no systematic differences in quality of care (Donaldson and Gerard 1993, Institute of Medicine 1986, Bennett 1991). These results therefore contradict the usual assumption that for-profits are more efficient than not-for-profits in the US context. There is less evidence on this issue for other OECD countries.

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15 This pattern is attributed to the greater provision by for-profit hospitals of high cost (and high profit) services, which is a predictable response to the incentives of the fee-for-service reimbursement system used in the US at the time of these studies.

Some data from the UK does suggest that the private hospital costs are lower than those of public hospitals in the production of non acute services (Brazier, Hutton and Jeavons 1990). There is also evidence that as the internal market emerges, DHAs are making increasing use of private providers, with a recent survey demonstrating that 94% of DHAs held contracts with both for-profit and voluntary private providers (Raftery, Robinson, Mulligan *et al.* 1996). There is however no evidence on any differences in efficiency between these and NHS providers. Walsh (1995) observes, though, that public service contracts with private providers in the UK are terminated more frequently than those with public contractors, although there is no indication as to whether this is due to inferior performance by the private contractors, or to reluctance by public purchasers to terminate contracts with public providers.

There is also very limited empirical evidence on these issues in developing countries. Some limited studies of not-for-profit private providers, usually owned and operated by church organisations, indicate that cost recovery is better in these than in public hospitals, but there is no consistent evidence that they are more efficient than public hospitals (Bennett 1991). Other studies comparing the costs of public and private sector hospitals and health facilities in developing countries have shown mixed results (Mills 1990a, Mills 1990b, Berman and Dave 1990, Alailima and Mohideen 1984, Bennett 1991). Some studies indicate that private hospitals tend to have significantly lower costs than public hospitals, while others suggest no significant cost differences. Where cost differences do exist, these appear to be attributable mainly to lower staff costs at the private hospitals. These observations suggest that while hospital ownership and the motivation of hospital managers may exert effects on hospital efficiency, there is no consistent evidence as to the direction or extent of these effects. It is also difficult, given current empirical evidence, to separate out the impact of these two factors, and to isolate them from the context in which hospitals function.

This concludes the review of the evidence on the first two claims for managed markets. A third, and usually implicit argument for these reforms is that their benefits will outweigh the costs of their implementation and maintenance. The sources of these costs and their likely magnitude are discussed in the next section.

2.4.4. The costs of selective contracting and other marketisation reforms

Any benefits of marketisation reforms must clearly be weighed against their costs, including transactions costs, the higher costs that may result from the loss of monopsony purchasing power, and the social costs arising from equity problems. Each of these costs is briefly explored in the following sections.

2.4.4.1. Transactions costs

As discussed above, there are likely to be substantial transaction costs involved in creating and maintaining the contracts which form the basis of a managed market for health care services. The extent of such costs will depend on the numbers of contracts that have to be written, the extent of detail in their specification, and the intensity with which implementation is monitored, and will therefore vary between and within systems. Early evidence from various OECD countries bears out the expectation of very high transactions costs resulting from 'marketisation' reforms, including both one-off costs of establishing the market, as well as recurring costs of contract re-negotiation and management. Reviewing the general experience with these reforms thus far, Saltman and von Otter (1996) argue that the costs of transition to contract based health care systems have almost universally been significantly higher than expected.

There is also strong evidence of substantial one-off and recurring transactions costs in the UK internal market (Ham 1996b, Mills 1995, Walsh 1995, Appleby, Little, Ranade *et al.* 1992), with a recent estimate by the UK Audit Commission putting the cost of commissioning at an average of 1.3% of total DHA expenditure. Walsh (1995) cites interesting data on the costs of contracting for local government services in the UK, which demonstrate that costs to government of contract negotiation amount to approximately 7.7% of total contract value, while those for monitoring account for

6.4%. These data also show that approximately two thirds of these costs are incurred repeatedly at each contract round.

While it is thus clear that 'marketisation' reforms incur high transactions costs, it is important to compare these with the explicit and hidden costs of directly managed public systems, rather than to view them as entirely incremental. For example, public agencies may face large costs in monitoring staff and output quality, and there may also be significant costs involved in bureaucratic administrative mechanisms, and in the effects of political interference (Krashinsky 1986).

2.4.4.2. Loss of monopsony purchasing power

A second set of costs may come from the loss of monopsony power resulting from the fragmentation of the single purchasing agency in the traditional public health sector. This problem might apply to the purchasing of goods and services throughout the health sector, but is most often identified in connection with labour costs (Kings Fund Institute 1989, Robinson 1990). In the case of the pre reform UK NHS, for example, the relatively low wage levels associated with its monopsony position are argued to be one of the major factors behind its relatively low cost, especially when compared with systems in which there are multiple employers (Robinson 1990). Evidence from the US suggests that hospital wage levels are higher in more competitive environments (Le Grand 1991). The current UK reforms are predicted to lead to increases in wage levels, and to increasing dispersion of wages, as competing providers bid up wages (Barr, Glennerster and Le Grand 1989). Within a cash limited system, the increase in the total wage bill is thus predicted to cause a drop in service volumes and/or quality, while wage dispersion may aggravate the recruitment and retention problems faced by many hospitals (Kings Fund Institute 1989, Robinson 1990). Counter arguments here include the fact that wage differentials and higher wages may overcome some of the morale problems associated with low wages, and may also increase productivity (Robinson 1990, Kings Fund Institute 1989).

2.4.4.3. Equity considerations

Some critics of 'marketisation' reforms argue that they embody a potential conflict between efficiency requirements of the market environment and equity goals, and may act to undermine equity. Examples of this problem include the loss of comprehensiveness of local service provision, and potential loss of consumer choice (both of which would also impair efficiency), as inefficient local services are forced to close, as economies of scale dictate increasing concentration of service provision, or as hospitals concentrate on more profitable services at the expense of core services (Robinson 1990).

Equity may also be threatened through the practice of provider, or purchaser selection of low risk patients (Le Grand 1991, Bartlett and Le Grand 1994). Another threat to equity is identified by von Otter and Saltman (1992) as peculiar to the `mixed market' approach, as exemplified by the UK reforms. In this instance, the participation of private sector providers in the market is predicted to force public hospitals to behave more like for-profit hospitals, focusing on profitable services and stripping out non profitable but essential services. These authors also predict that for-profit hospitals are better equipped to survive under market conditions, and that public hospitals will thus be disadvantaged, further aggravating equity problems. Commenting on the Swedish reforms, Annel (1995) confirms this risk of a threat to the equity of the system due to the potential for increasing private sector participation in the health care market. While the theory therefore suggests that 'marketisation' reforms may have negative effects on equity, there is as yet no definitive evidence on this issue from either developed or developing countries.

2.4.4.4. Effects on the wider health care system

While comprehensive marketisation reforms are designed to restructure large parts of the health care system, selective contracting may be regarded as having minimal impact

beyond the specific contract itself. However, these contracts may also have a substantial impact on the wider health care system. Firstly, introduction of contracted private providers may lead to fragmentation or lack of coordination within the broader public health system. Secondly, contracting can lead to competition between contractors and public providers for staff resources, particularly where supply is already constrained, leading to increasing salaries, and to public hospitals being drained of key personnel, or to suffer from increased staff turnover (Mills 1995). Thirdly, contracts can lock scarce resources into a particular allocation, even when changed circumstances dictate a reallocation. Finally, as noted above, competition may distort the behaviour of public hospitals or other providers. These systemic effects should therefore be taken into account when the cost and benefits of selective contracting are being evaluated.

2.5. The experience of 'marketisation' reforms

This section reviews the available empirical evidence on the overall impact of selective contracting and of more comprehensive 'marketisation' reforms, on both provider and system efficiency, as well as on other social objectives. While its main focus is obviously on these reforms in the health sector context, there has been more extensive experience with public sector contracting for various other public services, and these experiences are briefly reviewed as well.

Selective contracting for public services, including both health and other services, has been utilised by many developed countries over the past decade or more. Experience of this form of public service delivery is probably most developed in the US and the UK, although it is increasingly applied in many other countries including Denmark, the Netherlands, Australia and New Zealand (Walsh 1995). The evidence on the impact of this approach to public service delivery is somewhat ambiguous, with different commentators having different views of what constitute the relevant costs and benefits of these measures. In general, selective contracting appears to have realised often substantial savings in direct service costs, particularly for services which rely on relatively simple, repetitive tasks (Walsh 1995), although some data from the US

indicate that the Federal government has also been able to achieve substantial savings by contracting out the delivery of more complex clinical services to for-profit providers (Kutzin 1995).

The evidence emerging from the UK experience of contracting of ancillary hospital services during the 1980s also suggests that fairly substantial savings were achieved. Domberger *et al.* (1987) report reductions in service costs of 34% for contracted out services relative to savings of 22% when an in-house provider was awarded the bid. A 1986 study by the UK National Audit Office suggests savings equivalent to 20% of service costs before competition (Walsh 1995). Walsh (1995) however argues that these data should be treated with caution given the limited data available, the lack of systematic evaluations, and the evidence that savings tend to be reduced or eliminated in subsequent contracting rounds.

The ambiguity in these cost data also emerges from the fact that cost savings were derived mainly from some combination of reducing the number of employees used to produce the service, as well as reductions in wages and other benefits (Kettle 1993). If a broad view of social costs is assumed, as several authors contend should be the case (Key 1988, Kettle 1993, Saltman and von Otter 1996), it is arguable that any financial savings on direct service costs are undermined by the broader social costs incurred through lower wages and benefits, as well as additional costs to government, such as higher unemployment insurance payouts (Key 1988, Kettle 1993). There is also very limited data on which to judge these experiences in terms of other measures of efficiency, such as effectiveness and quality of services. Walsh (1995) argues that evidence on effectiveness is mixed, with some evidence of failed contracts and some of significant improvements in service delivery. In terms of quality, he argues that there is definite evidence of improved quality in services involving simple, repetitive tasks (e.g. waste collection), but that there remains insufficient evidence to evaluate the quality of more complex services subjected to selective contracting.

The data on the overall impact of the more extensive and recent health sector reforms is also ambiguous, but some common themes are emerging. There is suggestive evidence

that some of the reforms are generating short term gains in micro-efficiencies (Saltman 1995). This is illustrated by the apparent success of GP fundholding in the UK, which has been able to obtain better prices and quality of care for patients than the DHAs are able to achieve, and by the greater responsiveness of Trust hospitals to the needs of the market (Smee 1995).[16] As noted above, the UK reforms have also resulted in an increased focus on patient needs and outcomes in resource allocation decisions, and have led to the rationalisation of services in London (Ham 1996a, Ham 1996b). There is however no systematic evidence, thus far, that these reforms have effectively improved the responsiveness of services to patients, and the prevalence of 'block contracts' has meant only marginal changes in the extent of patient choice (Ham 1996b). Early evidence from the Swedish reforms suggests that hospitals have become more productive and responsive to patients, that queues have been eliminated, and that patient choice and accessibility have improved in some areas of the country (Annel 1995, Diderichsen 1995).

Notwithstanding this evidence of some short term gains, most commentators argue that it remains too early to make definitive judgements on the long term success or failure of these efforts, and that in some cases, definitive judgements may be very difficult to make due to the speed of implementation of the reforms, and the difficulty of isolating the individual impacts of the multiple measures which have been implemented in recent years (Saltman and von Otter 1996, Saltman 1995, Smee 1995, Annel 1995, Roberts 1993, Ham 1996b). There is also evidence of a number of problems associated with these reforms: the problem of high transactions costs has been discussed above, and it remains unclear whether the long term efficiency gains from these reforms will in fact justify these increased transactions costs. As also mentioned above, there are concerns from some countries about the negative equity effects of these reforms, as well as about their broader intersectoral and social impacts (Diderichsen 1995, Saltman and von Otter 1996, de Roo 1995).

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16 As noted above, however, it remains unclear whether the introduction of Hospital Trusts has systematically improved either hospital or system efficiency.

A number of problems have also been encountered in the implementation of these reforms, including political and technical difficulties, and problems emerging from conflicting objectives (e.g. efficiency versus equity) and/or from conflicting policy instruments (e.g. allowing patients to choose providers versus requiring patients to attend providers contracted by public purchasers) (Saltman and von Otter 1996).

In developing countries, experience has thus far been limited to selective contracting for a range of non-clinical and clinical services, although as noted in the introduction, countries such as Colombia (Gonzales-Sedano 1995), Mexico (Mills, Hongoro and Broomberg 1997), Chile (Jiminez 1993), Thailand (Mills 1995), South Africa (Department of Health, Republic of South Africa 1996) and Zambia (Bennett, Russell and Mills 1996) are presently considering or have implemented more comprehensive 'marketisation' reforms. There is thus far greater experience with selective contracting for non-clinical than for clinical services, as demonstrated in Table 2.1, which shows that many countries contract out a wide variety of non-clinical, ancillary services.

Empirical evidence on these arrangements is extremely limited and unsystematic, and is also fairly mixed. In some cases, contracting appears to have resulted in efficiency gains: a catering contract in Bombay, for example, appeared to result in some savings (Bhatia 1997), while an hospital cleaning contract in Thailand resulted in lower costs than had the service been provided in-house (Tangcharoensathien, Nittayaramphong and Khungsawatt 1997). There is also evidence from a public hospital in Tunisia which appears to have obtained contracted out food, cleaning and security services of higher quality for comparable or lower cost than the in-house alternative (World Bank 1993).

In some of these contracts, and in others, however, problems have arisen which could be argued to undermine the cost savings from contracting out. In the Thailand situation, for example, contracting out led to a loss of control by hospital staff over the performance of the relevant functions, and over the specific duties carried out by the staff concerned (Tangcharoensathien, Nittayaramphong and Khungsawatt 1997, World Bank 1994). A survey of contracting out of non-clinical services in South Africa demonstrated that extensive use is made of outside contractors for a range of functions, but that no

comparisons had been made with the costs of in-house provision, nor had any systematic evaluations of contractor performance been undertaken. Some of these contracts also presented problems of poor performance (especially in contracts for security services), as well as loss of flexibility and control by hospital staff (Hospital Strategy Project Consortium 1996a).

Table 2.1: Selective contracting arrangements in developing countries

Type of contract	Service contracted for	Country
Non Clinical Services		
	Laundry	India, Malaysia, South Africa, Sri Lanka, Indonesia, Bangladesh, Pakistan, Zimbabwe, Mexico, Thailand
	Cleaning	Thailand, Jamaica, South Africa, Mexico
	Security	Lesotho, South Africa, Malaysia, Sri Lanka
	Billing functions	Zimbabwe, South Africa
	Catering services	India, Lesotho, Malaysia, South Africa, Mexico, Catering
	Equipment maintenance	South Africa, Venezuela, Zimbabwe, Mexico, Uganda
	Patient transport	South Africa
	Distribution of pharmaceutical supplies	South Africa
	Gardening services	South Africa
	Waste removal services	South Africa
Clinical services		
	Acute hospital care (explicit contracts)	South Africa, Zimbabwe, Papua New Guinea, Tanzania, Thailand, Philippines[17]
	Acute hospital care (implicit contracts with church or other NGO providers)	Ghana, Malawi, Zimbabwe and Nepal, Rwanda, Swaziland, South Africa
	Long term hospital care	South Africa (TB and chronic psychiatric care)
	Ambulatory care	South Africa, Namibia
	Diagnostic services	Thailand (CT, ESWL, MRI)[18]; Malaysia (CT, Xray, Radiation therapy)
	Laboratory services	Nigeria, South Africa
	Public health services	India (vector control)
	Hospital management contracts	China, Bolivia, South Africa
	Blood product supply	South Africa
	Supply of nursing personnel	South Africa

Modified from: Bennett, Russell and Mills 1996. Additional sources: Mills 1995, Kutzin 1995, Hospital Strategy Project Consortium 1996a.

17 In the Philippines and Thailand, the contracts are held by the social insurance system.

18 CT: Computerised tomographic scanning; ESWL: Lithotripsy; MRI: magnetic resonance imaging

While experience with contracting for clinical services is less extensive, there is nevertheless fairly wide experience of contracts for a range of different clinical services in many developing countries, as also shown in Table 2.1. South Africa has particularly extensive experience in this regard, having had a long history of contracting out to both for-profit and not-for-profit providers of hospital services for several decades, as well as for a broad range of other clinical service contracts. In total, clinical contracts held by the various South African government authorities accounted for 9.4% of total hospital expenditure in 1995 (Hospital Strategy Project Consortium 1996a). As shown in the table, contracts for provision of hospital services take a variety of forms. In South Africa, Zimbabwe and Papua New Guinea, there are explicit contracts, although in the latter two countries, only single hospitals are covered in each contract. In South Africa, on the other hand, a large number of contracts, covering both acute and long term hospital care are held with a single for-profit provider, details of which were given in Chapter 1.

Several countries also operate implicit contracts with a range of private, usually not-for-profit providers. As noted above, these are usually with hospitals run by church organisations, although as described in Chapter 1, the South African government authorities have similar arrangements with a charitable organisation which runs TB hospitals, as well as with numerous autonomous not-for-profit acute care hospitals (Hospital Strategy Project Consortium 1996a). As Mills (1995) points out, these contracts are 'implicit' in the sense that there is no obvious competition in the award of the contracts, and governments have not historically specified contract terms or monitored performance. Tanzania is an exception here, since the government has explicit contracts in place with the various church organisations which provide services (Gilson, Adusei, Arhin *et al.* 1997, Bennett, Russell and Mills 1996).

Again despite this fairly extensive experience, there remains very little systematic data on the impact of these various clinical contracts. A study of a contract between a DHA and a mine hospital in Zimbabwe indicated that the government was able to obtain services of the same quality at a lower cost than the equivalent costs in a public hospital. However, the contract was also noted to be unable to control utilisation and hence total

cost, and was found to account for almost 70% of non-staff recurrent expenditure in the district, despite the fact that only a small minority of the district population utilised the hospital. This led the authors to query whether the contract could in fact be regarded as successful at all (McPake and Hongoro 1993). A recent comparison of contracted and public sector TB hospital services in South Africa found that costs were lower, and quality of care higher, at the contractor compared to the public hospital, although here again the authors identified a number of important systemic inefficiencies resulting from the contract, including lack of coordination between the contractor hospital and other public services (van Zyl *et al.* 1996). A series of case studies comparing the performance of 'contracted' church hospitals with public sector hospitals in Ghana, Tanzania and Zimbabwe did not identify any systematic differences in performance or cost, except in the case of Zimbabwe, where the church hospitals were noted to have lower unit costs. These studies noted, though, that the church hospitals were characterised by more highly motivated managerial staff, and enjoyed substantially greater autonomy than the public hospitals, suggesting potential for greater efficiency. One serious problem identified by the study was the fragmentation and lack of coordination in district health services resulting from the dual lines of accountability when church owned hospitals are introduced into the public health system (Gilson, Adusei, Arhin *et al.* 1997).

A case study from Mexico, in which a state owned company contracted with private providers, showed that the average cost per beneficiary was 15% higher than the costs of direct provision, a result that was attributed to the use of a fee-for-service reimbursement mechanism. By contrast, a capitation based PHC contract for workers covered by the social health insurance system in Mexico demonstrated efficiency gains (Domberger, Meadowcroft and Thompson 1987).

Analysis of the sources of efficiency or inefficiency in these various contracts highlights some important trends. Where cost savings were shown, they were in most cases due to some combination of lower wages, lower staffing levels, and tighter management of supplies (Domberger, Meadowcroft and Thompson 1987). These studies have also identified a number of problems in the design, management and implementation of

contracts, which may explain their failure to generate meaningful efficiency gains in several cases. Firstly, many of the contracts appear to have arisen in an ad hoc way, with little explicit justification or evaluation of their likely costs and benefits, and were often very vaguely specified (Bennett, Russell and Mills 1996, Hospital Strategy Project Consortium 1996a, Gilson, Adusei, Arhin *et al.* 1997, Kutzin 1995). This explains the fact that contracting in a developing country environment has generally failed to live up to one of its objectives, that of clarification of organisational objectives and increased transparency of resource allocation through an explicit trading relationship between purchasers and providers (Bennett, Russell and Mills 1996). Many contracts also resulted in a shift of most of the contractual risk to the government, thus unduly favouring the contractors, for example through minimal specification of contractor performance (especially in clinical contracts) and/or of sanctions for poor performance, through use of payment methods in which the purchaser bears all the risk, or through long contract terms. Specific examples of these problems were identified in South Africa (Hospital Strategy Project Consortium 1996a) and in Thailand (Bennett, Russell and Mills 1996), and are attributed, at least in part, to poor government negotiating capacity. Similar problems were also noted in the contracts or agreements between governments and church hospitals in the study by Gilson *et al.* (1997) cited above, as well as in several of the case-studies reviewed by Mills (1987).

Bennett *et al.* (1996) also argue that there is little evidence that contracting in developing countries has met the objective of encouraging provider competition, although, as noted above, there has been little explicit effort to encourage competition in most cases. In a review of several case studies of non-clinical and clinical contracts, Mills (1987) found that the majority of non-clinical contracts were in fact awarded on a competitive basis, while the majority of the clinical contracts were awarded through direct negotiation. The South African survey cited above found very similar results, and in that case, the authors note that directly negotiated contracts appear to more strongly favour the contractor, again suggesting that contractors are often stronger negotiators than governments (Hospital Strategy Project Consortium 1996a). There is also the risk, noted by McPake and Hongoro (1993) that, without competition, governments can become dependent on powerful monopolistic contractors.

Experience in some countries suggests that contracting also has mixed success in overcoming bureaucratic restrictions, despite the fact that this is argued as one of its key objectives. While evidence from Lesotho, Thailand and South Africa suggest that contracting has assisted governments or individual hospitals to overcome public service restrictions, other experiences in South Africa, Thailand, Ghana, Zimbabwe and Tanzania suggest that the public procurement process itself can become highly bureaucratic, undermining the potential efficiency of contracted providers (Tangcharoensathien, Nittayaramphong and Khungsawatt 1997, Hospital Strategy Project Consortium 1996a, Bennett, Russell and Mills 1996, Gilson, Adusei, Arhin *et al.* 1997). Finally, there is fairly extensive evidence of very weak government capacity to monitor the performance of both for-profit and not-for-profit contractors (Mills 1995, Bennett, Russell and Mills 1996, Gilson, Adusei, Arhin *et al.* 1997, Domberger, Meadowcroft and Thompson 1987).

Taken together, these observations suggest that despite the fairly extensive experience with selective contracting and other marketisation reforms in both developed and developing countries, systematic evaluation and evidence on their impact remains very limited. The data which does exist shows mixed results; there is fairly broad evidence of short-term gains in micro-efficiency, including cost savings and quality improvements, although several studies, particularly in developing countries, have also highlighted short term efficiency losses. It is also generally regarded as too early to judge the long term effects of these arrangements, although there are serious concerns as whether their high transactions and other social costs will reduce or even eliminate overall efficiency gains from these reforms. Finally, there is evidence that the potential efficiency gains from contracting may be undermined by the absence of critical environmental conditions, such as government contracting capacity, and competition or contestability, among others.

2.6. Conclusions and research questions

This review has identified a number of important conclusions and unanswered questions in relation to the implementation of selective contracting or more comprehensive 'marketisation' reforms in the context of developing countries. Perhaps the most important conclusion is that there remains relatively limited and contradictory evidence on the impact of these reforms on efficiency and equity at the institutional and/or at the health system level. This is true for both developed and developing countries, and highlights the need for extensive additional research on the effects of the various reforms now being implemented in various countries.

This review has also shown that many of the theoretical claims on which basis 'marketisation' reforms are argued to improve efficiency themselves remain ambiguous. This ambiguity is important since it leads to uncertainty as to the determinants of efficiency gains through 'marketisation', and hence, as to the set of conditions that are necessary for achieving efficiency gains through these reforms.

This is illustrated, firstly, by the set of issues concerning the relationship between the nature of the contract, the contracting process, and efficiency. This review has highlighted several aspects of the design of contracts which may impact on contractor behaviour and hence efficiency, but the relative importance of each of these aspects, their interrelationships, and their individual and combined impacts on efficiency merit further investigation. For example, while the literature does indicate the general direction of the trade-offs between detailed specification of contracts, balanced distribution of contractual risk and transactions costs, there remains limited evidence on the specific relationships between these various factors and efficiency in various contractual situations. Regarding the relationship between the contracting process and efficiency, the relative merits of awarding contracts competitively or through direct negotiation remain unclear, as do other issues such as the optimal number of bidders for a contract, and the trade-offs between securing adequate numbers of bidders and ensuring an efficient distribution of risk between the contractor and the purchaser.

Closely related to these issues of contract design and process are questions relating to government capacity to act as a competent purchaser of health services. This review has indicated that efficiency gains from contracting appear to be contingent on government capacity to act as an efficient purchaser, and more specifically, to make the appropriate decisions as to whether and when to let contracts, to design efficient contracts, and to effectively monitor contractor compliance. Conversely, lack of this capacity may lead to inefficiency through exploitation by contractors, through distorted resource allocation (Bennett 1991, Mills 1995), or through uncontrolled expansion of the private sector, creating further problems of fragmentation and inequity (Saltman 1991).

Some analysts have pointed out a generic set of skills and resources that governments require in this context, including skills in planning, economic analysis, and contract design and negotiation, as well as suitable information systems (Bennett, Russell and Mills 1996, Kutzin 1995), and sophisticated government regulatory capacity to carry out such functions as licensing and accreditation (Saltman and von Otter 1996). Not surprisingly, current evidence suggests that most developing country governments lack all or most of these capacity requirements (Bennett, Russell and Mills 1996, Mills 1995). However, there is as yet limited evidence on the relative importance of these various aspects of government contracting capacity, nor on their specific impacts on contractual efficiency. It is thus difficult, without further research, to identify accurately those situations in which governments are likely to achieve efficiency gains, or in which these reforms should be avoided until specific aspects of contractual capacity have been strengthened.

A second critical area of ambiguity concerns the relationship between competition and contractual efficiency. The theoretical arguments reviewed here suggest that at least some degree of contestability for contracts, or preferably, actual competition, is required to ensure efficiency gains from contract based provision. There is also some empirical evidence that where competition or contestability is absent, efficiency may be undermined through contracts biased towards contractors, through exploitation by for-profit contractors, or through governments becoming dependent on a single monopolistic contractor.

The limited evidence available on these issues suggests that the conditions necessary for competition, and even for contestability, are generally absent from most areas of most low and middle income countries (Mills 1995, McPake and Ngalande Banda 1994, Chernichovsky 1995, Saltman 1995). However, there remains scant information on the actual extent of competition or contestability in most countries, an issue that is made more complex by geographic variations in levels of competition, as well as by the fact that both local and international providers may compete for contracts. Similarly, there are still few data on the precise relationships between competition or contestability and contractual efficiency, so that is not possible to predict the likely success of 'marketisation' reforms under various competitive conditions. For example, there is limited evidence on what number of actual or potential competitors would constitute adequate levels of competition, on whether competitors should be local as opposed to international, and on whether competitive requirements differ in contracts for different types of services (e.g. PHC versus hospital services).

This review has also suggested that the success of 'marketisation' reforms may be contingent on a number of features of the broader social, political and economic environment. Important factors here appear to include a general political and social environment in which corruption is discouraged, in which contractors share a commitment to public responsibility and contractual compliance, and in which there is effective legal system to ensure that sanctions for non-compliance pose a meaningful threat. Where such conditions are absent, there is the risk that contracts may be inappropriately awarded, and that contractors may exploit contracts, thus undermining efficiency (Schieber 1995, Saltman 1995, Bennett, Russell and Mills 1996). There is also evidence that under conditions of inadequate financial resources, contracting may not lead to efficiency gains. For example, financially constrained governments may only wish to let short-term contracts, which may be unattractive to potential bidders. Contract prices may also be set too low, leading to poor quality of services (Mills 1995, Gilson, Adusei, Arhin *et al.* 1997); and contracts may lock public resources into a specific use, limiting the flexibility which governments have to reallocate such resources (McPake and Hongoro 1993, Domberger, Meadowcroft and Thompson 1987). Once again,

however, there remains quite limited empirical evidence on the extent to which these various conditions, alone or combined, are necessary for the achievement of efficiency gains from contracting or other 'marketisation' reforms, and further research will be required before it is possible to predict the likely success or failure of such reforms under various environmental conditions.

This review has also examined the impact of the ownership structure of the contractor, and the associated motivations and managerial structures and systems, on efficiency. As indicated above, there remains limited and ambiguous evidence on the relative merits of for-profit and not-for-profit contractors in a contractual environment, as well as on the determinants of efficient behaviour on the part of these two types of contractor. It is also not possible, given available evidence, to separate the effects of ownership structure from the various other determinants of contractual efficiency outlined here.

The fifth and final area of ambiguity identified by this review concerns the impact of the relationship between public purchasers and contracted providers on provider efficiency. More specifically, it is not yet clear whether contracting leads to transparency in the contractual relationship, or to decentralisation of management authority, nor is it clear to what extent these consequences of contracting contribute to efficiency gains. As discussed above, the potential advantages of a greater awareness of needs, prices, quality and quantities in resource allocation are dependent on the availability of detailed information, and on the administrative capacity to use this information. The evidence, cited above, on poor government administrative capacity in many developing countries suggests that contracting or other forms of marketisation may not necessarily produce the degree of 'transparency of trade' claimed by proponents of these reforms. Similarly, while contracting will clearly encourage some degree of managerial decentralisation relative to direct public management, the general lack of managerial expertise in developing countries may prevent effective decentralisation amongst the majority of providers, even where this is formally introduced. In developed countries and in some middle income developing countries, however, contracting may produce these desired consequences.

Together these observations suggest that there remains much uncertainty as to the overall impact of 'marketisation' reforms on efficiency and equity, as well as to the determinants of efficiency and the necessary conditions for ensuring efficiency gains when such reforms are implemented. It is thus clear that the overall role and future of 'marketisation' reforms in the health sectors of developed and developing countries, and the relative importance of these as opposed to more traditional public sector reforms, cannot be regarded as settled issues at this stage. In addition, it remains difficult to predict with confidence those countries or areas within countries, or those components of the health system, in which 'marketisation' reforms are more or less likely to generate meaningful efficiency gains. Instead, more experience and extensive further research, along the lines outlined in this section, is still required in order to provide answers to these and related questions.

CHAPTER THREE: METHODOLOGY

This chapter describes the methodological approaches used to address the objectives of this study, as outlined in Chapter 1. Table 3.1 summarises these objectives together with the analytic methods used to address each one. The chapter begins by describing the methodology used in the assessment of hospital utilisation statistics and the general cost analysis, followed by tracer cost analysis and DEA. This is followed by the various components of the evaluation of quality of care, and then by the assessment of the various determinants of efficiency studied here. In each section, the methods used and methodological problems encountered are outlined, and where required, further details are provided in the appendices.

Table 3.1: Research objectives and analytic methods

Research objectives	Analytic method used
Compare production efficiency at contractor and directly managed public hospitals compare utilisation statistics	Analysis of hospital utilisation statistics Pabon Lasso analysis
compare production costs	Step down unit cost analysis Tracer cost analysis
compare quality of care	Evaluation of structural aspects of quality of care Objective and subjective evaluation of the quality of nursing care Evaluation of quality of clinical record keeping Evaluation of outcomes of care in tracer conditions Evaluation of avoidable factors in cases of peri-natal and maternal mortality
Compare overall efficiency of contracted out versus directly managed public hospitals	Incorporation of total contract costs into step down unit cost analysis and tracer cost analysis
Assess impact of various determinants of efficiency contracts and the contracting process	Analysis of contracts, interviews
competition	Interviews
ownership structures	Interviews
transparency in the contractual relationship, and extent of decentralisation of authority	Interviews
management structures and systems	Interviews

3.1. Cost analysis and assessment of hospital utilisation statistics

The primary objective of the cost analysis was to obtain the unit costs of a uniform range of hospital outputs, thus allowing assessment of the relative costs of producing these outputs at the study hospitals. Further objectives included assessment of the distribution of total costs between different cost centres, and across a defined range of inputs, as well as evaluation of the relationships between recurrent and capital costs, and between fixed and variable costs[19], thus allowing assessments of the relative efficiency of resource use, and explanations of unit cost differentials. In addition to the assessment of these costs, this analysis also aimed to compare the total costs incurred by the government in the contracting out of hospital services with those incurred in production of public sector hospital services. This comprehensive approach necessitated calculation of the full financial costs to the health services, including recurrent and capital costs, involved in the production of the various outputs listed here. Costs to users, and other costs external to the health sector, were omitted from the analysis.[20] All cost and other data were obtained for a one year period. In all public and private hospitals, this was for the 1992/93 financial year. In the case of the Lifecare hospitals, data were obtained for the 1991/92 financial year and inflated for comparability with the other hospitals.[21]

Cost analysis was carried out using a 'step down' cost accounting approach (Barnum and Kutzin 1993b, Cowing *et al.* 1983, Mills 1990b, Robertson 1985, Creese and Parker 1990). This involved the following steps, each of which is discussed in more detail below:

1. Identification of hospital cost centres
2. Identification and adjustment of all expenditures incurred in production of hospital outputs

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19 Fixed costs are defined here as all costs which do not vary with the quantity of outputs of the hospital over a one year period. These would therefore include all capital costs, as well as staff costs and other overhead costs. Variable costs are defined as those costs which vary with the quantity of outputs, and would include medicines, disposables etc.

20 All costs incurred in the direct production of public sector health services, but which are borne by government agencies outside of the health sector were included.

21 Although the study was planned to include data from the 1992/93 year for all hospitals, Lifecare agreed to provide access to data only from the 1991/92 year for its three hospitals.

3. Allocation of line item expenditures as direct costs to intermediate and final cost centres
4. Allocation of costs of intermediate cost centres as indirect costs to other intermediate cost centres, and to final cost centres
5. Calculation of unit costs and other cost relationships.

3.1.1. Identification of hospital cost centres

Each hospital was divided into intermediate administrative, intermediate service and final cost centres based on interviews with administrative staff and analysis of the organisational structure of the hospital. Intermediate administrative centres were defined as those which provided administrative services to other cost centres; intermediate service centres were defined as those providing services to patients, but whose costs could be further allocated to final cost centres, while final cost centres were defined as those which provide services only to patients and not to other cost centres. In those hospitals which undertake nursing training, and/or in which community services are supported by the hospital, both of these activities were also identified as final cost centres. Table 3.2 provides an example of the cost centre structure of a public hospital. Table A1.1, Appendix 1 shows the actual cost centre structure of each hospital, and illustrates the variability in actual organisational structure between the study hospitals.

Table 3.2: Organisation of typical public hospital into cost centres

Intermediate Administrative Cost Centres	Intermediate Service Cost Centres	Final Cost Centres
Administration Stores Maintenance and housekeeping Catering Transport Laundry Nursing administration and housing	Laboratory Pharmacy Radiology Department Rehabilitation Unit Operating theatres Mortuary	Outpatients Department Wards: • Female medical • Male medical • Female surgical • Male surgical • Isolation • Tuberculosis • Psychiatry • Maternity • Paediatrics Nurse Training Department Community Services

3.1.2. Identification and adjustment of expenditures

Expenditure reports for each hospital for the study year were obtained from the relevant authorities.[22] These were adjusted to include all expenditures incurred in the production of hospital services, but not reflected on the expenditure reports, as well as to exclude any expenditures reflected in the reports, but not regarded as being utilised for production of hospital outputs. Examples of additional expenditure items not reflected in the expenditure reports included capital expenditures and services provided to the hospitals by other government departments or by the head offices (HO) of the private and contractor hospitals. The cost items excluded despite their appearance in the expenditure reports were some capital items (since a 'replacement cost' approach was adopted for estimation of capital costs[23]), as well as items not regarded as representing true production costs (e.g. bad debts, discounts allowed and similar items found in the expenditure reports of the private hospitals). Full details of the adjustment to the expenditure reports for each hospital are given in Table A1.2, Appendix 1, which also shows the sources of any additional expenditure data included in the analysis. In the case of the contractor hospitals, the use of 1991/92 expenditure data necessitated adjustment to 1992/93 prices. This adjustment was carried out using a specific factor for each hospital, based on the actual inflation in production costs experienced by each hospital between 1991/92 and 1992/93.[24]

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22 Sources of expenditure reports were as follows: Lifecare Head Office (HO) for the three Lifecare hospitals. In the case of Shiluvana and Hewu, additional data on staff costs and other expenditures were obtained from the Gazankulu and Ciskei Departments of Health (DoH) respectively; Gazankulu DoH for Tintswalo and Letaba; Ciskei DoH for Bisho; HospiPlan HO for Pietersburg and Nelspruit; Afrox HO for St Dominics.

23 This approach involves an estimate of the current cost of replacing all capital items in the hospital. and is described in more detail below. This approach means that inclusion of specific capital items from the current expenditure data would represent double counting.

24 Data on which these factors was based were obtained from Lifecare HO. The factors used were as follows: Matikwana: 15% ; Hewu: 15% ; Shiluvana: 17%. These compare with the change in the Consumer Price Index of 13% over the same period (Central Statistical Services 1994).

3.1.2.1. Estimation of capital costs

Capital items were defined as all items having a lifespan of at least one year and a current replacement cost of at least R500. The costs of all capital items were estimated using a 'replacement cost' approach, in which the annuitised values of the current replacement costs of all buildings and equipment were estimated. This approach was adopted in preference to the more conventional 'accounting' approach in which historic purchase costs are used as the basis of valuation, since in most cases, there were insufficient data to undertake this latter approach. As discussed further below however, historic costs were in some cases used as the basis for estimating current replacement costs.

3.1.2.1.1. Building costs

Official government estimates (Department Health and Welfare, Republic of South Africa 1985) were used to estimate the current replacement costs of the public hospital buildings.[25] These replacement cost estimates are given in 1985 prices, and were inflated to 1992/93 prices using a locally developed building cost inflation index (Kilian and Snyman 1993). The inflated figures were then applied to each of the public hospitals and to one of the contractor hospitals which was originally built as a public hospital (Hewu), using dimensions obtained from floor plans. This allowed an estimate of the current replacement costs for each section of the hospital, and for the hospital as a whole.

In the case of the remaining two contractor hospitals, historic building costs were available and these were inflated to 1992/93 prices using the building cost index described above, and the estimated total replacement cost was attributed to the various functional areas of each hospital using relative weights for each area, which were derived from the public sector estimates. A similar approach was adopted for two of the

25 These estimates were independently reviewed by two experts both of whom confirmed them as sufficiently accurate for use in estimating current replacement costs (Jackson 1994, Abbot 1994).

private hospitals for which historic building cost data were available (Pietersburg and Nelspruit). In the case of the third private hospital, for which no historic cost data were available, the historic costs of the other two private hospitals were used to estimate a mean replacement cost for each area, which was then applied to the dimensions of the hospital. The choice of historic costs as the basis for estimating current replacement costs in the private hospitals was based on the view that the use of public sector estimates would produce biased results due to probable differences in building specifications and in control over building costs between the public sector and the private hospital companies. Table A1.3, Appendix 1 illustrates the extent and direction of the bias for these hospitals, confirming that the use of public sector estimates would lead to overestimation of replacement costs for contractor hospitals, and underestimation for private hospitals.

3.1.2.1.2. Equipment costs

Since there were no detailed equipment inventories at any of the study hospitals, it was not possible to estimate individual replacement costs. Instead, the current costs of re-equipping each of the study hospitals were obtained from a specialist hospital equipment supply company[26], on the basis of detailed specifications concerning the structure and range of services delivered by each hospital. The resulting estimates of equipment replacement costs (in 1994 prices) were deflated to 1992/93 prices.[27] These data were compared with inflated historic cost data for the same two contractor and private hospitals for which building costs were available, indicating that the estimates of current replacement cost exceeded historic costs by 53% on average for the contractor hospitals and 41% on average for the private hospitals (see Table A1.3, Appendix 1).

While these discrepancies suggest that the historic costs should be used where available, the absence of specific sources of data for the public hospitals (unlike the case of

26 MedPro Pty (Ltd), a hospital turnkey and supply company based in Johannesburg.

27 Deflation was carried out using a factor of 10% per annum, which has been accepted as standard for the hospital equipment industry over the last several years (Gunning 1994).

building costs) would mean that such an approach would risk biasing the public sector estimates to a greater degree than for the other two groups. It was therefore decided to apply the current replacement cost estimates to all hospitals, and to adjust these to allow for the discrepancies noted here.[28] Sensitivity analysis was conducted by applying a range of adjustment factors to these estimates. In the case of vehicles, current replacement costs of all vehicles used by each hospital were obtained and deflated to 1992/93 prices.[29]

3.1.2.1.3. Annuitisation of capital costs

The annual cost of all capital items was estimated by annuitising the estimated initial capital outlay over an assumed useful life of the asset concerned, thus incorporating both depreciation, and the opportunity cost of capital employed. A discount rate of 8% was used as the standard rate throughout the cost analysis.[30] The useful life of buildings was assumed to be 50 years, equipment 10 years, and vehicles 5 years, and all assets were assumed to have no salvage value at the end of their life-spans. Sensitivity analysis was carried out to test the effects of changes in the discount rate and in lifespan assumptions on final cost estimates.

3.1.3. Allocation of expenditure items to intermediate and final cost centres

Once all expenditures were identified and adjusted, these were allocated, in a first step, to the appropriate intermediate, and/or final cost centres, to give the direct costs of each of those centres. In a second step, the costs of all intermediate cost centres were then

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28 Since contractor and public hospitals are likely to resemble each other more closely in terms of equipment than they would private hospitals, the average discrepancy for contractor hospitals was used to adjust the estimates for all public and contractor hospitals, while the equivalent figure for the two private hospitals was used for all three private hospitals.

29 Deflation was based on official vehicle price inflation rates (Central Statistical Services, Republic of South Africa 1994).

30 This was the discount rate used by the public sector to calculate the costs of capital during the 1992/93 financial year (Central Economic Advisory Services, Republic of South Africa 1994).

allocated, as indirect costs, to other intermediate cost centres, and to final cost centres. Details of the allocation methods used in each of these steps are now described.

3.1.3.1. Allocation of recurrent costs

Recurrent costs were attributed to each cost centre on the basis of information obtained from the relevant HOs and hospitals, and where this was not available, on the basis of standard assumptions applied uniformly to all hospitals. In the case of staff costs, time use data were used to allocate appropriate proportions of total costs to the relevant cost centres. Details of the information used in these allocations is given in Table A1.4, Appendix 1. In all cases, sample estimates of staff costs were adjusted proportionately to fit the known total expenditures on staff from the annual expenditure reports. Table A1.5, Appendix 1 shows the margins of error encountered in sample estimations of total staff costs relative to known totals obtained from expenditure reports, and provides some explanations for these errors. Table A1.6, Appendix 1 describes the information and assumptions used to allocate medical and surgical supplies, while Table A1.7, Appendix 1 provides similar information for all other categories of direct recurrent costs.

3.1.3.2. Allocation of capital costs

In the case of buildings, the annuitised replacement costs per square metre for specific areas of the hospital were allocated to the appropriate cost centre using dimensions obtained from floor plans. The annuitised replacement costs of equipment for each section of the hospital were allocated to the appropriate section where this could be determined. Where equipment replacement costs apply to generic areas, such as wards, these were allocated to specific wards in relation to the proportion of beds accounted for by each ward. Annuitised vehicle replacement costs were allocated in full to the transport section.

3.1.4. Allocation of indirect costs to intermediate and final cost centres

In the second step of the allocation process, the costs of each intermediate cost centre were allocated to other relevant intermediate cost centres, and to final cost centres, using appropriate allocation formulae. This approach required that an allocation sequence be adopted, with the first intermediate centre being fully allocated, followed by the second, and so on until all intermediate cost centres were fully allocated to final cost centres. The general principle adopted in designating the sequence was to give priority ranking to those intermediate centres which deliver most services to other intermediate centres, while receiving relatively few services from others. Where intermediate services are involved in servicing each other, this necessitated a subjective judgement as to the balance between these. For the purposes of uniformity, it was decided to maintain a consistent allocation order between all hospitals. While it is clear that the overall choice of allocation sequence can have some impact on the relative costs of different centres, this appears to relate mainly to the prioritisation of those centres which primarily service others. Evidence from other studies indicates that the particular ranking of intermediate centres which service each other does not have a significant influence on final cost estimates (Trisolini *et al.* 1992). For this reason, sensitivity analysis on the impact of different allocation sequences was not carried out.

Allocation formulae were developed from information obtained from hospital statistics and from interviews with hospital officials. While the study attempted to attain uniformity of approaches between hospitals, the variability in organisational structure and functioning between hospitals meant that accurate allocation within each hospital necessitated the adoption of unique allocation formulae in some cases. Table A1.8, Appendix 1 describes the allocation formulae, and notes where different approaches were used in particular hospitals. The order of intermediate cost centres in the table reproduces the allocation sequence adopted (as does Table 3.2). Where a particular hospital did not have one of these intermediate centres, allocation proceeded to the next cost centre in the sequence.

3.1.5. Calculation of unit costs and other cost relationships

The outputs defined for the purposes of the unit cost calculations were beds, operations, outpatient (OPD) visits, in-patient days and admissions, the latter two for the hospital as a whole, as well as for four service-mix categories: medical, surgical, paediatric and maternity patients.[31] Table A1.9, Appendix 1 describes the methods used for collecting data on these outputs at each hospital. In addition, composite 'in-patient day equivalent' and 'admission equivalent' outputs were defined, which aggregated in-patient days and OPD visits, and admissions and OPD visits respectively. In both cases, the relative weights of the in-patient and outpatient outputs in the composite measure were determined individually for each hospital on the basis of the relative unit costs of the respective outputs at that hospital. Table A1.10, Appendix 1 shows the relative weights used for the two composite measures at each hospital.

Unit costs were calculated by dividing total costs for each section by the outputs for that section. In order to allow for standard comparisons between all hospitals, the costs and outputs of particular cost centres had to be aggregated in some cases. These aggregations are described in Table A1.11, Appendix 1.

In order to assess, and correct for, the effects of service-mix, the unit cost estimates were standardised using an indirect standardisation approach, in which all hospitals were assumed to have the same service-mix profile as an hypothetical hospital. This hypothetical profile was calculated by taking the mean service-mix of all nine hospitals,

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31 These various terms were defined as follows:

Beds: the actual number of beds in active use at the hospital during the study year.

Operation: surgical procedures carried out in the operating theatres. Minor procedures carried out in the casualty departments were excluded from the definition of operations.

OPD visit: a visit by a patient to the OPD, irrespective of the number of procedures/treatments carried out during the visit.

In-patient day: each twenty four hour period that the patient was treated as an in-patient in the hospital.

Admission: an episode of in-patient treatment, beginning with initial admission to the hospital, and ending with discharge.

Service-mix: the distribution of cases treated as in-patients in the hospital between the four standard service categories - medical, surgical, maternity and paediatric.

or of the six contractor and public hospitals where only these were being compared. Table A1.12, Appendix 1 shows the service-mix profiles for each hospital as well as the hypothetical profiles used in the standardisation procedure.

In addition to the distribution of costs between capital and recurrent costs discussed above, recurrent costs were aggregated into standard categories for purposes of comparison across hospitals. These were administration, domestic services, clinical support services, and staff costs.[32] Recurrent costs were also categorised as fixed or variable, with variable costs defined as those costs which increase with an increase in the number of in-patients treated or OPD visits conducted over a one year period.[33]

3.1.6. Comparisons of total contract costs and public sector production costs

As discussed in the research framework in Chapter 1, the critical comparison from a policy perspective is that between the total costs incurred by the government in the contracting out of hospital services (total contract cost) and the costs to the government of producing services in public hospitals (public sector production costs). This section begins by defining and distinguishing between total contract cost, contractor production costs, and total production costs at contractor hospitals, and then describes the methods used in calculating these various costs.

Total contract cost is defined as the total cost borne by the government in contracting out of hospital services, and includes the price paid to the contractor, the transactions costs incurred by the government in establishing and maintaining the contract, as well as

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32 Administration costs included external administrative costs (incurred by the HO infrastructure and allocated to the hospital), and internal administration costs (including all costs incurred in the administration cost centre)

Domestic services included all costs incurred in the transport, laundry, catering and housekeeping/maintenance cost centres.

Clinical support services included all costs incurred in the pharmacy, radiology, rehabilitation services and operating theatres cost centres.

Staff costs included all medical, paramedical and nursing staff costs, but excluded the costs of staff working in the administration, domestic services and clinical support services categories.

33 Variable costs included medicines costs, food, supplies used in production of X-rays and laboratory tests, tests conducted by outside laboratories and other consumable items.

other costs borne by the government.[34] Examples of this latter category include the costs of public sector staff employed (full-time or part-time) in contractor hospitals, and the costs of public sector ambulance services which support the contractor hospitals.[35]

As distinct from total contract cost, contractor production costs include only those costs borne by the contractor itself in producing services at each hospital. This cost should in turn be distinguished from the concept of total production costs at contractor hospitals, which includes both contractor production costs, and costs incurred by the government, but excludes the contract price.[36]

Data on the price of the contracts at the three contractor hospitals were obtained from Lifecare, and corroborated by data from the relevant government authorities. The contract prices incorporated an element of value-added tax (VAT), which was introduced five months into the study year at a rate of 10%. Since there is some debate over whether VAT should be treated as a true cost to the public sector, total contract costs were calculated with and without VAT.

Total contract costs per in-patient day, per admission and per OPD visit were estimated by allocation of the total contract cost between the OPD and all in-patient wards as a whole, in proportion to their respective shares of production cost at each of the contractor hospitals. This approach was necessary since the contract price is charged as a

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34 Total contract cost may be formally defined as follows:

$$C_T = P + C_G$$

where:

C_T = Total contract cost

P = Price of the contract

C_G = Costs incurred by the government in contracting out of hospital services

35 The costs incurred by the government in supporting community services in the vicinity of the contractor hospitals were omitted from the cost estimates, since the cost analysis explicitly excluded community services at all of the study hospitals.

36 Total production costs at contractor hospitals may be formally defined as follows:

$$C_C = C_G + C_{con}$$

where

C_C = Total production costs at contractor hospitals

C_G = Costs incurred by the government in contracting out of hospital services (excluding contract price)

C_{con} = Contractor production costs

fixed amount per day for all hospital patients, with no distinction being made between patients of different service-mix categories.[37]

3.1.7. Assessment of hospital utilisation statistics

The assessment of hospital utilisation statistics drew on the same hospital output data described in Section 3.1.5 of this chapter and in Table A1.9, Appendix 1. The parameters analysed included turnover rate, average length of stay (LOS), and bed occupancy rate. Turnover rate was defined as the total number of admissions per available bed per year.[38] LOS was defined as the stay (in days) of the average in-patient.[39] LOS data were adjusted for service-mix. This adjustment assumed that all hospitals admitted an identical service-mix profile, derived from the mean values of the 6 public and contractor hospitals[40], but that LOS for individual wards at each hospital remain constant. The average bed occupancy rate[41] was defined as the percentage of

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37 An exception to this occurs in the case of OPD visits, which are charged for at the rate of one third of a patient day price at Matikwana and Hewu hospitals, and are not charged for at Shiluvana. These factors were taken account of in the allocation of total contract cost to individual cost centres.

38 Turnover Rate was calculated as follows:

$$T = \frac{N}{B}$$

where:
T = Turnover rate
N = Total annual admissions
B = Average annual number of beds available

39 Length of stay was calculated as follows:

$$LOS = \frac{D}{N}$$

where:
D = Total number of in-patient days during the study year
N = Total annual admissions

40 The 6 contractor and public hospitals were used in preference to all 9 hospitals in deriving the hypothetical service-mix profile because of the primary focus of the study on the former 2 groups, and because the considerably different service-mix profile of the private hospitals was thought likely to bias the results of the adjustment.

41 Bed Occupancy Rate was calculated as follows:

$$O = \left[\frac{D}{B \times 365}\right] \times 100$$

where:

time, on average, that all beds in the hospital (or ward) are occupied. The estimates of average bed occupancy rates were also adjusted for service-mix.

The individual performance indicators discussed here are interrelated[42], and can be analysed simultaneously, using a graphical technique devised by Pabon Lasso (1986), in which occupancy rate is plotted on the X axis, and turnover rate on the Y axis. As illustrated in Figure 3.1, when hospitals are plotted on a graph of this type, a ray drawn from the origin through each point represents the LOS, which increases across the top of the graph and down the right hand axis. The graph is divided into four quadrants by the mean values for occupancy rate and turnover rate. The resulting graph consists of four sectors; Sector 1 is characterised by relatively low turnover rates and low levels of occupancy, despite relatively long LOS, and represents the least productive use of hospital resources. Sector 2 represents a more productive use of resources, with higher turnover and shorter LOS than in Sector 1. Sector 3 represents the most desirable situation, with high turnover and intermediate levels of LOS resulting in high occupancy levels, while Sector 4 is characterised by high occupancy and low turnover, suggesting particularly long LOS.

In the application of this technique, the data used to divide the graph into quadrants were derived from the contractor and public hospitals only.[43] The data for individual study hospitals were then used to plot their respective positions on the resulting graph.

O = Occupancy rate
D = Total number of in-patient days during the study year
B = Average annual number of beds available

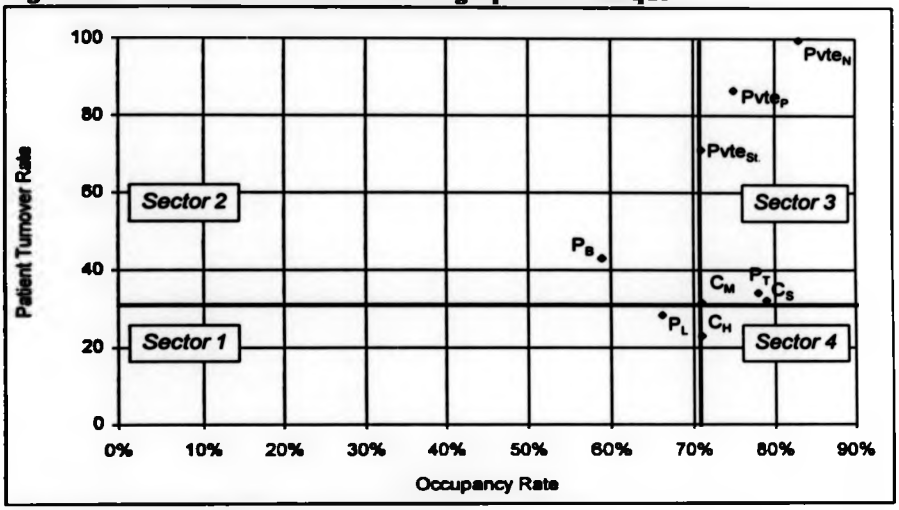
42 The equations for each of the individual statistics can be solved to give:

$$LOS = \frac{O \times 365}{T}$$

where
LOS = length of stay
O = Occupancy rate
T = Turnover rate

43 The contractor and public hospital data were used in preference to data from all nine hospitals in order to highlight differences between these two groups, since the inclusion of the private hospital data would have blurred the distinctions between the public and contractor groups. In addition, the very different utilisation profiles at the private hospitals would have lead to bias in these results.

Figure 3.1: Illustration of Pabon Lasso graphical technique



Note: Data represents the study hospitals (see Chapter 4).

3.1.8. Comparisons between hospitals and groups

As indicated in the research framework (Chapter 1), study hospitals were matched by geographic area so as to eliminate the possible confounding effect of location on the primary assessment of the relationship between hospital ownership and performance. Analysis of variance was therefore performed to test the relative effects of location and ownership on a range of key hospital utilisation and cost parameters. Because of the small sample sizes involved, the Kruskal-Wallis one way analysis of variance by ranks test was used. This is a non-parametric test, which does not rely on the assumption of a normal distribution of data in the underlying population and is thus appropriate with sample sizes of the order used in this study (Siegel and Castellan 1988). Because of small sample sizes involved, statistical tests measuring the significance of observed differences between the ownership groups were not appropriate, and were therefore not utilised.

When the private hospitals were included in the cost analyses, costs at the contractor and public hospitals had to be adjusted by eliminating the costs of medical and paramedical staff, and of radiological and laboratory investigations to allow for comparability with the private hospitals. These adjustments were necessary because, as described in Chapter 1, medical and paramedical staff are self-employed, and radiology and pathology services are owned and operated by independent specialists, and not by the private hospitals themselves. As a result, the private hospital costs (and prices) exclude all of these items, and patients using these hospitals pay separately for these various services.

3.1.9. Data collection and analysis

All data were collected by the senior researcher and two research assistants during two site visits to each hospital, and one visit to each of the relevant head offices. All data processing and statistical analysis was carried out using a spreadsheet programme (Microsoft Excel Version 5).

3.1.10. Methodological problems

Two main sets of methodological problems were encountered in the cost analysis. The first arose from the estimation of unit costs at the individual hospitals, and the second from comparisons between the hospitals. Problems in the estimation of unit costs arose firstly from the process of adjusting expenditures to estimate total hospital costs, secondly from the various assumptions required in the 'step down' cost allocation process, and thirdly from the data on hospital outputs.

Capital costs presented the major problem in the estimation of total hospital costs. Unlike the majority of recurrent costs, the costs of capital items were neither available from expenditure reports, nor could the estimates of their replacement values be adjusted to fit known total expenditures from the expenditure reports. The gaps between some of the replacement cost estimates and the available historic cost data point out the potential

problems of this approach. Additional uncertainties in capital cost estimation derive from the use of assumptions as to lifespan of assets which may not accurately reflect their usage patterns, as well as from an assumed cost of capital, which may not accurately reflect the true opportunity cost of capital to the different hospitals. In these latter cases, sensitivity analyses were carried out in order to test the impact of variations in these assumptions on total and unit costs. A final problem with the use of the 'replacement cost' approach is that it fails to capture the condition or age of buildings or equipment. This provides cause for concern in this study since these factors vary significantly both within and between some of the study hospitals.

Another problem encountered in the estimation of total costs concerns the inclusion of costs which were not reflected within the budgets of the hospitals or the respective HOs. Since these data were obtained from a large number of outside agencies, it was not always possible to obtain the data required to corroborate them. This was a particular problem in the case of the costs of staff employed by outside agencies, where estimates of annual staff costs could not be adjusted to fit known total expenditures as was done for hospital staff.[44] This problem affected mainly the public hospitals, and to a lesser extent the contractor hospitals, but did not occur at the private hospitals.

The absence of detailed cost centre information at all hospitals necessitated the development of allocation formulae which may not accurately reflect the true utilisation of the relevant resources by each cost centre. Although efforts were made to develop the formulae as accurately as possible, the validity of these formulae in three particular areas gives rise to some concern. The first emerges from the allocation of HO costs to the individual public hospitals; whereas the contractor company and the two private hospital companies account accurately for the use of HO administrative resources by their individual hospitals, this was not the case with the public sector hospitals, for which specific allocation formulae had to be developed. While detailed interviews were undertaken in the development of these formulae, it is not clear that these accurately capture the true use of HO administrative resources by the public hospitals. The high

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44 Carrying out these adjustments would have required detailed data on numbers and costs of all staff employed by the relevant agencies, and was judged to be not feasible within the timetable set for this study.

administrative costs in the public sector HOs emphasises the importance of this problem, and sensitivity analysis was carried out to document the impact of these allocations on the resulting cost estimates.

A second area of concern emerges from the allocation of staff costs to cost centres. One possible source of inaccurate information here is sampling error resulting from the sampling of payroll, roster or other data to obtain details of numbers and costs of staff in each cost centre. This is likely to have been a particular problem only where small samples were available, as occurred at Bisho hospital, for example. It was also more serious where accurate data were not available, as was the case with the distribution of doctors', nursing managers' and hospital managers' time.

A final problem in the cost allocation process arose in the allocation of medicines and surgical supplies costs to final cost centres. As noted above, a range of different formulae with different levels of accuracy were applied, depending on the availability of data at the different hospitals. In general, these allocations were most accurate in the case of the private and contractor hospitals, and least so in the public hospitals, where the allocation relied heavily on sampling of utilisation patterns rather than on more accurate tracking of utilisation.

Several problems were also encountered in the collection of data on hospital outputs, the accuracy of which is vital to the validity of the unit cost estimates. Perhaps most important amongst these were possible inaccuracies in the output data available from the public and contractor hospitals.[45] Wherever possible, these data were checked for inaccuracies through the use of multiple data sources, and through resolution of inconsistencies between these sources. None of the information systems at the study hospitals contained the full range of data required for this study, necessitating various

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45 Data collection systems at two of the public hospitals (Bisho and Letaba) were haphazard and poorly organised, with most data collection driven by the need to submit statistical returns to the relevant government HO. At the third, Tintswalo, a well developed, systematic data collection system was in place and was functioning well. In the contractor hospitals, data collection is driven primarily by the need to collect information on the total number of patient days and outpatient visits (since billing is based on these data), so that data on these parameters were accurate, but data on other outputs appeared to be more haphazard. In the private hospitals, the use of itemised billing procedures necessitates highly sophisticated information systems which maintain accurate and detailed data on all hospital outputs.

sampling procedures at each hospital, and implying the possibility of some degree of sampling error in most instances. While efforts were made to obtain large sample sizes wherever possible, logistical factors prevented this in several cases.

Variations in hospital information systems also presented important problems of their own. Inconsistency in the definitions of service-mix categories was a particular problem at the private hospitals, where definitions of surgical and medical patients differ substantially from those pertaining at the public and contractor hospitals (where these definitions are fairly uniform). This problem was addressed through reclassification of samples of medical and surgical patients at the private hospitals in line with the implicit definitions at the public and contractor hospitals, an approach which itself introduced the potential for further sampling error. Variations in organisational structure between the hospitals necessitated aggregation of certain outputs into uniform categories, which also complicated the cost allocation process in many cases.

Some of the problems highlighted here contributed to the methodological problems relating to the comparability between study hospitals. Several other factors are however more relevant in this context, including the variability between hospitals in demographic, service-mix and case-mix[46] profiles, as well as the small sample sizes. Although demographic profile data were collected, this was of uneven quality, and was not used for standardisation in the light of the results of the logistic regression analysis carried out in the tracer analysis (see Chapter 4). As discussed above, an attempt was made to adjust for variations in service-mix profiles by calculating the unit costs of service-mix based outputs, as well as by standardisation against an hypothetical service-mix profile. Both of these attempts however rely upon a fairly crude categorisation of service-mix, which may have masked important differences in actual service-mix between the study hospitals. The problems arising from service-mix differences are aggravated by likely differences between hospitals in case-mix and severity[47] of cases, as well as in the demographic profiles of patients within each of the service-mix

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46 As distinct from service-mix, which was defined above, case-mix refers to the distribution of patients treated in the hospital (and within each service-mix category) between different types of clinical cases.

47 Severity refers to the seriousness of a particular illness. Patients in the same case-mix category can be more or less severely ill, and will require different resources for successful treatment.

categories. The application of the cost analysis to four tracer conditions (see below) was undertaken to partially address these problems.

An additional constraint on the comparability between the hospitals emerges from the small sample of hospitals in each of the groups. This prevented parametric statistical analysis of the significance of any observed differences between the groups, and also limits the generalisability of the results to other hospitals within each of the groups. While the statistical problem was addressed through the use of non-parametric statistical techniques, the limited generalisability of these results to other public and private hospitals is conceded as an additional important limitation of the cost analysis, as well as of the broader study more generally.

3.2. Cost analysis of tracer conditions

In an effort to address the problems caused by differences between the hospitals in case-mix and severity, cost analysis was applied to four specific types of cases, termed tracer conditions here. Two of these were obstetric conditions - normal vaginal deliveries (NVD) and caesarean sections, while the other two were surgical conditions - hernia repair and appendectomy cases. These four conditions were selected on the basis that they are relatively simple and homogenous, at least in comparison to most other types of cases treated in these hospitals, and could thus be expected to reduce, if not eliminate, the problem of varying severity across the study hospitals.

The tracer cost analysis involved identification and selection of a sample of cases from each of the four tracer conditions, the collection of data for each case on the use of various resources (termed cost components here), and the attachment of costs to each of the cost components to give an estimate of total costs per case. This was followed by statistical analysis to facilitate comparison between individual hospitals and groups. Each of these steps is discussed in more detail below.

3.2.1. Identification and sample selection

All caesarean sections and NVDs conducted at each hospital during the study year were identified as described in Table A1.9, Appendix 1. A systematic sample of cases from each of the two tracers was drawn from the maternity registers in all hospitals. All cases of the surgical tracers conducted at the contractor and public hospitals during the study year were identified from the operating theatre registers, and the same source was used to draw a systematic sample of cases. In the private hospitals, total numbers of cases of the surgical tracers were obtained from the hospital information system, and the same sources were used to identify systematic samples. Once samples had been identified, case identification numbers were recorded, and the appropriate case records were withdrawn for analysis. Tables A2.1 and A2.2, in Appendix 2, show the total numbers of cases, as well as intended sample sizes and actual sample sizes for the obstetric and surgical tracer conditions respectively. Absolute sample sizes and corresponding percentages of the sampling populations differ between hospitals, in part because of logistical constraints on the number of cases that could be analysed (resulting in different intended sample sizes), and in part because of variable record retrieval rates among hospitals.[48]

3.2.2. Collection of data on cost components and cost analysis

Data were collected on LOS, usage of laboratory services, medicines and surgical supplies, usage of operating theatre time, and age and sex profiles for each of the tracer conditions. Where possible, these data were collected from the analysis of individual patient records. In some cases, however, the required information was not available from individual patient records, and other methods of deriving this information had to be utilised. The methods and sources of data collection on these cost components are summarised in Table A2.3, Appendix 2.

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48 Failed retrieval was due either to a failure to find the record at all, or to successful retrieval of an incorrectly identified or filed record.

Costs were then attached to each of the components using a standard approach for all tracer conditions and for all hospitals, wherever possible. The methods used here are also summarised in Table A2.3, Appendix 2. These data were then used to calculate the total costs per day and per admission for each individual case.[49] The mean and median values of the costs per case were calculated for each of the tracers at each hospital, using Microsoft Excel Version 5, and the same package was used to carry out T tests for the statistical significance of differences in mean cost per case between the ownership groups. These tests were done by pooling all cases within each group, and were conducted to compare the contractor and public hospitals only, as well as to compare all three groups. In the latter case, the costs per case at the contractor and public hospitals were adjusted to allow for comparability with cases at the private hospitals. Logistic regression analysis, again using Microsoft Excel Version 5, was carried out in order to test for the effect of age and sex on costs per case for each tracer. These variables were regressed against cost per case individually, as well as collectively, for each hospital, as well as on the pooled data for each of the groups.

The estimation of total contract costs for the tracer conditions was based on an adjustment of the hotel and staff costs[50] component of each of the tracer cases to reflect the difference between production cost and total contract cost. It was not possible to adjust the other components of total cost per case since the contract price itself could not be allocated to intermediate cost centres. The estimates of total contract cost per case for

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49 The costs per day and per admission were calculated using the formulae:

$$CD = H + I + M + Op$$

$$CE = (H \times LOS) + I + M + Op$$

where:

CD = Cost per day

CE = Cost per admission

H = Average hotel cost per day for the relevant ward (defined as all costs incurred in running the ward aside from laboratory, medicines and operating theatre costs)

I = The sum of laboratory and radiological costs

M= medicines and surgical supplies costs

Op = operating theatre costs

LOS = length of stay

50 Hotel and staff costs include all ward costs besides the costs of laboratory tests, drugs and operating theatre time, which were estimated separately.

the tracer conditions are therefore likely to underestimate the true total contract cost per case for these conditions.

3.2.3. Methodological problems

Some of the methodological problems encountered in the tracer analysis related to the problems of the general cost analysis, while others were specific to this analysis. As noted in Tables A2.1 and A2.2, Appendix 2, logistical constraints and problems with record retrieval resulted in differing sample sizes at the various hospitals. All sample sizes were, however, sufficiently large to permit parametric statistical analyses of the data. An additional problem was encountered at Bisho hospital, where no hernia repair or appendectomy operations were undertaken during the study year, necessitating omission of this hospital from the analysis of the surgical tracer conditions. In the analysis of the individual cost components, some of the required data were noted to be absent from some of the patient records, primarily as a result of poor record keeping. The most frequent problem in this instance was the absence of data on utilisation of medicines and surgical supplies. Where these or other data were missing, the case involved was assumed to have utilised the relevant resource at the average rate obtained from the analysis of the remaining cases.

As for the general cost analysis, perhaps the most significant problem here concerns the impact of factors such as case-mix, severity and age and sex on the comparability of the tracer cases across the study hospitals. As discussed further in Chapter 4, logistic regression analysis showed no confounding relationship between age or sex and costs per case. Lack of data however prevented a similar analysis of the effects of case-mix and severity on costs. In particular, it was not possible to assess the impact of parity and gravidity[51], nor of the reasons for caesarean section on the costs of the obstetric cases. Similarly, it was not possible to assess the effects of the severity of the pre-existing

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51 Parity refers to the number of times a woman has been pregnant, and gravidity to the number of times a pregnancy has been carried to term. Variations in these factors are clearly recognised to impact on the outcomes of obstetric care, and are therefore likely to affect LOS, and investigation and treatment costs, and hence costs per case.

appendeceal disease, nor of the presence or absence of a strangulated hernia or other complications on the costs per case of appendectomies and hernia repairs respectively.[52] It is therefore recognised that systematic differences between the hospitals in the occurrence of one or more of these factors may have affected costs per case, and hence may have led to biased results.

3.3. Data Envelopment Analysis

Data Envelopment Analysis (DEA) is a relatively recently developed linear programming technique designed to measure technical efficiency, which can be applied to any production process. Since this technique is relatively new, particularly in its application to the health sector, this section reviews some details of the basic technique, before providing details of its application in this study.[53] Appendix 3 provides a formal mathematical formulation of the DEA technique, while Appendix 4 reviews the recent literature on the advantages and disadvantages of this technique, and its applications in the health sector.

The DEA technique was developed by Charnes *et al.* (1978), following initial developments by Farrel (1957), and has been extended by Fare *et al.* (1985). The basic unit of analysis may be any production unit, often termed a decision making unit (DMU), which combines a defined set of inputs to produce a defined set of outputs. The notion of technical efficiency implicit in the technique is based on the concept of Pareto efficiency, which may be defined in terms of input and output criteria. In terms of the input criterion, a DMU is efficient if it is not possible to decrease any input without increasing any other input and without decreasing any output. In terms of the output

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52 The reasons for appendectomy may vary from acute abdominal pain to more severe problems such as rupture of the appendix with or without infection of the abdominal cavity. In these latter situations, the post operative recovery period is likely to be longer, and more expensive drugs may also be required, thus increasing the cost per case. Similar considerations apply to a situation in which a hernia repair is carried out on an emergency basis due to strangulation of the hernia, as distinct from the more usual situation, in which elective hernia repair is undertaken prior to such complications occurring.

53 The description of the methodology of DEA provided here draws on a number of published sources, including: Sexton 1986, Norman and Stoker 1991, Ganley and Cubbin 1992, Rosko 1990, Sexton *et al.* 1989, Sherman 1984, Nunamaker 1983, Huang 1989.

criterion, a DMU is efficient if it is not possible to increase any output without decreasing any other output and without increasing any input. Within the DEA framework, a DMU would be regarded as perfectly efficient when both of these criteria are fulfilled (Rosko 1990, Nunamaker 1983).

DEA evaluates the technical efficiency of a DMU relative to other DMUs in a given sample by calculating a relative technical efficiency ratio (TE) for each DMU, which is defined as the ratio of the DMU's total weighted output to its total weighted input. The computation of input and output weights is based on maximisation of the TE for each DMU, subject to some constraints on the selection of weights.[54] In other words, each DMU is permitted to select that set of weights which will maximise its own TE, provided these weights satisfy the general constraints. In general, maximisation of the TE means that DMUs will place higher weights on the outputs which they produce most of, and on the inputs which they use least of. Within any sample of DMUs being assessed, this approach therefore allows for the identification of the most efficient DMU or DMUs, which define a production envelope along which production is maximally efficient, as well as the location of all other DMUs relative to the efficient production frontier. DMUs on the efficient frontier are accorded a TE of 1, while the scores for all others (which will be between 0 and 1) reflect their efficiency relative to the efficient frontier.

The DEA model for each DMU can be formulated as a linear fractional programme, which can be solved if it is transformed into its equivalent linear programme in which the decision variables are the input and output weights of the DMUs. The transformed linear programme is then solved using the simplex method. A complete DEA analysis requires that one such programme be solved for each DMU in the sample under study. The results of the DEA analysis are therefore the TE for each DMU and its set of input and output weights. In addition, DEA identifies a reference set of perfectly efficient hospitals for each DMU identified as inefficient, together with multipliers for each DMU. These allow the formulation of an hypothetical composite DMU, which uses the

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54 These constraints are firstly, that no weight may be negative, and secondly, that that all weights must be universal - that is any DMU must be able to use the same set of weights and the resulting TE must not exceed 1.

same input and output weights as the inefficient DMU, but which is able to produce the same level of outputs with fewer inputs, or greater levels of output with the same inputs. This composite DMU thus indicates the extent of potential efficiency gains if the DMU were to move to the efficiency frontier (while retaining the same production technology) and also provides efficiency targets (in terms of inputs or of outputs) for the inefficient DMU.

The application of DEA in this study involved the steps of model specification, data collection and analysis. Each of these steps are discussed in the following sections.

3.3.1. Specification of DEA models

DEA was applied separately to a range of DMUs, using various permutations of input and output specifications in each case. Table 3.3 shows the various DMUs for which the analysis was carried out, as well as the relevant output variables used in each analysis. As noted in the table, where individual wards were the DMU, total annual admissions to those wards was used as the output.[55] Where all wards combined was the DMU, three different specifications were used: the first used total annual admissions for the hospital as a whole, the second used admissions adjusted for service-mix, while the third used admissions broken down into the same four service-mix categories utilised in the cost analysis. The table also shows that three similar specifications were used where the whole hospital was the DMU. In this instance, however, three additional specifications were included, incorporating adjustments for various aspects of quality of care. Finally, DEA was also applied to the four tracer conditions used in the cost analysis, with total numbers of cases of each of the tracers being the relevant output variable in each instance.

Admissions were chosen over in-patient days as the key output variable in all analyses for two main reasons: the first is that, like OPD visits or operations, an admission

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55 The medical and surgical wards were analysed jointly, since at some of the study hospitals the costs (and hence inputs) of these wards could not be determined separately.

represents a true functional output of the hospital, whereas in-patient days could arguably be viewed as a controllable input to the production of an episode of patient care. The second reason was the expectation that were in-patient days to be used as the key output variable, DEA would produce the counter-intuitive result that, *ceteris paribus*, hospitals with relatively longer LOS, and hence higher numbers of total in-patient days would appear relatively more efficient than hospitals with shorter LOS, and hence fewer total in-patient days. Sensitivity analysis was carried out to assess the impact of the use of in-patient days rather than admissions as the key variable.

Table 3.3: Decision making units and corresponding output variables used in DEA

DMU	Output variables used in DEA
Medical/Surgical ward/s	Output model 1: i. Total annual medical admissions ii. Total annual surgical admissions Output model 2: i. Total annual medical in-patient days ii. Total annual surgical in-patient days
Paediatrics ward/s	Output model 1: Total annual paediatrics admissions Output model 2: Total annual paediatrics in-patient days
Maternity wards	Output model 1: Total annual maternity admissions Output model 2: Total annual maternity in-patient days
All wards	Output model 1. Total annual admissions Output model 2: Total annual admissions adjusted for service-mix Output model 3: i. Total medical admissions ii. Total surgical admissions iii. Total paediatrics admissions iv. Total maternity admissions Output model 4: i. Total annual in-patient days
Outpatient Dept.	Total annual OPD visits
Operating theatres	Total annual operations
Whole hospital	Output model 1: i. Total annual admissions ii. Total annual OPD visits iii. Total annual operations Output model 2: i. Total annual admissions adjusted for service-mix ii. Total annual OPD visits iii. Total annual operations Output model 3: i. Total medical admissions ii. Total surgical admissions iii. Total paediatrics admissions iv. Total maternity admissions v. Total annual OPD visits vi. Total annual operations Output model 4: As for Output model 1; all outputs adjusted for structural quality of care Output model 5: As for Output model 1; all outputs adjusted for quality of nursing care Output model 6: As for Output model 1; all outputs adjusted for combined structural quality of care and quality of nursing care Output model 7: i. Total annual in-patient days ii. Total annual OPD visits iii. Total annual operations
Maternity ward/s	1. Total annual caesarean section cases 2. Total annual normal delivery cases
Surgical ward/s	1. Total annual appendectomy cases 2. Total annual hernia repair cases

Adjustment of total admissions for quality of care was carried out using the results of the analyses of structural quality of care and quality of nursing care (see Chapter 5). These two elements of the quality of care evaluations were selected since they are the only ones which generated quantitative evaluations of quality of care which could be used to adjust outputs. In both of these analyses, quality of care at each hospital was rated using a percentage of the maximum possible attainable score. In this exercise, the resulting percentages were used as weighting factors to adjust the various outputs specified in each model.[56] In the adjustments for both structural quality of care and quality of nursing care, the grand total scores obtained by each hospital were used to adjust the relevant outputs. In the combined adjustment, a weighted average of the scores obtained in the two separate evaluations was calculated and used to adjust the outputs in the same manner.[57]

Since detailed cost data were available for all hospital inputs, it was decided to measure the input variables in terms of cost (in 1992 Rand), rather than in physical units, since this would allow evaluation of economic rather than just technical efficiency. As shown in Table 3.4, three separate sets of general input models were specified, with separate models specified for the operating theatres and tracer analyses. Since the results of the DEA were expected be sensitive to the total number of input and output variables included, particularly in the light of the small samples of DMUs being analysed here (Norman and Stoker1991, Sexton *et al.* 1989), input model 1 (also referred to as the base model) aggregated total production costs into two input variables. To test the sensitivity of the DEA results to the number of variables, model 2 aggregated total costs into four variables, while model 3 broke costs down further to give a total of eight variables. As noted in Table 3.4, adjustments to some of the inputs were required in some of the analyses, particularly where the private hospitals were included in the analysis set.

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56 For example, where a hospital obtained a grand total score of 78%, and where total annual in-patient admissions = X, total OPD visits = Y and total operations = Z, the adjusted values of the outputs would be given by 0.78 x X, 0.78 x Y and 0.78 x Z.

57 The score obtained in the structural quality of care evaluation was given a weight of 35%, while that obtained in the evaluation of the quality of nursing care was given a weight of 65%. These weights reflect a subjective assessment of the relative importance of nursing care and structural factors on the ultimate outcomes of patient care.

Total contract costs, as well as production costs, were used as input variables in the comparisons between the contractor and public hospitals.[58] In the case of the tracer analysis, a four input model was used since the data emerging from the tracer analysis were available in this form only. The major difference between this and the other models is the inclusion of capital costs within the 'hotel and staff costs' variable.

DEA can be carried out assuming constant (CRS) or variable returns to scale (VRS). Since the study hospitals vary systematically in size according to their ownership group, the base models incorporated an assumption of CRS in order to eliminate the effect of scale on efficiency. A further justification for the use of a CRS assumption is the fact that the data used in this study refer to a short run period of one year, with the result that capital stock can safely be regarded as fixed during the study period. The available empirical data on hospital cost functions in developing countries also generally suggest constant returns to scale in most cases, the exceptions being some limited studies in which decreasing returns to scale were noted (Barnum and Kutzin 1993). In order to test the sensitivity of the results to this assumption, all models were run again incorporating an assumption of VRS.

58 Since only a single total contract cost was available, this was broken down into the required variables using proportions derived from the production cost analysis.

Table 3.4: Input model specifications for DEA

Input model 1 (Base model):	i. Total recurrent costs[a] ii. Capital costs
Input model 2:	i. Administrative/Domestic services costs[b] ii. Drugs/Other clinical services costs[c] iii. Total staff costs[d] iv. Total capital costs
Input model 3[e]:	i. Administrative costs ii. Domestic services costs iii. Drug costs iv. X-ray and laboratory investigations costs v. Theatre costs vi. Nursing staff costs. vii. Medical, paramedical and other staff costs viii. Capital costs
Operating theatre input model:	i. Theatre costs
Tracer analysis input model:	i. Drug costs[f] ii. Laboratory investigations[g] iii. Theatre costs[h] iv. Hotel and staff costs[i]

Notes: a. When the private hospitals were included in the analyses, total recurrent costs at the contractor and public hospitals were adjusted to exclude the costs of X-ray and laboratory investigations, and medical and paramedical staff costs.
b. Includes all expenditures in the categories of administration and domestic services, as defined in the methodology of the cost analysis above.
c. Drugs category includes total expenditure on drugs and surgical supplies. Other clinical services includes expenditures on X-ray and laboratory investigations, as well as on operating theatres. The 'other clinical services' category had to be adjusted for the particular DMU being analysed. Where the OPD and the individual wards were analysed, operating theatre costs were excluded. When the private hospitals were included in the analyses, X-ray and laboratory investigations were omitted from this category (since these services are not provided at the private hospitals).
d. When the private hospitals were included in the analyses, medical and paramedical staff costs at the contractor and public hospitals were excluded from this category.
e. Variables in this model were adjusted in similar ways to those noted in the other two models. Costs of X-ray and laboratory investigations, as well as medical and paramedical staff were omitted from the contractor and public hospitals when the private hospitals were included in the analysis. Theatre costs were excluded when the OPD and the individual wards were the DMUs being analysed.
f. Mean drug costs per case. Calculated as described in cost analysis methodology.
g. Mean laboratory investigations per case. These costs were omitted from the contractor and public hospitals when the private hospitals were included in the analysis.
h. These costs omitted from normal delivery cases.
i. These costs include all administrative, domestic, staff and capital costs.

3.3.2. Data collection

All data required for the various input and output variables were derived from the general and tracer cost analyses.

3.3.3. Analysis

The DEA was carried out using a proprietary software programme, IDEAS (1 Consulting 1993). Separate analyses were carried out on analysis sets comprising the six contractor and public hospitals, and one comprising all nine hospitals. For each analysis set, multiple runs were required to incorporate the full number of permutations emerging from the various input and output models specified. Mean values of the resulting efficiency scores were calculated using Microsoft Excel Version 5.

3.3.4. Methodological problems

The approach adopted here attempted to overcome several of the general methodological problems associated with DEA, as reviewed in Appendix 4. As noted above, the availability of detailed cost data allowed this analysis to overcome one of the critical limitations of most DEA studies, that of the restriction of the technique to evaluations of technical efficiency. The problem of potential sensitivity of results to model specifications was addressed through the comparison of the results emerging from a wide range of models, incorporating variations in input and output specifications, total numbers of variables, and scale assumptions. The problems of the confounding effect of service-mix and case-mix on efficiency were partially addressed through use of service-mix adjustments and through the use of DEA analysis applied to the four tracer conditions, while an attempt was made to address the confounding effect of differences in quality of care through the use of two quality of care adjustments.

A final problem concerns the validity of, and possible measurement errors in, the data used in the input and output variables, which were described in detail in the discussion of the cost analysis methodology above.

3.4. Evaluation of quality of care

This section describes the methods used in the evaluation of the quality of patient care. It begins with the evaluation of structural aspects of the quality of care, followed by the evaluation of the quality of nursing care, the quality of clinical record keeping, and the evaluation of the outcomes of care in the tracer conditions.

3.4.1. Evaluation of structural aspects of quality of care

The evaluation of the structural aspects of quality of care (SQOC) involved the development of an evaluation instrument, data collection and analysis.

3.4.1.1. Development of evaluation instrument

The development of the SQOC instrument involved the identification of evaluation criteria, the grouping of these criteria into appropriate categories, and the development of standards by which to judge hospital performance on each criterion. This was followed by the development of a scoring and weighting system to allow for quantitative comparisons of hospital performance. Discussion of each of these stages is facilitated by examination of the structure of the final instrument, which is shown in Appendix 5. This illustrates the definitions of *'good'*, *'adequate'* and *'poor'* standards for each criterion, the grouping of individual criteria into categories, and the grouping of categories into clusters.

In the first step of this process, a draft list of criteria, standards for each criterion, and suggested groupings was developed on the basis of information obtained in consultations with a number of experts in hospital management, clinicians and researchers, as well as from written documentation and previous research studies. The individuals and published sources consulted in this drafting process are shown in

Appendix 6.[59] The general approach adopted was to develop criteria and standards which would reflect realistic norms for the public sector, and where possible, existing official norms and standards for the public sector were used. The draft instrument emerging from this process formed the basis for a consensus development process involving a series of individual and group discussions with a smaller group of experts in hospital management, clinicians and researchers.[60] A final draft was then piloted at three of the hospitals, following which minor modifications were made.[61]

As shown in Appendix 5, the final instrument consists of 132 individual criteria, grouped into standard categories, which are further grouped into 9 clusters. The clusters represent the major functional divisions within the hospital. The clinical personnel cluster refers to medical, nursing and paramedical staff, and is treated separately because of the importance attached to these aspects of SQOC. The maternity ward is treated separately from the other wards because of its unique equipment requirements. Most clusters are divided into the standard categories of staff, functions, supplies and equipment, and buildings. The *staff* category refers to non-clinical staff (since clinical staff are dealt with in a separate cluster) and covers issues such as staff numbers, training and qualifications. The *functions* category covers the major activities carried out within the section being reviewed. The ward clusters have neither staff nor functions categories, since their staff are covered in the clinical personnel cluster, while the functions of the wards were separately evaluated. *Supplies and equipment* refers to the availability, quantity and quality of supplies and/or equipment in different sections, while *buildings* covers issues such as availability of space, provision of toilets and other amenities, and the physical condition and cleanliness of buildings.

In the second step of this process, the final instrument was used as the basis for a further consensus development exercise, in this case aimed at developing a scoring and weighting system. The aim of this step was to attach scores to criteria, as well as to

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59 Managers and clinicians connected with the study hospitals were omitted from this process because of the problem of potential bias in their contributions.

60 Consensus was developed 'serially', rather than with the entire group of experts simultaneously.

61 These involved adjustments to the definitions of standards where these were found to be impossible or impractical to measure, or to capture inadequately the specific feature being evaluated.

weight categories and clusters so as to allow for aggregation of scores. In recognition of the fact that performance on different criteria could be expected to impact differently on overall quality of care, it was decided to attach unique scores to individual criteria, rather than to use a standard scoring system for all criteria. The approach adopted was to give *'good'* a value of 1, but to vary the scores attached to the *'adequate'* and *'poor'* standards between 0 and 1, with a lower score representing a more negative impact on overall quality of care.[62]

Weighting of individual categories was designed to reflect the relative impact of each category within its own cluster, while that of clusters was similarly aimed at reflecting the relative impact of each cluster on quality of care in the hospital as a whole. The same group of experts who participated in the design of the instrument were asked to attach scores and weights on an individual basis, in accordance with the general approach adopted here. The median values of the sample of scores and weights obtained from the whole group were then taken to represent the 'consensus' values. Median values were used in preference to means in order to exclude the potential bias that might be introduced by outlier scores or weights. Sensitivity analysis was carried out to test the impact of using mean rather than median values. Table A7.1, Appendix 7 shows the range, mean and median values of the scores for the *'adequate'* and *'poor'* standards for each of the criteria in the final instrument, while Table A7.2, Appendix 7 shows the weights for the categories and clusters.

3.4.1.2. Data collection

Direct observation was used to complete a checklist of required information which is shown in Appendix 8. Formal interviews, using structured interview schedules, were conducted with the medical superintendent, senior management officials and the nursing service manager at all hospitals.[63] The interview schedules used are shown in

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62 A score of zero was excluded because of the use of geometric means in the analysis (see below).

63 The actual officials interviewed at the different hospital groups varied due to the different management structures in place. In the contractor hospitals, the medical superintendent and hospital manager were

Appendix 9. A questionnaire, shown in Appendix 10, was also distributed to all medical staff in order to obtain additional information. A variety of informal interviews were also held with clinical, nursing, administrative and domestic staff. All observations and interviews at all hospitals were conducted by the senior researcher so as to eliminate inter-observer bias.

3.4.1.3. Analysis

Inconsistencies identified in the data were resolved through discussion with relevant officials in the hospital concerned. The rating of hospital performance using the SQOC instrument was carried out by the same researcher who collected the data, once again to eliminate inter-observer bias, and to ensure consistency of judgements across hospitals. Scores were calculated for each category, cluster and for the hospital as a whole using Microsoft Excel Version 5. In the calculation of total scores for each category, the geometric mean of the scores of all criteria in the category was used in preference to a simple sum of the scores.[64] This approach, which involves a multiplicative aggregation of the data, was adopted in order to capture the interactive effect of the individual criteria within each category on quality of care. Aggregation of the category scores to give a total cluster score was however carried out by calculation of the weighted sum of the scores for each category, and the same approach was used for calculation of the total

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interviewed; corresponding officials at the public hospitals were the medical superintendent and hospital secretary, while at the private hospitals, they were the hospital manager and assistant manager.

64 The formula for the geometric mean is:

$$GM_{\bar{y}} = \sqrt[n]{y_1 y_2 y_3 \ldots y_n}$$

where:

y_n = score for criterion n

hospital score.[65] Weighted sums were used in preference to the geometric mean, since the implication of the impact of interactions between different categories and between clusters for quality of care is much less clear than in the case of the individual criteria within each category. Sensitivity analysis was carried out to test the effect of using mean rather than median values of the score and weight data obtained from the panel of experts, as well as to test the effect of using the weighted sum rather than the geometric mean to aggregate the scores for individual criteria within each category.

3.4.1.4. Methodological problems

The critical methodological problem encountered in this evaluation is the influence of subjective judgement at each stage of the evaluation process. Although efforts were made to address this problem through the use of a wide range of published information, through consensus development with numerous experts, and through the use of a single researcher to collect and interpret the data, these could not completely eliminate the influence of subjectivity from the evaluation process.

The impact of subjectivity was perhaps strongest, and this component of the study consequently weakest, in the implicit judgements as to the importance of the various elements of the structure of care relative to each other, as well as to the causal

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65 The formula giving the score for each cluster was therefore:

$$CL_j = \sum_{i=1}^{n} C_i \cdot W_i$$

where:
CL_j = Total score for Cluster J
C_i = Score for category i
W_i = Weight for category i
n = number of categories in the cluster.
Similarly, the score for the hospital as a whole is given by the formula:

$$CT = \sum_{i=1}^{n} CL \cdot W_i$$

where:
CT_j = Total score for the hospital; CL_i = Score for cluster i
W_i = Weight for cluster I; n = number of clusters

relationships between these elements and the ultimate quality of patient care. These problems are somewhat aggravated by the use of quantitative scales, which may imply the existence of ordinal relationships both between the various elements measured, and in their impact on quality of care, when it is clear that such relationships do not exist. Despite these potential problems in the interpretation of the study, it was nevertheless felt that quantitative measures would more easily allow for concise interpretation of the data, as well as for comparability between individual hospitals and groups. It is thus crucial that the data emerging from this component of the study be interpreted cautiously, and that ordinal relationships are not imputed where they do not exist.

These latter problems also relate to the more general problem of the uncertain relationship between structural aspects of care and overall quality of patient care. While it is clear that several of the elements evaluated here impact directly on the nature of patients' experiences in the hospital, and that other elements are vital to the ongoing functioning of the hospital, it is not clear which of these elements are necessary and/or sufficient for good quality of care, nor how they relate individually and collectively to the ultimate measure of quality of care - the outcome of care for the patient.

As in the cost analysis, the small sample sizes again prevented statistical analyses of the significance of observed differences between the hospital groups.

In addition to these various problems, all six of the public and contractor hospitals, but not the private hospitals, were affected by problems related to the general political environment during the period in which this evaluation was being conducted.[66] In particular, some level of industrial action amongst nurses affected all six hospitals either prior to, or during the evaluation process. Since this evaluation relied upon a one-off assessment of conditions pertaining in the hospital at the time of data collection, these

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66 The process of political transition occurring during this period created uncertainty with regard to the future of the 'homeland' administrations, and consequently, some level of job insecurity on the part of all civil servants, including nurses. These general problems were aggravated by specific, and different political tensions affecting the Ciskei and Gazankulu administrations, which resulted in widespread industrial action. These problems affected all three of the public hospitals, as well as the contractor hospital where nursing staff are public sector employees (Shiluvana). In the remaining two contractor hospitals, the tense political environment caused similar problems, even though the nursing staff are not government employees.

problems are likely to have impacted on the performance of these hospitals. These factors were therefore taken into account in the rating of the hospitals, and where appropriate, adjustments were made to the ratings in order to avoid bias emerging from the differential impact of these problems on the various study hospitals.

3.4.2. Evaluation of the quality of nursing care

The quality of nursing care was evaluated using two main approaches. The first used a survey instrument, modelled on the SQOC instrument, to evaluate various aspects of nursing care against a set of pre-defined criteria and standards. This was complemented by a subjective evaluation of a number of aspects of the nursing process, carried out by two experts in nursing care, education and management.[67]

3.4.2.1. Development of survey instrument

An approach similar to that used in the development of the SQOC instrument was used, with the important difference that the exercise was undertaken by a team of two experts, who were also responsible for the data collection, the initial stages of analysis, and the subjective evaluation exercise. As with the previous instrument, the approach adopted aimed to identify a set of criteria that would capture critical aspects of clinical nursing care at the ward level, as well as of nursing management at the hospital level, and to define standards for each criterion. These standards were again based on a combination of existing public sector norms or standards and, where these did not exist, the opinions of the two experts. A draft of the instrument was piloted at three of the study hospitals, after which modifications were made.[68] The final instrument was then used as the basis for development of the scoring and weighting system, using the same approach as that used for the SQOC instrument.

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67 Professor B. Robertson, Head, Department of Nursing Education, University of the Witwatersrand, Johannesburg; and Ms D. Lee, Senior Lecturer, Department of Nursing Education, University of the Witwatersrand, Johannesburg.

68 These were made for the same reasons as those noted in the discussion of the SQOC instrument.

The final instrument, together with scores for individual criteria, categories and clusters, is shown in Appendix 11, and consists of 29 separate criteria, grouped into 2 broad clusters - *nursing care* and *nursing management*. The nursing care cluster is further broken down into four categories - *assessment and diagnosis*; *nursing care planning/monitoring/control; equipment;* and *diet*. Several elements of this cluster are based on a particular model of appropriate nursing care, in which the nurse makes an assessment and diagnosis of each patient on admission, followed by the development and implementation of a nursing care plan (NCP). The model further assumes that rigorous and consistent monitoring and control procedures are integral to the implementation process, as are adjustments to the nursing care plan (here termed 'upgrading') in the light of any changes in the patients' circumstances. Implicit in this model is the expectation that this nursing process should occur in conjunction with, but independently of, the medical care of the patient, since there are distinct aspects of nursing care that are unlikely to be covered by the latter.[69]

In the evaluation of ward equipment, the focus of the instrument was on those aspects assumed to be under the control of nurses, including the completeness and level of organisation, as well as the regular checking, of equipment. The evaluation also covered some aspects not specifically related to the quality of nursing care, including the availability of supplies and equipment, ward linen, and the quality of patient diets. While it is recognised that these aspects are not under the control of the nursing staff, they are nevertheless important determinants of the quality of patient care. Since the nursing care experts were competent to evaluate these additional aspects of care, it was decided to include these in the survey instrument.

In the case of the nursing management cluster, the instrument again included a range of criteria considered to be critical to the ultimate quality of nursing care, although some of these are not directly under the control of the nursing management team. Examples include those criteria concerned with service conditions, occupational health services,

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69 In the view of the experts involved in this review, this model of nursing care is appropriate for, and ought to have been expected in, all of the study hospitals.

and staff patient ratios. This cluster thus aimed to evaluate the general management of the nursing staff in each hospital, rather than the performance of the nursing management team itself. However, some of the criteria included in the cluster did in fact serve to evaluate some relevant aspects of the performance of the nursing management team itself; examples here being the recruitment and placement mechanisms for nursing staff, the nature of in-service training for nurses, the use of procedure and policy manuals, and the nature of the relationships between the senior nursing management and the general nursing staff.

3.4.2.2. Data collection

Data collection was carried out by the two experts who designed the survey instrument, both of whom visited each of the study hospitals. Direct observation was supplemented by data obtained in formal and informal interviews. Formal interviews were conducted with the nursing service manager at all hospitals, and with the medical superintendent at some hospitals, and were carried out jointly by both researchers. Each expert was assigned to assess either the maternity or the medical and surgical wards, and these roles were maintained at all study hospitals, so as to allow uniformity in judgements between hospitals.[70] Where hospitals had separate medical and surgical wards, one of each of these wards were assessed. In some hospitals, medical and surgical wards are combined into adult male and adult female wards. Where this was the case (Matikwana, Pietersburg and St. Dominics) one or more of these combined wards were assessed. Where discrepancies in information obtained from different sources were noted, these were resolved through discussion with the nursing service managers and other appropriate individuals.

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70 The researchers were denied permission to evaluate the maternity ward at Bisho hospital, and this ward had to be omitted from the analysis.

3.4.2.3. Analysis

The rating of hospital performance on the various criteria in the survey instrument was also carried out by the two experts. In the case of individual wards, rating was carried out by the expert who had collected data for that ward. For all other criteria, the rating was conducted jointly by both experts on a consensus basis. Scores were then calculated for each category, cluster and for the hospital as a whole using Microsoft Excel Version 5, and using the same approach as used in the SQOC instrument.

The subjective evaluations were carried out immediately following the data collection in each hospital, and were recorded in note form, loosely based on the structure of the survey instrument. As with the survey instrument, these were conducted by one of the experts in the case of individual wards, and on the basis of joint consensus for all aspects not concerned with individual wards. Once the evaluations of individual hospitals were completed, evaluations of each of the hospital groups were also made, once again on the basis of joint consensus, and in loosely structured note form. The notes were subsequently structured in tabular form by the senior researcher, and then reviewed by the two experts, following which some modifications were made.

3.4.2.4. Methodological problems

Several of the problems encountered in this evaluation were very similar to those encountered in the evaluation of SQOC, including the influence of subjective judgements, and the implication of ordinal relationships between the elements evaluated and quality of care, as well as uncertainty as to the precise nature of the relationship between the quality of nursing care and the ultimate quality of patient care. In this latter instance, it seems clear that the relationship between the quality of nursing care and the outcomes of care is a more direct one than in the case of structural aspects of care. This is particularly true in the context of the public and contractor hospitals, where the relative shortage of medical staff necessitates a more important clinical role for the nursing staff.

In addition to these general problems, some specific problems were encountered in the data collection phase. The expert observers noted a tendency for nurses, particularly in the contractor and public hospitals, to bias the information supplied so that it reflected well on their own performance.[71] While efforts were made to verify information by using multiple sources, this possible source of bias should be noted in the interpretation of the findings reported here. While the influence of bias was generally subtle, in two particular cases it took the form of the evaluators being denied access to wards designated for evaluation.[72] Although other ostensible reasons were given for this, it was the view of the evaluators that they were deliberately being prevented from seeing the wards in question. In these cases, the wards were omitted from the evaluation. Bias in the information supplied may also have been aggravated by the industrial action affecting the public hospitals and one of the contractor hospitals, as discussed above. Where such industrial action was in progress, or had taken place recently, the evaluators attempted to compensate for this in the ratings of the affected hospitals. The potential bias emerging from this problem should nevertheless be recognised.[73]

An additional problem encountered in the data collection phase was the variable ward structure between the study hospitals, in particular the designation of male and female as opposed to medical and surgical wards in some hospitals. Where this was the case, evaluations were conducted so as to ensure comparability between hospitals.[74] As noted in the discussion of the evaluation of SQOC, the small sample sizes prevented the use of

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71 It is not clear why this problem of bias should have been more serious in the case of nurses than for other officials interviewed for the various components of this study. It is arguable that this may be attributable to the more rigid and hierarchical employment structures for nurses than for other groups of hospital employees, which may engender both job insecurity and more general fear of admitting to problems in the work place.

72 This occurred in one public and in one private hospital. In each case, access to only one ward was denied.

73 It is arguable that the industrial action which occurred at the time of the study may have been systematically linked to poor management within the public sector hospitals, in which case it should not necessarily be compensated for completely in these evaluations. However, the particular political circumstances prevailing at the time of the study clearly played an important role in this particular round of industrial action, and it is difficult to separate these causes from the longer term problems in human resources management within public hospitals.

74 Where a hospital had male and female wards, the nursing care of medical and surgical patients within these wards was separately evaluated, in order to ensure comparability with hospitals which have medical and surgical wards.

statistical analyses for the significance of observed differences between the hospital groups in this component of the study.

3.4.3. Evaluation of clinical record keeping

This component of the quality of care evaluation focused on aspects of clinical record keeping from a medical point of view, and involved analysis of a sample of the records of patients in the hospital at the time of the study, as well as a review of some of the data collected from the samples of patient records withdrawn for the tracer cost and quality of care analysis.

3.4.3.1. Sample selection

Eight patients in each of the medical, surgical, paediatrics and maternity wards at each hospital were chosen at random, and their records examined at the bedside. Where a patient record was missing, another patient was randomly chosen, and so on until eight records were obtained from each of the selected wards. Where a hospital had more than one ward in each category[75], the samples of records were obtained from all appropriate wards. The data on the use of partograph charts[76] in maternity cases were obtained from the general review of the NVD and caesarean section records undertaken as part of the tracer quality of care evaluation. Additional data on some of these topics were obtained from an analysis of a sub-sample of the tracer records which was undertaken for the SQOC evaluation.

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75 For example, some hospitals have male and female medical and surgical wards, or different categories of medical or surgical ward.

76 These are standardised charts which are used in all South African hospitals for monitoring of the progress of labour.

3.4.3.2. Data collection and analysis

The records of patients in the hospital were analysed at the bedside by the senior researcher, using the data capture form shown in Appendix 12. Data on the use of partograph charts as well as the other data used in this study were collected by the senior researcher as part of the process of data collection for the tracer cost and quality of care analysis.[77] All data were analysed using Microsoft Excel Version 5, and the chi-square test was applied to test for the significance of the observed differences between the pooled data from the three hospital groups (Kirkwood 1991).

3.4.4. Evaluation of the outcomes of care in tracer conditions

This component of the study focused on the evaluation of the outcomes of patient care, using the same four tracer conditions as were used in the cost analysis. Quality of care was defined largely in a negative sense here, that is by the presence or absence of evidence of poor outcomes of care. In this context, poor outcomes were defined in two ways: firstly, by the prevalence[78] of a set of indicators of potential problems in the outcomes of care; and secondly, by the proportion of cases in which expert clinicians judged there to be evidence of poor outcomes which might possibly or clearly have been avoided. This approach required, firstly, the development of a set of indicators for each of the tracer conditions, followed by sample selection and analysis of patient records for the prevalence of indicators. Thereafter, a sub-sample of cases was selected for further evaluation by expert clinicians.

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77 The data on the recording of medicines usage and laboratory investigations, as well as concerning the general organisation of the records, were also used as components of one of the criteria in the evaluation of SQOC. The data were used again in this analysis in order to give more weight to these particular aspects of the process of care, as well as to provide a more complete picture of clinical record keeping.

78 Prevalence was defined here as the proportion of cases in the sample in which one or more of the indicators was present.

3.4.4.1. Definition of indicators of potential problems in the outcomes of care

An initial list of indicators for each of the tracer conditions was developed by the senior researcher. Criteria for selection of these indicators included, firstly, their assumed sensitivity and specificity[79] in detecting potential problems in the outcomes of care, and secondly, the assumed availability of the information required to identify the presence or absence of the indicators. The ideal indicator would be both sensitive and specific, and would be easily identifiable from routine hospital records. The initial lists for each of the tracer conditions were then independently reviewed by two expert clinicians in each case (obstetrician/gynaecologists for the NVDs and caesarean sections, and specialist surgeons for hernia repair and appendectomy cases), and consensus on the lists achieved through a series of discussions with the reviewers. These lists, and corresponding data capture forms were then piloted at three of the study hospitals, following which modifications were made. These involved primarily the removal of those indicators for which it was clear that the relevant data were not readily available from routine hospital records.

The piloting process also highlighted those specific indicators in each of the tracer conditions which were suitable or unsuitable for selection of cases for further evaluation by the expert clinicians.[80] The final list of indicators used in the analysis of each of the tracer conditions is shown in Table 3.5, while Appendix 13 shows those indicators for which identified cases were submitted for, or excluded from, further evaluation by the expert clinicians. The data capture forms for the four tracer conditions are shown in Appendix 14.

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79 In this context, sensitivity refers to the probability that the indicator/s will correctly detect true poor outcomes of care, while specificity refers to the probability that absence of the indicator/s will detect cases in which there is truly no poor outcome of care (Last 1988).

80 For example, in both the hernia repair and appendectomy groups, analysis of patient records indicated that reasons for delays between initial presentation and operation, or between admission to hospital and operation, were never provided in the patient records, nor was it possible to assess whether or not these delays had themselves affected negatively the outcomes of care. All cases identified by these indicators alone were therefore excluded from further evaluation by the expert clinicians. Cases identified by the indicators concerned with pre-operative assessment, and with histology results (in the appendectomy group) were excluded for similar reasons.

Table 3.5: Indicators of potential problems in the outcomes of care in tracer conditions

All obstetric cases	1. Maternal mortality: all deaths occurring within 1 month of childbirth 2. Peri-natal mortality: all deaths occurring within 2 weeks of birth, and where birthweight above 1000g
Normal deliveries	1. Third degree tear 2. Failed assisted delivery 3. Puerperal sepsis 4. Other complications
Caesarean sections	1. Post operative wound sepsis 2. Anaesthetic complications 3. Other complications
Appendectomy	1. Evidence of delay between first presentation and operation 2. Evidence of delay between admission to hospital and operation (evidence of rescheduling of operation, or evidence of wait of more than 24 hours before operation) 3. Absence of basic investigations prior to surgery (basic investigation defined as at least one of: white cell count, urinalysis, abdominal X-ray) 4. Negative histology (any findings other than acute appendicitis on histological examination of appendix tissue) 5. Peritonitis during operation or in post-operative period 6. Post operative wound sepsis 7. Other post-operative complications 8. Death following appendectomy or due to appendicitis 9. Anaesthetic complications
Hernia Repair (groin hernias only)	1. Evidence of delay between admission and operation (evidence of rescheduling of operation for logistic rather than medical reasons) 2. Absence of pre-operative assessment by anaesthetist/medical officer for fitness for surgery 3. Post operative wound sepsis 4. Other postoperative complications 5. Death following hernia repair 6. Anaesthetic complications

3.4.4.2. Sample selection

The same samples of cases as those identified for the cost analysis were used for the initial analysis of the prevalence of indicators of poor outcome. All retrieved records were analysed on site by the senior researcher, and data concerning the prevalence of

indicators was entered onto data capture forms. The subsequent analysis of these records is further described below. All records showing the presence of one or more of the indicators were then reviewed again by the senior researcher in order to exclude those individual records where there was clearly insufficient information to justify further evaluation by the expert clinicians.

Once records suitable for expert evaluation had been selected, permission was sought to photocopy the relevant parts of the records. Permission was obtained at all hospitals aside from Shiluvana.[81] All signs of identification of the hospital, the patient and all staff involved in treatment of the patient were removed from each of the photocopied records, which were then labelled with a unique code for each hospital and tracer condition.

3.4.4.3. Analysis of patient records for prevalence of indicators

The prevalence of indicators in the sample of each of the tracers was analysed using Microsoft Excel Version 5. The Chi-square test, and where appropriate, Fishers' exact test,[82] was applied to test for the statistical significance of observed differences in the prevalence of indicators between the hospital groups (Kirkwood 1991).

3.4.4.4. Evaluation of records by expert clinicians

The samples of records of hernia repair and appendectomy cases, selected as described above, were submitted for analysis by the same two specialist surgeons who developed the lists of indicators. The records were analysed sequentially and independently by the two experts, who were requested to evaluate whether or not the records demonstrated evidence of one or more poor outcomes of care, and whether these outcomes were possibly or clearly avoidable. Avoidability was defined as a situation in which the

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81 At this hospital, permission was denied by the hospital superintendent. No reasons were given for this decision.

82 Fisher's Exact test was applied when the overall total of the 2X2 contingency table was less than 20, or when the overall total of the table was between 20 and 40, and the smallest of the four expected numbers was less than 5 (Kirkwood 1991).

outcome of note could have been prevented had one or more actions been undertaken or omitted. The results of this analysis were recorded on a data capture form shown in Appendix 15. As noted in the results section, the analyses made by the two surgeons turned out to be the same in all the cases submitted, obviating the need for adjudication of divergent results.

The obstetrical tracer condition cases were evaluated by one of the specialist obstetricians using a specially developed audit system. This system, which is discussed in more detail below, focused primarily on a detailed analysis of the causes and avoidability of peri-natal and maternal mortality. Poor outcomes as related to the presence of the indicators discussed above were also analysed, although outside the framework of the audit system.

The audit system applied here[83] involved a systematic analysis of all cases of peri-natal death in infants weighing more than 1000g, with the initial aim of classifying each case in terms of the primary obstetric cause of death (defined as the major maternal factor contributing to the death of the infant). In a second stage, the cases were analysed for the presence of avoidable factors (defined as potentially avoidable actions taken or omitted which might have affected the outcome of peri-natal death).

Avoidable factors were then classified as *patient orientated*, *administrative* and *medical management* related. The *patient orientated* category, which relates to actions undertaken or omitted by the patient, was further divided into inappropriate response to a complication (e.g. failure to present to hospital after premature rupture of membranes), non or late attendance at ante-natal clinics, and intervention in the pregnancy (e.g. attempted abortions). *Administrative* factors were defined as those relating to logistical and other problems within the clinic and hospital system, and included transport problems, laboratory related problems, lack of adequate equipment in theatres, and lack of adequately skilled or trained staff. These problems were further divided into those associated with the hospital itself and those occurring outside the hospital (e.g. related to

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83 This system, termed the ICA Solution system, was developed by the Department of Obstetrics and Gynaecology, University of Pretoria (Pattinson *et al.* 1995, Ward *et al.* 1995)

clinic transport systems, or clinic laboratory services). The *medical management* category included all factors which could be attributable to actions undertaken or omitted by the clinical staff caring for the patient. This category was further divided into *honest errors* (situations in which appropriate action was undertaken given the available information, but in which that information was inaccurate), *oversight* (situations in which information pointing to an abnormal situation was available, but was overlooked or not acted upon), and *gross deviation from accepted practice* (a situation in which a potentially dangerous and/or inappropriate intervention is carried out). In a final stage of the analysis, the avoidable factors identified here were classified as either Grade 1 (actions which, if altered or avoided, could *possibly* have modified the outcome) or Grade 2 (actions which, if altered or avoided, would *probably* have modified the outcome).

All cases submitted were reviewed and discussed by a group of clinicians from the Department of Obstetrics and Gynaecology of the University of Pretoria (the University of Pretoria group). The final classification of avoidable factors was undertaken by one senior member of the group in order to eliminate inter-observer bias. The results of this analysis were analysed using proprietary software designed to accompany the audit system.[84] A less systematic analysis of the causes of maternal mortality was undertaken. In this case, all records were analysed by the same group of clinicians, and where possible, the presence of avoidable factors was identified. An attempt was also made to judge whether or not the maternal death was possibly or probably avoidable. In the case of the general analysis of obstetric outcomes in relation to the defined indicators, results were entered on the data capture forms shown in Appendix 15, and were analysed using Microsoft Excel Version 5. Chi-square and, where appropriate, Fishers' exact tests were applied to all the results obtained from these analyses to test for the statistical significance of observed differences in the prevalence of poor and avoidable outcomes between the hospital groups (Kirkwood 1991).

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84 Peri-natal Problem Identification Programme (PPIP), also developed by the Department of Obstetrics and Gynaecology, University of Pretoria.

3.4.4.5. Methodological problems

The major methodological problems encountered in this evaluation were related to the reliance on patient records as the primary sources of data. In several of the hospitals, the quality of record keeping on clinical aspects of care was so poor that it was not possible to detect the presence of indicators, and even where these were detected, the records were often judged to contain insufficient information to allow for accurate evaluation by the expert clinicians. Record keeping appeared to be a particular problem in the case of the surgical tracer conditions, and less so in the obstetrical conditions, since maternity care tends to be recorded on standard forms resulting in more usable information being recorded on a routine basis.[85] These problems explain in part the very small numbers of surgical cases submitted for expert review, although other factors also influenced sample size, including small total numbers of cases in some of the hospitals, low prevalence of some of the indicators, and the unsuitability of some of the indicators for case selection purposes. Conversely, the much larger numbers of maternity cases were mainly attributable to the larger total sample sizes, as well as to the generally better recording of patient information in obstetrical cases in all hospitals.

Where record keeping is generally poor, it is also likely that the occurrence of problems in clinical care will be underreported. This tendency may be aggravated by deliberate underreporting of mistakes or other aspects of care likely to reflect badly on the clinical staff, and may serve as an additional explanation for the low prevalence of indicators noted for some of the tracer conditions. This particular problem may also lead to a perverse situation in which those hospitals in which record keeping is of a high standard will show higher prevalence of indicators of poor outcome, and will therefore systematically appear to have poorer quality of care, whereas in fact there may well be a positive correlation between good record keeping and quality of care.

A particular set of problems related to record keeping were encountered in the analysis of patient records at the private hospitals, relating mainly to the fact that much of the

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85 The nature of record keeping in the surgical tracer conditions is thus likely to be representative of most record keeping in the hospitals, with obstetric cases being the exception.

care of these patients is undertaken by their doctors on an outpatient basis. These problems are discussed in more detail in Appendix 18.

Finally, poor record keeping was also evident in the absence of central records of anaesthetic complications in all of the study hospitals, thus preventing systematic analysis of this aspect of care in the surgical and caesarean section cases.[86] Although reporting of such complications is a legal requirement, all of the hospitals fulfilled these requirements by submitting statutory reports but did not keep copies of these reports, nor any other centralised record of these complications.

3.5. Assessment of management structures and processes

The management structures and systems applied in the various HOs and hospitals were qualitatively assessed through a series of interviews with relevant officials and employees. The individuals interviewed for this assessment are shown in Appendix 16. All interviews were conducted by the senior researcher, using a structured interview schedule, which is shown as Schedule 1 in Appendix 17. In addition to the formal interviews, informal interviews were conducted with nursing and other staff at all of the study hospitals, and these data were used to supplement those obtained from the formal interviews. All interviews were recorded manually, and were subsequently analysed by the senior researcher. Additional information on the issues addressed here was obtained in a series of 'feedback' sessions held with HO and hospital officials from the various government departments and private hospital companies.

This approach involved a number of largely predictable problems. The introduction of some element of both observer and respondent bias[87] is inevitable in the personal interview situation. The use of the same interviewer for all interviews, as well as in the

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86 It was possible, in some cases, to identify anaesthetic complications from the patient records or from the operation notes. However, these sources are likely to be subject to the same sources of bias discussed above.

87 In this instance, observer bias may have emerged from variations in responses to the answers provided by different interviewees, from biases in recall of interviews, as well as from biases in the subsequent analysis of the interview data. Respondent bias is taken to mean the bias introduced when respondents perceive that certain answers may be more or less acceptable and modify their responses accordingly.

analysis, was in part designed to limit observer bias, while the use of multiple interviews from each organisation hopefully served to mitigate some of the effects of respondent bias. Time and other logistical constraints also prevented the use of structured focus group discussions among hospital staff, which would have allowed for a more comprehensive 'view from below' of the range of issues assessed in this component of the study.

3.6. Assessment of contracts and the contracting process

Various aspects of the contracting process were assessed through interviews with senior officials from the relevant government departments and hospitals, and from the contractor company. These issues were explored in the same interviews as those described in the previous section, in this case using the structured interview schedule shown as Schedule 2 in Appendix 17. The contracts currently in force at the three contractor hospitals were also analysed, using the analytic framework embodied in Schedule 2, Appendix 17.

3.7. Assessment of market structures, competition and prospects for contracting

Issues related to market structures, competition and the prospects for extension of contracting arrangements were assessed in a series of interviews with the same senior officials of the contractor and other private hospital companies listed in Appendix 16, as well with officials from other private hospital companies in South Africa. These interviews were conducted using a structured interview schedule, shown as Schedule 3 in Appendix 17. Information obtained in the interviews was collated and interpreted by the senior researcher in tabular form. These initial findings were then discussed with most of the interviewees, and the analysis was modified on the basis of their responses.

CHAPTER FOUR: RESULTS - HOSPITAL UTILISATION STATISTICS, COST ANALYSIS AND DATA ENVELOPMENT ANALYSIS

As indicated in the research framework outlined in Chapter 1, the main focus of this study is on the comparison of contractor and public hospitals, and only secondarily on the performance of private hospitals. The presentation of results in this and other chapters will reflect these priorities, with most attention focused on the former two groups, while private hospital performance will be highlighted where relevant. As indicated in Chapter 3, study hospitals were matched by geographic area so as to reduce the possible confounding effect of location on the primary assessment of the relationship between hospital ownership and performance. The relative effects of location and ownership on the various measures of performance and costs are therefore explicitly addressed prior to the presentation of individual results. As indicated below, this analysis provides justification for the use of ownership group, rather than location, as the basis for aggregate comparison between the study hospitals. The data for all parameters measured are therefore presented by ownership group and by individual hospital. In the former case, both mean and median data are presented throughout, since significant variation within ownership groups was observed across several of the parameters, suggesting that the use of mean data alone would lead to distorted interpretations.

The chapter begins with a brief utilisation profile of the study hospitals, followed by the results of the analysis of hospital utilisation statistics. It then presents the results of the general and tracer cost analyses, of the comparison of total contract costs with public sector production costs, and of the DEA analysis.

4.1 Utilisation profiles of study hospitals

Table 4.1 summarises the utilisation profiles of the study hospitals over the 12 month study period, further details of which are given in Tables A19.1 and A19.2, Appendix

19. Table 4.1 demonstrates a significant degree of homogeneity within, as well as clear differences between, the ownership groups in several of the key utilisation parameters. This pattern holds true for admissions and in-patient days, as well as for OPD visits and operations, although there is a somewhat higher degree of intra-group variability in respect of the latter two outputs. Table A19.1, Appendix 19 also shows a higher degree of intra-group variability when admissions and in-patient days are broken down by service-mix category.

Table 4.1: Hospital utilisation profiles

	Contractor			Public			Private		
	Matik.	Hewu	Shil.	Tints.	Letaba	Bisho	St. Doms.	Piet.	Nels.
Beds	178	250	170	322	364	287	138	100	94
Admissions	5,635	5,761	5,464	10,994	10,350	12,346	9,807	8,647	9,361
Patient Days	46,161	49,728	49,170	91,310	87,567	62,147	35,846	27,339	28,448
OPD visits	12,204	14,678	22,995	78,316	45,581	30,941	n/a	818	2,837
Operations	801	1,136	1,506	3,540	3,070	754	6,442	6,562	5,915
OPD/Admissions ratio	2.17	2.55	4.21	7.12	4.40	2.51	n/a	0.09	0.30
Operations/ Admissions ratio	0.14	0.20	0.28	0.32	0.30	0.6	0.66	0.76	0.63

Notes: n/a - not applicable, since no OPD at St. Dominics

These three tables provide evidence of the relatively similar 'pattern of care' offered by the contractor and public hospitals, particularly when contrasted with that delivered by private hospitals. Table 4.1 shows that public and contractor hospitals have relatively similar ratios of operations and OPD visits to total admissions, while the private hospitals show a very different pattern, with significantly higher operations to admissions ratios and a lower OPD visit to admissions ratios than the other two groups. Similar patterns are also apparent in the analysis of other utilisation statistics, such as turnover rate and LOS (see below).

These different 'patterns of care' are in part explained by variations in hospital structure and service delivery, details of which are shown in Table A19.2, Appendix 19. This table shows that the public hospitals are generally larger (in terms of numbers of hospital beds) than the contractor hospitals, and that the private hospitals are significantly smaller than those of the other two groups. The table also shows that the

private hospitals have a significantly higher proportion of their total complement of beds in surgical or combined medical/surgical wards than either of the other two groups.[88] Additional features of note are that two of the public hospitals have dedicated wards for TB, psychiatric and infectious disease patients (and that one contractor hospital also has a TB ward), and that one of the public and one of the private hospitals has a short stay ward.[89]

Table A19.2, Appendix 19 also highlights some differences in the range of services and facilities offered by these hospitals. Both the contractor and public hospitals provide a wide range of outpatient services, with two of the private hospitals providing a more limited range of these services.[90] All of the public hospitals and one of the contractors provide community services[91], while no private hospitals provide these services. The different pattern of care prevailing at private hospitals is also highlighted by the presence of intensive care units at all three of these hospitals, while none of the other hospitals have similar units.

In addition to these differences in structure and service delivery, the varying patterns of care delivered by these hospitals are also reflected in, and partly explained by, the service-mix profiles demonstrated in Figure 4.1. This shows the proportion of total

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88 As indicated by the data on service-mix profiles and admissions presented below, the substantial majority of patients admitted to the combined medical/surgical wards at Pietersburg and Nelspruit hospitals are surgical patients.

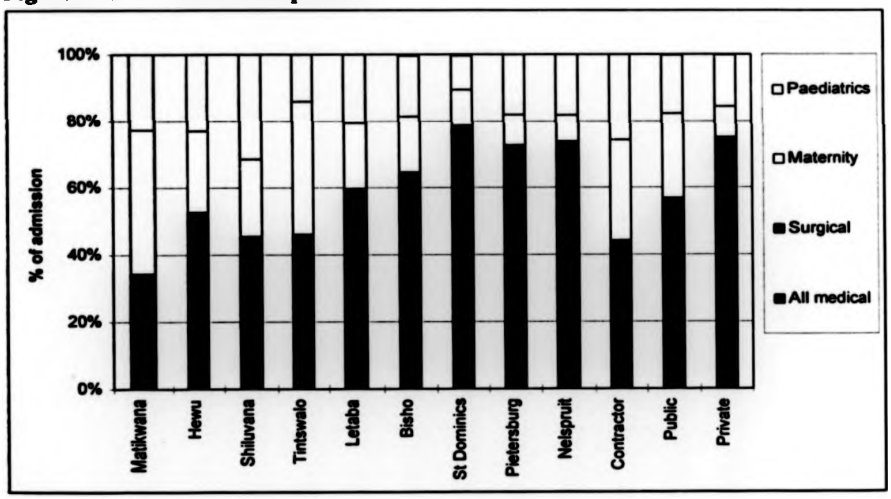
89 These short stay wards serve different functions in these hospitals. In the case of the public hospital, Bisho, this ward is used to admit patients for observation prior to a decision to discharge or admit to one of the wards for further treatment. In the case of the private hospital, St Dominics, the short stay ward is used for day surgery, where patients are admitted for treatments (usually surgical or investigative) requiring admission of less than one day.

90 None of the contractor hospitals provide specialist outpatient care which is provided at all of the public hospitals. In contrast to the fully fledged outpatient departments at the public and contractor hospitals, those at the two private hospitals consist of small casualty departments which function mainly to treat minor and major emergencies, since the bulk of routine outpatient care required by patients using these hospitals is provided in the offices of private practitioners.

91 The term community services is used here to cover the provision of fixed and mobile clinic services, school health services, immunisation and a range of other primary health care activities which are provided by staff based at the hospital and financed out of the hospital budget. The model of a district hospital supporting community services is typical of public sector hospitals in former 'homeland' areas. The contracts at all three contractor hospitals do not cover the provision of community services. However, since the Gazankulu government employed all nursing and medical staff at Shiluvana hospital, all staff in these categories working in community services are formally on the staff establishment of the hospital, so that the hospital can be regarded as providing and supporting community services, although to a lesser extent than in the public hospitals.

admissions accounted for by the different service-mix categories for each hospital, as well as the mean values for each ownership group. Despite some variation between individual hospitals in each group, these data indicate a relatively similar service-mix distribution at the contractor and public hospitals, particularly in comparison with the pattern observed in private hospitals. As the figure indicates, however, the public hospitals admitted higher proportions of medical and surgical cases, on average, than did the contractors, with the pattern being reversed for paediatric and maternity cases. In the private hospitals, by contrast, surgical cases constitute a much higher, and maternity cases a much lower, proportion of total admissions than in the other two groups.

Figure 4.1: Service-mix profiles



4.2. Effects of ownership and location on hospital utilisation and costs

Table 4.2 presents the results of an analysis of the relative effects of ownership and location on various key parameters of hospital utilisation and cost, using the Kruskal-Wallis one way analysis of variance by rank. As the table indicates, location exerts a very limited effect on the parameters assessed here, with a statistically significant effect at the 5% level occurring only in the case of production costs per OPD visit. Ownership, on the other hand, is demonstrated to exert a statistically significant effect on twelve of

the sixteen parameters assessed here, the exceptions being the percentages of surgical and paediatrics admissions in the service-mix data, bed occupancy rate, and the production cost per admission. Location also fails to be statistically significant in the case of these four parameters. These data therefore emphasise the influence of ownership group, and the relative lack of influence of geographical location, on key aspects of hospital performance. They therefore justify the use of ownership, rather than location, as the basis for comparisons between the study hospitals.

Table 4.2: Relative impact of ownership and geographical location on key hospital parameters

Parameter measured	P value (Kruskal-Wallis analysis of variance)	
	Ownership	Location
Hospital utilisation data		
Admissions	<0.05	>0.1
Days	<0.05	>0.1
OPD visits	<0.05	>0.1
Operations	0.05	>0.1
Total expenditure per bed	<0.05	>0.1
LOS	<0.05	>0.1
Turnover rate	<0.05	>0.1
Bed Occupancy rate	>0.1	>0.1
Service-mix data		
% medical	<0.05	>0.1
% surgical	>0.1	>0.1
% maternity	<0.05	>0.1
% paediatrics	>0.1	>0.1
Production costs		
per day	<0.05	>0.1
per admission	>0.1	>0.1
per OPD visit	<0.05	<0.05
per composite output	<0.05	>0.1

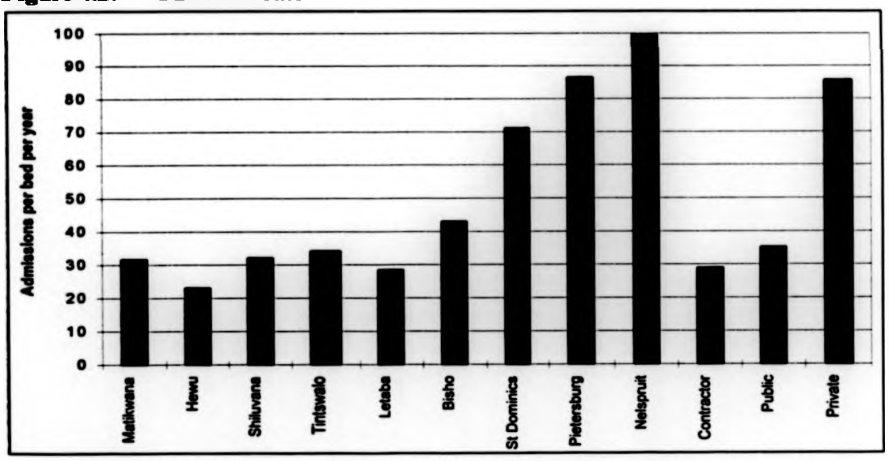
4.3. Hospital utilisation statistics

This section presents the results of an analysis of three interrelated indicators of hospital utilisation: turnover rate, LOS and bed occupancy rate, as well as the application of the Pabon Lasso graphical technique described in Chapter 3.

4.3.1. Turnover rate

Figure 4.2 illustrates the total turnover rate for each hospital as well as the mean values for each ownership group. As the figure demonstrates, contractor and public hospitals occupy an overlapping range of values (23-31 and 28-39) with the public group demonstrating higher mean and median values. The figure also illustrates the very high rates for private hospitals (71-100), which are on average more than double those of public hospitals and treble those of the contractor hospitals. Table A19.3, Appendix 19 shows these data for different service-mix categories. These data show some intra-group variability, but confirm that public hospitals have higher mean and median turnover rates than contractors across all service-mix categories with the exception of paediatrics.

Figure 4.2: Turnover rate

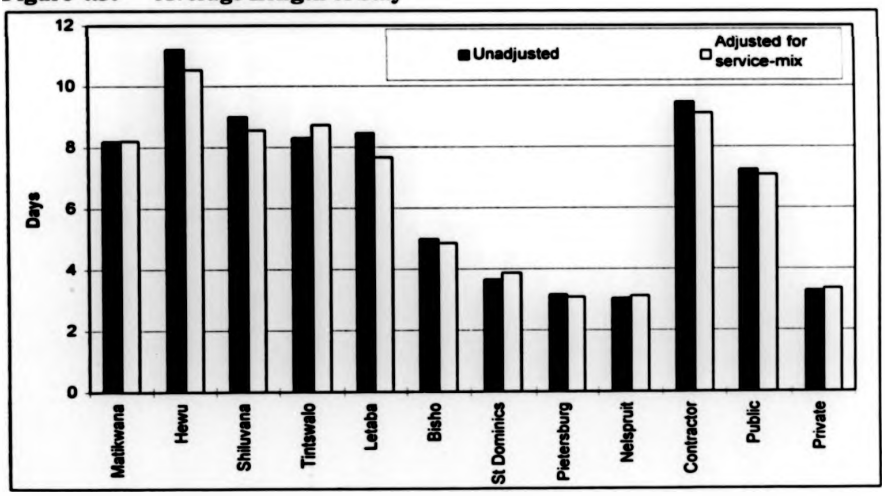


4.3.2. Average length of stay

Figure 4.3 shows LOS for all in-patients, as well as the effects of adjustment for service-mix. The figure shows that, using both unadjusted and adjusted data, the contractors demonstrate a higher range of values for LOS than the public group, with a slight overlap between the ranges, which is confirmed by the higher mean and median values for the contractors relative to the public group. The use of median values reduces the

contractor-public gap, due to removal of the effect of the short LOS at one of the public hospitals, Bisho.[92] The effect of service-mix adjustment is to slightly increase the gap between the contractor and public hospitals in both the mean and median values. Private hospitals, on the other hand, show a substantially lower range of values of LOS than all other hospitals, an observation which is not affected by adjustment for service-mix. Table A19.4, Appendix 19 shows these data for individual service-mix categories. Despite some intra-group variability, these data maintain the general pattern observed for all in-patients. Using the mean and median data, for example, the contractors demonstrate longer LOS than the public hospitals across all service-mix categories, with the exception of the median value for surgical cases where public hospitals show longer LOS.

Figure 4.3: Average Length of Stay

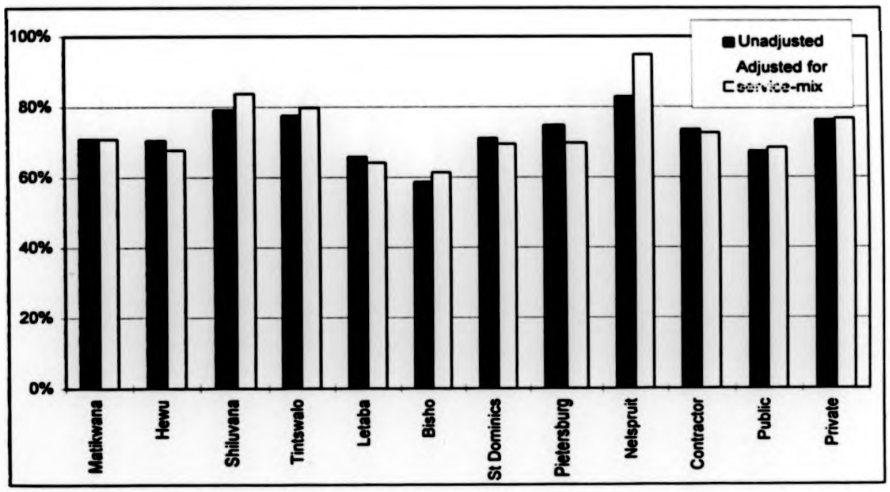


92 This is largely attributable to the fact that a high proportion of admissions to this hospital are to the short stay ward, in which length of stay is 1 day or less. Short stay admissions accounted for 21% of admissions and 4.4% of in-patient days during the study year. Service-mix, case-mix and severity factors may also contribute to the short LOS at this hospital.

4.3.3. Bed Occupancy Rates

Figure 4.4 shows the average occupancy rates for individual hospitals as well as the mean values for each group, with and without service-mix adjustment. The contractors and public hospitals again demonstrate an overlapping range of values (71%-79% and 59%-78% using unadjusted and adjusted data respectively), although the contractors occupy the higher end of the range, and have higher mean and median values than do the public hospitals. The private hospitals show data in a similar range to the other two groups, although they occupy the higher end of the total range, and demonstrate the highest mean and median values overall. As the figure indicates, service-mix adjustment does not significantly affect these general observations.

Figure 4.4: Bed occupancy rate



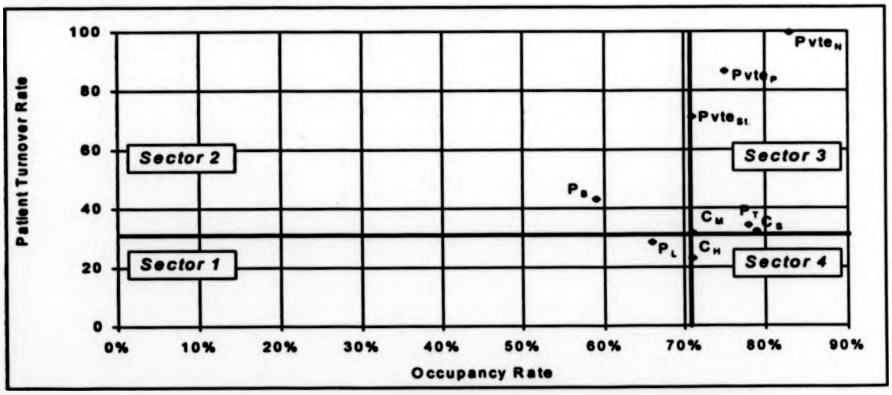
The data on turnover rates and LOS suggest that the observed convergence between the three groups in average bed occupancy rates is attributable to different factors in each of the groups. Comparing the contractor and public hospitals, for example, it is clear that in the contractor group, long LOS overrides the effect of a lower turnover rate on average bed occupancy, while the opposite is the case in the public hospitals, which have relatively shorter LOS and higher turnover rates. Similarly, the generally high

occupancy rates for private hospitals occur despite the short LOS, and are attributable to the particularly high turnover rates in these hospitals. Table A19.5, Appendix 19 shows data on occupancy rates for individual service-mix categories. These data maintain a generally consistent pattern with that observed for all in-patients, although there is some variability across service-mix categories within individual hospitals, as well as within and between hospital groups.

4.3.4. Combined hospital utilisation indicators

Figure 4.5 applies the Pabon Lasso graphical approach to assessment of hospital utilisation, as described in the Chapter 3. As would be expected from the data discussed above, this integrated analysis highlights important differences between the three groups. As Figure 4.5 shows, the contractors all lie close to the borders of Sector 4, demonstrating a consistent pattern of relatively low turnover and high LOS, resulting in relatively high occupancy rates. The public hospitals show a more variable pattern, with one each in sectors 1, 2 and 3, while the private hospitals all occupy sector 3, demonstrating consistently superior performance in activity terms, characterised by high turnover, short LOS and high occupancy rates.

Figure 4.5: Combined performance indicators



Note: C_M = Contractor (Matikwana); P_B = Public (Bisho); $Pvte_{St}$ =Private (St. Dominics), etc.

4.4. Cost analysis

This section begins with a brief review of the expenditure profiles of each hospital, and then examines the unit production costs of a range of outputs, as well as the costs per case of the four tracer conditions. It then explores the reasons for variations in these unit costs through further analysis of a series of component unit costs and input-output ratios. Thereafter, it presents the data on the comparative costs to the public sector of contracting as opposed to directly managed public provision.

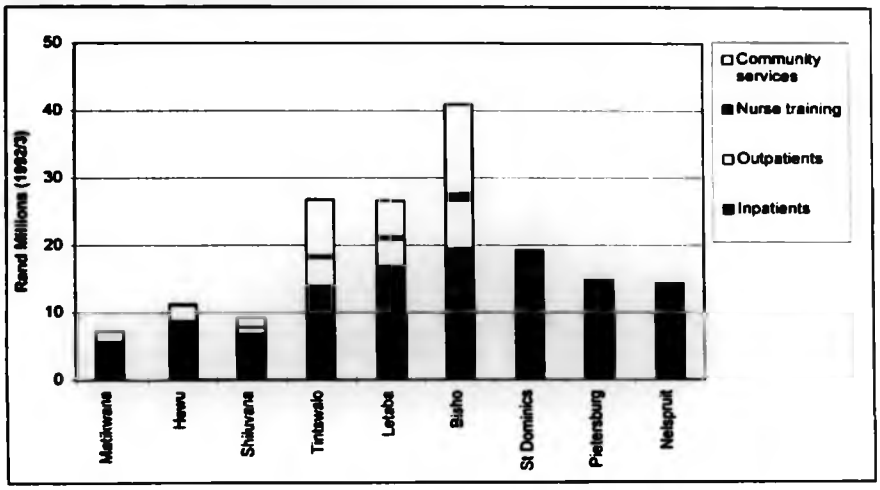
4.4.1. Hospital expenditure profiles

Figure 4.6 shows the total annual expenditure, and its distribution between four main areas of hospital activity, for each of the study hospitals. Table A19.6, Appendix 19 provides further detail on these data. The data on both total expenditure and its distribution confirm the differences between ownership groups noted above, with variation between ownership groups exceeding intra-group variability in all cases. The figure shows that total expenditure by contractor hospitals is one third that of the public hospitals, on average, even when the outlier in the former group (Bisho) is excluded. This factor is in excess of that expected from the analysis of bed numbers and hospital throughput data given earlier, suggesting differences in unit production costs, which are discussed in more detail below.

These expenditure data also reflect the differences between the groups in hospital structure and service delivery noted above, with public and contractor hospitals demonstrating significant expenditure on outpatient services, and the public hospitals (and one contractor) showing expenditure on community services. As expected, the private hospitals show a different picture, with two hospitals showing small proportions of expenditure on outpatient services and none showing expenditure on community services. All hospitals also show some expenditure on nurse training, although this

accounts for a very small proportion of the total at the private hospitals, and slightly larger, but still small, proportions in the other two groups.

Figure 4.6: Expenditure profiles



4.4.2. Analysis of production costs

4.4.2.1. Production costs per in-patient day

Figure 4.7 shows the total production cost per in-patient day for all in-patients at the contractor and public hospitals, as well as the mean values for the two groups, with and without adjustment for service-mix. Table 4.3 shows these data for individual service-mix categories. Figure 4.7 indicates that the costs per in-patient day at the contractor hospitals are consistently below those at the public hospitals, with the mean contractor cost 66% lower than that of the public hospitals, while the equivalent margin in the median values is 41%.[93] Service-mix adjustment does not affect these general

93 The term margin, as used throughout this chapter, generally refers to the margin, expressed as a percentage, between the mean or median values of the public hospital costs and contractor hospital costs (or between the mean or median private and public hospital costs) and is calculated as:
[(public hospital cost- contractor hospital cost)/(contractor hospital cost)] X 100.

observations: after adjustment, mean contractor costs are 71% lower than the mean public hospital costs, while the margin in the median values is 33%.

Figure 4.7: Production costs per in-patient day

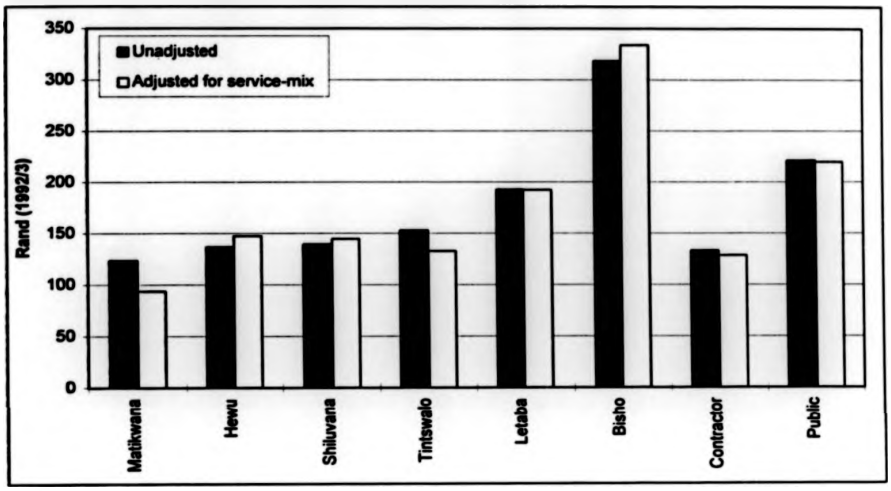


Table 4.3 shows that the same general pattern is maintained across the individual service-mix categories when mean and median data are used, although there is some variation across categories in the extent of the margin between the contractor and public hospitals. The table also shows some individual instances where contractor costs exceed those at public hospitals.

Table 4.3: Total Production costs (Rand, 1992/93)

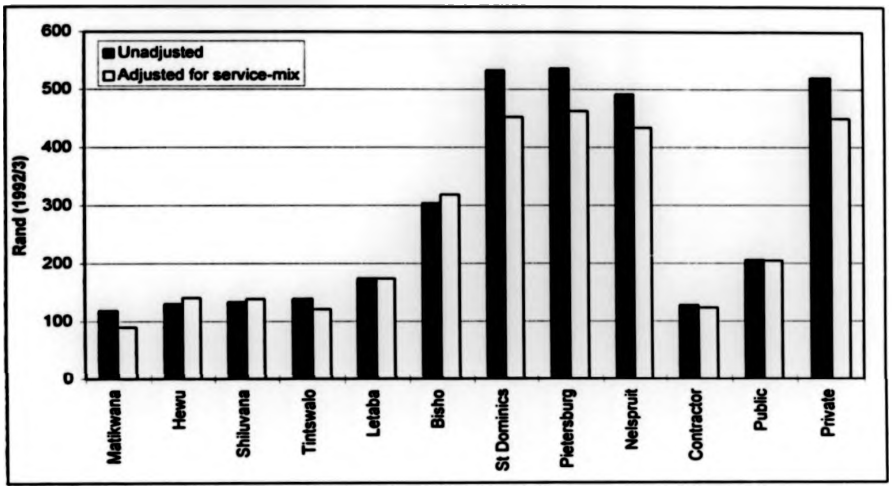
	Contractor			Public			Mean			Median		
	Matik.	Hewu	Shil.	Tints.	Letaba	Bisho	Con.	Pub.	Margin (%)[a]	Con.	Pub.	Margin (%)[a]
In-patient days												
Medical		128	145	140	168	288	137	198	45	137	168	23
Surgical		133	183	187	214	285	158	229	45	158	214	35
Adult medical/surgical	108	130	166	154	186	286	135	209	55	130	186	42
Maternity	184	306	212	171	371	444	234	329	40	212	371	75
Paediatrics	100	84	74	120	157	322	86	200	132	84	157	88
All in-patient days	124	137	140	153	193	318	133	221	66	137	193	41
All in-patient days - adjusted	94	148	145	133	193	334	129	220	71	145	193	33
In-patient admissions												
Medical		1,572	1,568	1,456	1,741	1,691	1,570	1,629	4	1,570	1,741	11
Surgical		1,488	1,436	2,097	2,021	1,172	1,462	1,763	21	1,462	2,021	38
Adult medical/surgical	1,342	1,532	1,485	1,643	1,857	1,386	1,453	1,629	12	1,485	1,857	25
Maternity	813	1,703	1,437	890	1,162	1,793	1,318	1,282	-3	1,437	1,162	-19
Paediatrics	901	1,347	795	1,123	1,431	2,085	1,014	1,546	52	901	1,431	59
All in-patient admissions	1,014	1,533	1,256	1,269	1,632	1,586	1,268	1,496	18	1,256	1,632	30
All in-patient admissions - adjusted	1,098	1,538	1,330	1,383	1,580	1,676	1,322	1,546	17	1,330	1,580	19
Outpatient visits	121	154	40	53	88	227	105	123	17	121	88	-27
Operations	1,236	952	679	587	751	3,164	956	1,501	57	952	751	-21
Composite output	123	140	108	107	157	288	124	184	49	123	157	27
Composite output - adjusted	98	149	111	99	157	297	119	184	54	111	157	42

Notes a: Margin refers to the public-contractor margin, expressed as a percentage, and is calculated as: [(Pub-Con)/Con] X 100

Figure 4.8 shows the average costs per in-patient day for all in-patients at all hospitals, in this case adjusted for comparison with the private hospitals, as described in Chapter 3. As illustrated in the figure, the costs per in-patient day at private hospitals are substantially higher than those in all other hospitals, with mean costs exceeding mean public sector costs by 152%, and with the equivalent margin in the median values being 291%. Service-mix adjustment has the effect of significantly reducing average costs per in-patient day at all of the private hospitals, but this does not affect their position relative to the other two groups. These patterns are maintained across individual service-mix

categories, as illustrated in Table A9.7, Appendix 19, although with some variation between groups in the observed margins.

Figure 4.8: Production costs per in-patient day, adjusted for comparison with private hospitals



4.4.2.2. Production costs per admission

Figure 4.9 shows the total production costs per admission for all in-patients at the contractor and public hospitals, as well as the mean values for the two groups. The figure shows that the costs at these hospitals occupy an overlapping range (R1014-R1533 in the contractor hospitals, and R1269-R1632 in the public hospitals), with public hospital costs occupying the higher end of the range. This is reflected in the mean and median values which are 18% and 30% lower in the contractor than in the public hospitals respectively. Adjustment for service-mix does not affect the overall pattern observed here, although it does affect the extent of the margin in the median values, which is reduced from 30% to 19%.

Table 4.3 shows the costs per admission for individual service-mix categories. In general, these data maintain the general pattern of overlapping ranges between the two

hospital groups, with generally lower mean and median costs in the contractor group. One exception is in the case of maternity admissions, in which mean and median contractor costs exceed public hospital costs by 3% and 19% respectively. The table also demonstrates significant variation between the margins across service-mix categories, as well as instances in which costs per admission at individual contractor hospitals exceed those observed in one or more of the public hospitals.

The margins between contractor and public hospital costs observed here are substantially narrower than those observed in the data on costs per in-patient day. This is attributable to the longer LOS in the contractor hospitals than in the public hospitals, which has the effect of increasing the average cost per admission.

Figure 4.9: Production cost per admission

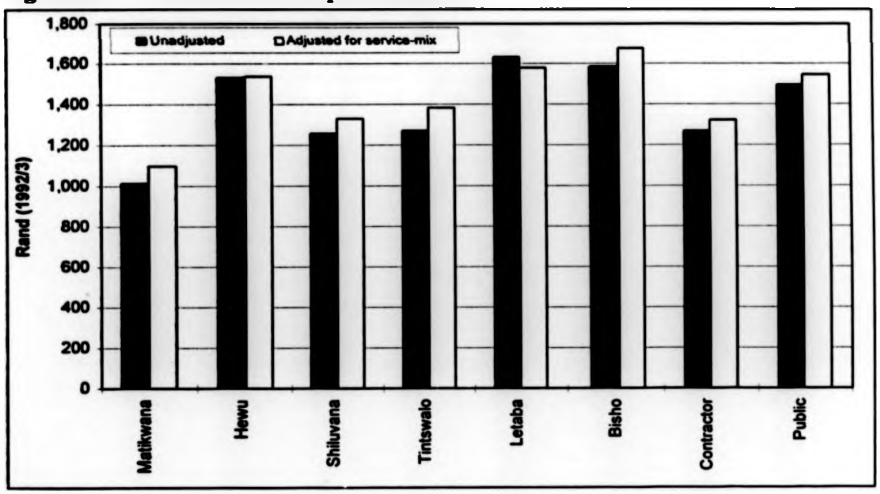
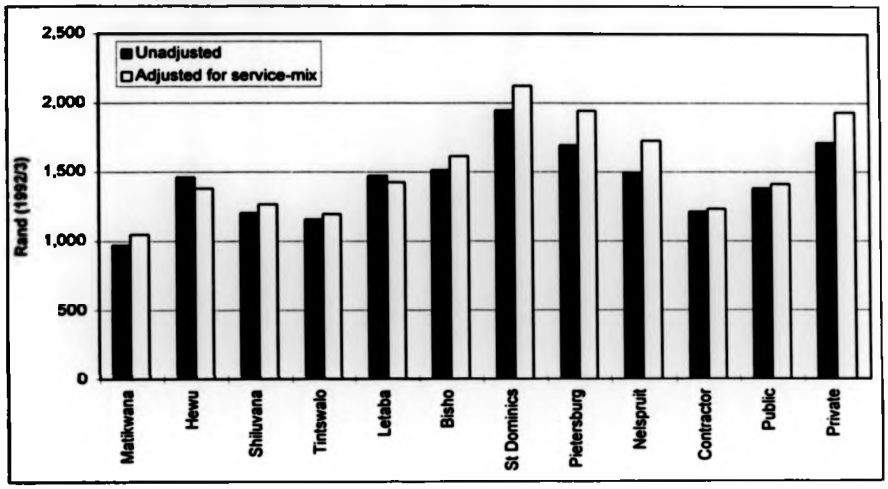


Figure 4.10 shows production costs per admission for all in-patients adjusted for comparison with the private hospitals, and shows that costs at the private hospitals fall into a higher range than the other two groups, although this range does overlap with that of the public hospitals. The fact that the margins between the private group and the other two groups are narrower in costs per admission than those observed in costs per in-

patient day is attributable to the significantly shorter LOS in the private hospitals, which weakens the impact of the significantly higher private hospital costs per in-patient day.[94]

Figure 4.10: Production cost per admission, adjusted for comparison with private hospitals



4.4.2.3. Production costs per outpatient visit and per surgical operation

Figures 4.11 and 4.12 show the total production costs per OPD visit and per surgical operation, respectively, at the public and contractor hospitals. As both figures illustrate, the unit costs for these two outputs occupy wide and overlapping ranges, with much greater variation within and between groups than was the case with costs per in-patient day or per admission. These high variations mitigate against the use of mean data for comparison between the groups here, particularly because of the distorting effect of the outlier in the public hospital group. Table 4.3 shows that median contractor costs exceed those of public hospitals in both cases, with margins of 27% and 21% for OPD visits and operations respectively.

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94 Service-mix adjustment does not affect this general pattern, although it does have the effect of increasing the private-public margin in the mean and median values, reflecting the longer LOS attributed to private hospitals when they are assumed to admit patients resembling the hypothetical service-mix profile.

Figure 4.11: Production costs per OPD visit

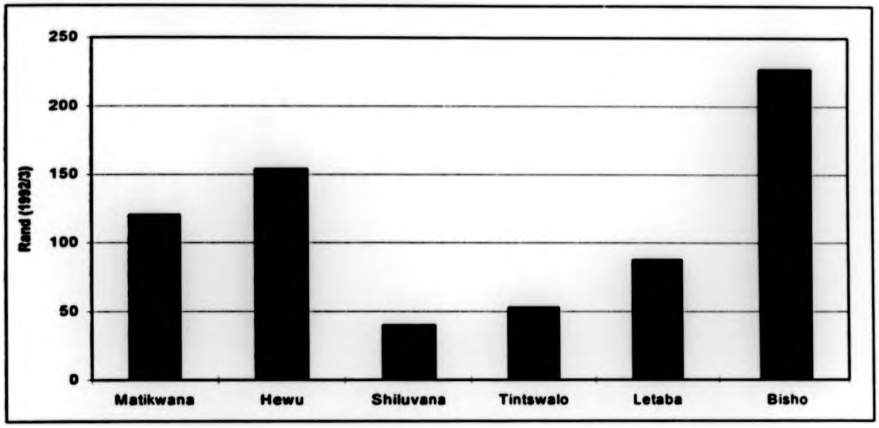

Figure 4.12: Production costs per operation

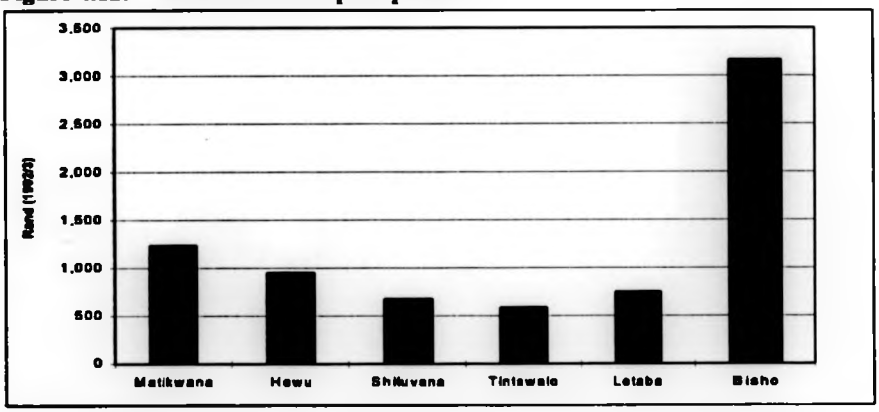

Table A19.7, Appendix 19 shows the data on cost per OPD visit and per surgical operation, adjusted for comparison with the private hospitals. The mean costs per OPD visit at the private hospitals exceed the median costs of the public and contractor hospitals by 297% and 177% respectively.[95] The data on the costs per operation show a very different pattern, with median costs per operation at the private hospitals being

95 Mean costs rather than median costs are used for the private hospitals since only two hospitals deliver OPD services.

31% and 45% lower than the equivalent costs at the public and contractor hospitals respectively,[96] an observation which is attributable to the very high throughput of the operating theatres in the private hospitals.

4.4.2.4. Costs per composite output

Figure 4.13 shows the costs per composite output, defined as the weighted sum of in-patient days and OPD visits[97] for the contractor and public hospitals, with and without adjustment for service-mix. The figure shows that the costs for the two groups occupy overlapping ranges, although the range of costs in the public hospital is wider and extends much higher than in the contractor hospitals. This is reflected in the higher mean and median costs in the public hospitals, with margins of 49% in the mean and 27% in the median values. The effect of service-mix adjustment widens the margin observed here to 54% in the mean and 42% in the median values. These margins, which are lower than those observed in the case of costs per in-patient day, reflect the impact of the higher median costs per OPD visit in the contractor hospitals. This has the effect of reducing, but not reversing, the margin observed in the cost per in-patient day, since the number of in-patient days substantially exceeds the number of OPD visits at all of these hospitals.

The use of in-patient days rather than admissions in computation of a composite output will bias the findings in favour of hospitals with long LOS, and hence would be expected to favour the contractor hospitals. Table A19.8, Appendix 19 provides a comparison of this approach with one in which the composite output is defined as the weighted average of admissions and OPD visits. As the table shows, the use of admissions in the definition of a composite output in fact reverses the observed margin between contractor and public hospitals, with the contractor hospitals now emerging as 2% more costly in the mean values, and 7% more costly in the median values (as

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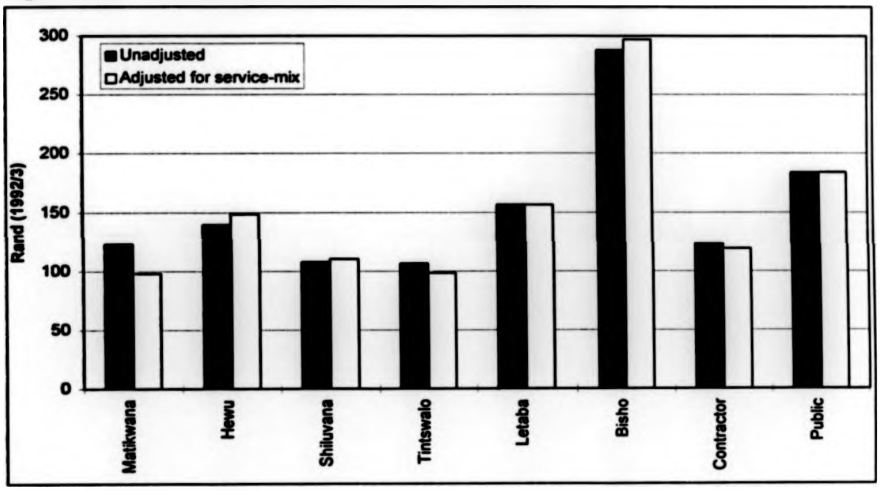
96 As noted in the discussion of hospital profiles above, the nature of the OPD visits at the private hospitals is very different from those at the other two groups, so that this cost comparison should be interpreted with caution.

97 Other elements of hospital output, including surgical operations, are included within the measure of costs per in-patient day.

opposed to being 47% and 27% less costly when in-patient days were used in the definition of a composite output).

Table A19.7, Appendix 19, shows the data on costs per composite output adjusted for comparison with private hospitals. As expected, the costs at the private hospitals exceed those in the other two groups by wide margins.

Figure 4.13: Production costs per composite output



This analysis has demonstrated that unit production costs of most of the outputs measured are generally lower at the contractor than at the public hospitals, with the exceptions of OPD visits and surgical operations. This pattern is maintained across most of the service-mix categories, although exceptions to this general pattern were noted in some cases. Analysis of individual hospital costs also revealed instances in which individual contractor hospitals demonstrated unit costs in excess of those at one or more of the public hospitals. The comparison with private hospitals demonstrated a similarly consistent pattern, with unit costs of these hospitals being uniformly higher than those of the other groups in all cases besides surgical operations.

4.4.2.5. Sensitivity analysis

As discussed in Chapter 3, the cost estimates presented here depend upon a range of assumptions, variations in which would be expected to affect the resulting estimates of unit costs to varying degrees. Figures A19.1 and A19.2, Appendix 19, illustrate the effect of variations in three of these assumptions on estimated capital and total costs respectively for the three hospital groups, while Tables A19.9 to A19.11, Appendix 19 show these data for the individual hospitals. Detailed commentary on these analyses is provided after Table A19.11 in Appendix 19. The first assumption to be varied was the level of the discount rate, which affects the interest costs of capital. Whereas the standard rate used was 8%, sensitivity analysis was performed using rates of 4% and 0%. The second set of assumptions concerns the estimated lifespan of capital items. Here the standard assumptions were 50 years for buildings and 10 years for equipment, and the sensitivity analyses examined the effect of reducing these estimates to 30 years and 5 years respectively. A third set of assumptions related to the method of estimating the replacement costs of equipment, as discussed in Chapter 3.

As shown in the figures and tables, these various sensitivity analyses lead to three main conclusions. Firstly, capital costs are highly sensitive to changes in these various assumptions, and total costs are somewhat less sensitive, although combinations of extreme assumptions did produce changes of 6-12% in total costs in the different hospital groups. A second observation concerns the differential response of the different groups to changes in these assumptions, and in particular, the greater sensitivity of the contractor hospitals to these variations, which is attributable to the higher proportion of total costs accounted for by capital costs in this group (see below). The third and most important conclusion is that the critical differences between contractor and public hospitals observed in the cost analysis are robust to these variations in capital cost assumptions. While the extent of the margins varied in some cases, these variations were not substantial in any of the cases analysed, and none of the margins were shown to change direction.

4.4.2.6. Composition and determinants of production costs

Figure 4.14 illustrates a breakdown of total production costs into capital and recurrent costs, as well as into selected recurrent cost components, further details of which are presented in Table A19.12, Appendix 19.[98] As the figure and the table demonstrate, capital costs account for a higher proportion of total costs in the contractor hospitals than in the public hospitals (ranges of 12%-17.5% and 8%-10% respectively), which is reflected in the contractors' lower recurrent to capital cost (RCC) ratios.[99] This is in part due to the inclusion of community services in the calculation of total recurrent costs, but not of capital costs, at the public hospitals (and at Shiluvana hospital). Removal of this element of recurrent costs reduces the RCC ratios at the public hospitals, but these remain higher, on average, than those of the contractor hospitals, suggesting some underlying differences in production patterns.[100]

Staff costs account for the largest proportion of recurrent and total costs in all hospitals[101], and for similar proportions of mean total costs in the contractor and public groups (ranges of 57%-67% and 53%-64% respectively), while administrative costs account for significantly lower proportions of mean total costs in the contractor than in the public group (5%-7% and 10%-13% respectively).[102] Pharmaceuticals and laboratory tests account for a slightly lower proportion of total costs in the contractor than in the public hospitals, while domestic services account for very similar proportions between the two groups. Figure 4.14 also demonstrates important differences between the private hospitals and the other two groups. These are seen primarily in the high

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98 Definitions of the recurrent cost components were given in Chapter 3.

99 The recurrent to capital cost ratio is defined as the ratio of annual recurrent costs to the total costs of the capital employed at the hospital.

100 Table A9.12, Appendix 19 shows that capital costs are dominated by building costs in all hospitals, although the distribution of these costs between building costs and equipment varies between hospitals, with equipment accounting for a higher proportion of capital costs in private hospitals than in the other two groups.

101 The one exception to this observation is Pietersburg hospital, in which staff costs and drug costs account for similar proportions of total expenditure.

102 Table A19.12, Appendix 19 shows the breakdown of the administrative cost category into internal and external components, with external administrative costs defined as those costs incurred by the relevant HO administration and allocated as an overhead to the hospital. The table demonstrates that the ratio of external to internal administrative overheads is much greater in the public hospitals than in the contractor hospitals.

proportion of total costs accounted for by pharmaceutical expenditure, and the relatively lower expenditure on staff.[103]

Figure 4.14: Composition of production costs

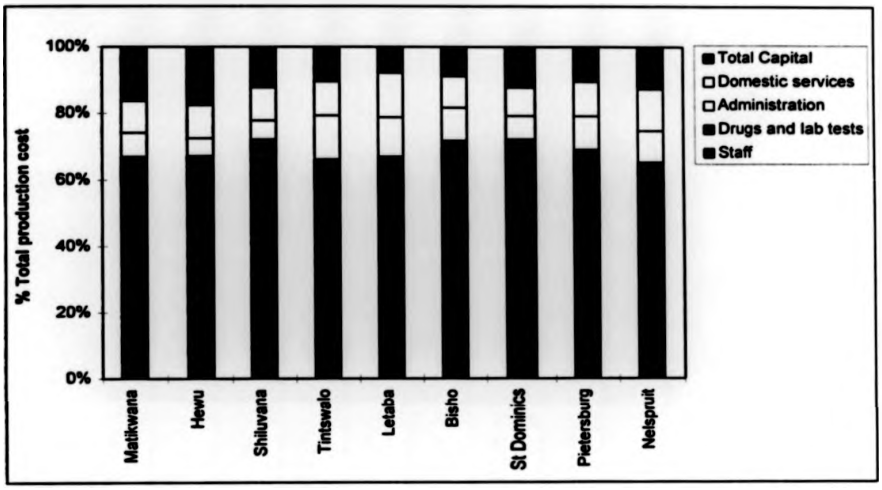

Table A19.12, Appendix 19 also shows the proportion of total expenditure accounted for by variable costs. These data show wide variation within each group, with the contractor and public groups showing a similar range of values (means of 14% and 15% respectively), which is significantly lower than that of the private hospitals (mean of 33%), in which high drug costs inflate total variable costs.[104]

Table 4.4 provides further insights into the cost differentials between contractor and public hospitals through an analysis of the composition of unit production costs, in this case using in-patient days as the measure of output. As the table demonstrates, mean contractor costs are lower than public hospital costs across all but one of the individual

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103 The comparison with the private hospitals is not strictly accurate, since the omission of some categories of staff and investigation costs from these hospitals leads to overestimates of the relative share accounted for by the other categories.

104 Variable costs at the private hospitals omit laboratory and X-ray costs, which are included in these costs at the contractor and public hospitals.

categories of non-capital costs[105], as well as for capital costs, although to a lesser extent in the latter category. The table also shows wide variations within each group across most of the cost categories and sub-categories.

Further analysis of each of the non-capital cost categories provides some explanations for these findings. The higher administrative costs per in-patient day in the public hospitals are almost entirely due to the much higher levels of external administrative costs in this group. Public hospital costs are also higher across all sub-categories of domestic services, in the clinical support services category (with the exception of radiology), and in both the nursing and medical staff categories.

Figure 4.15 shows the relative contribution of each of the categories to the total public-contractor margin, using mean and median data. As the figure indicates, differences in nursing, medical and paramedical staff costs[106] contribute most to the total public-contractor margin using both mean and median values. This is followed by domestic services and then by clinical support services when mean values are considered, with this order being reversed in the median data.

Table 4.4 also shows the total costs per in-patient day broken down into fixed and variable costs. This shows that the total variable costs per in-patient day at the contractor hospitals are consistently lower than those at the public hospitals, with a margin of 170% in both the mean and median values.

Table 4.5 provides the same analysis for OPD visits. Here, mean public hospital costs are higher than contractor costs in the administration, domestic services and staff categories, but not in the clinical support services category, where the pattern is reversed. In the median data, however, public hospital costs are lower in all cost categories besides domestic services.

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105 The single exception to this observation is the X-ray category, in which contractor costs exceed those of the public hospitals.

106 As noted in Table 4.4, only nursing, medical and paramedical staff costs are included in the general measure of staff costs, since all other staff costs are included within the remaining categories (domestic services and clinical support services).

Table 4.4: Composition of in-patient day costs (Rand, 1992/93)

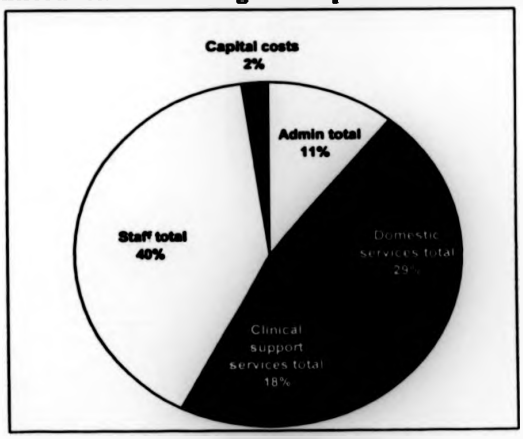
	Contractor			Public			Mean		Median	
	Matik.	Hewu	Shil.	Tints.	Letaba	Bisho	Con.	Pub.	Con.	Pub.
External administration	7.09	4.35	7.55	13.09	18.70	15.66	6.33	15.82	7.09	15.66
Internal administration	2.77	2.40	1.94	0.36	0.54	6.53	2.37	2.48	2.40	0.54
Admin. total	*9.87*	*6.75*	*9.49*	*13.45*	*19.24*	*22.19*	*8.70*	*18.29*	*9.49*	*19.24*
Transport	2.55	3.32	9.16	6.62	6.93	3.90	5.01	5.82	3.32	6.62
Laundry	6.92	5.17	7.55	5.39	5.28	19.25	6.55	9.98	6.92	5.39
Catering	12.02	8.76	12.96	11.07	17.33	27.26	11.25	18.55	12.02	17.33
Housekeeping/ Maintenance	5.53	9.96	12.94	11.37	22.75	35.62	9.48	23.25	9.96	22.75
Domestic services total	*27.02*	*27.21*	*42.61*	*34.44*	*52.30*	*86.03*	*32.28*	*57.59*	*27.21*	*52.30*
Pharmacy	8.05	10.32	5.61	7.54	8.73	11.49	7.99	9.25	8.05	8.73
Radiology	0.64	3.04	2.64	1.10	0.97	1.05	2.11	1.04	2.64	1.05
Rehabilitation services	0.55	0.22	1.71	1.75	1.83	5.15	0.83	2.91	0.55	1.83
Laboratory	2.76	1.94	1.01	2.18	10.59	3.73	1.90	5.50	1.94	3.73
Operating theatres	21.45	16.79	20.81	22.75	26.34	38.79	19.68	29.29	20.81	26.34
Clinical support services total	*33.43*	*32.32*	*31.79*	*35.32*	*48.46*	*60.20*	*32.51*	*48.00*	*32.32*	*48.46*
Nursing Staff	43.67	57.55	48.40	53.69	60.30	129.75	49.87	81.25	48.40	60.30
Medical Staff	1.66	1.87	1.40	8.32	5.34	4.39	1.64	6.01	1.66	5.34
Medical/Nursing Staff total[a]	*45.33*	*59.41*	*49.80*	*62.00*	*65.64*	*134.14*	*51.51*	*87.26*	*49.80*	*65.64*
Capital costs	*8.13*	*11.17*	*5.92*	*7.62*	*7.27*	*15.82*	*8.41*	*10.24*	*8.13*	*7.62*
Total costs	*123.78*	*136.87*	*139.61*	*152.84*	*192.91*	*318.38*	*133.42*	*221.37*	*136.87*	*192.91*
Total Fixed costs	100.22	118.21	127.46	111.69	142.30	263.29	*115.29*	*172.43*	118.21	142.30
Total variable costs	*23.56*	*18.65*	*12.15*	*41.15*	*50.60*	*55.09*	*18.12*	*48.95*	*18.65*	50.60

Notes: a: Staff total refers to medical/paramedical and nursing staff costs. Other staff costs are incorporated within the domestic services, administration and clinical support services categories.

Table 4.5: Composition of outpatient visit costs (Rand, 1992/93)

	Contractor			Public			Mean		Median	
	Matik.	Hewu	Shil.	Tints.	Letaba	Bisho	Con.	Pub.	Con.	Pub.
External administration	4.88	3.36	1.79	4.28	4.12	11.31	3.34	6.57	3.36	4.28
Internal administration	1.91	1.85	0.46	0.12	0.12	4.72	1.41	1.65	1.85	0.12
Admin. total	*6.78*	*5.21*	*2.26*	*4.40*	*4.24*	*16.03*	*4.75*	*8.22*	*5.21*	*4.40*
Transport	6.97	12.38	0.00	1.83	19.54	5.84	6.45	9.07	6.97	5.84
Laundry	1.58	1.76	1.79	1.79	1.54	6.32	1.71	3.22	1.76	1.79
Catering	1.09	1.56	0.58	0.82	1.00	8.50	1.07	3.44	1.09	1.00
Housekeeping/ Maintenance	7.02	4.10	1.51	2.43	11.29	26.99	4.21	13.57	4.10	11.29
Domestic services total	*16.66*	*19.79*	*3.87*	*6.87*	*33.37*	*47.65*	*13.44*	*29.30*	*16.66*	*33.37*
Pharmacy	16.52	30.57	5.15	6.51	6.13	11.70	17.42	8.11	*16.52*	6.51
Radiology	7.28	12.80	2.68	1.80	4.82	13.31	7.59	6.64	*7.28*	4.82
Rehabilitation services	2.62	1.11	3.61	3.40	6.15	4.60	2.45	4.72	*2.62*	4.60
Laboratory	3.10	2.10	1.88	1.46	0.51	2.21	2.36	1.39	2.10	1.46
Operating theatres	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Clinical support services total	*29.53*	*46.59*	*13.33*	*13.17*	*17.61*	*31.81*	*29.82*	*20.86*	*29.53*	*17.61*
Nursing Staff	32.43	44.37	11.79	15.31	13.70	94.55	29.53	41.19	32.43	15.31
Paramedical staff	1.52	1.03	0.00	0.00	1.18	1.09	0.85	0.76	1.03	1.09
Medical Staff	21.98	30.61	7.50	8.32	14.14	22.63	20.03	15.03	21.98	14.14
Other staff	0.00	0.00	0.00	1.93	0.00	0.00	0.00	0.64	0.00	0.97
Staff total	*55.93*	*76.01*	*19.29*	*25.56*	*29.02*	*118.27*	*50.41*	*57.62*	*55.93*	*29.02*
Capital costs	*11.61*	*6.42*	*1.36*	*2.84*	*3.43*	*13.45*	*6.46*	*6.58*	*6.42*	*3.43*
Total costs	*120.51*	*154.02*	*40.11*	*52.84*	*87.67*	*227.22*	*104.88*	*122.58*	*120.51*	*87.67*
Total fixed costs	98.02	116.53	32.04	43.38	76.18	201.66	82.20	107.08	98.02	76.18
Total variable costs	22.49	37.49	8.07	9.46	11.49	25.55	22.68	15.50	22.49	11.49

Figure 4.15: Contribution of cost categories to public-contractor margin



Tables A19.13 and A19.14, Appendix 19 show the composition of costs per in-patient day and per OPD visit respectively, adjusted for comparison with the private hospitals. Table A19.13 indicates that the higher overall costs per in-patient day in the private hospitals result from higher unit costs in all of the cost categories analysed, although the most important contributors are staff costs, capital costs and, importantly, the clinical support services category, where both pharmacy and operating theatre costs show substantial margins over the other two groups. The tables also indicate that variable costs are substantially higher at the private hospitals than at the other hospitals for both output measures.

The relative importance of staff costs in the composition of total costs, and in the contribution to the public-contractor margins noted above, justifies a closer examination of this category of production costs. The determinants of staff costs include the numbers and mix of staff employed, as well as levels of remuneration of different staff categories. Figure 4.16 shows the ratios of various staff categories to composite hospital outputs for the public and contractor hospitals. As indicated, the staff to output ratios are higher in all of the public than in all of the contractor hospitals in the total staff, as well as in the nursing and medical staff categories. In the administrative and domestic staff category, however, the public hospitals have marginally lower ratios than the contractor hospitals, with the exception of Bisho.

Figure 4.17 shows the ratios of nurses to in-patient days and OPD visits, the two components of the composite output measure.[107] As the figure indicates, the higher nurse to output ratio in the public hospitals is maintained in the case of in-patient days, but not consistently in the case of OPD visits. Table A19.15, Appendix 19 shows additional nurse to output ratios, in this case, for admissions and operations, and indicates that the difference between public and contractor hospitals is reduced in the case of admissions[108], while in the case of operations, the public sector data is heavily

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107 In these calculations, nurses working in the in-patient wards were counted separately from those working in the OPD.

108 This is explained by the relatively fewer admissions produced at the contractor hospitals, which has the effect of increasing the number of nurses per admission.

biased by the figure for Bisho, removal of which results in very similar results for the two groups.

Table A19.15, Appendix 19 also provides data on these various staff output ratios for the private hospitals, and indicates that these have higher total and nursing staff to composite output ratios than the public hospitals (with the exception of Bisho in both cases), while their administrative/domestic staff to output ratios are of a similar order to those of public hospitals (again with the exception of Bisho). The private hospitals also show higher ratios per in-patient day than the public hospitals (with the exception of Bisho), but show lower average nurse per admission and nurse per operation ratios, than both the other groups.

Figure 4.16: Staff to composite output ratios

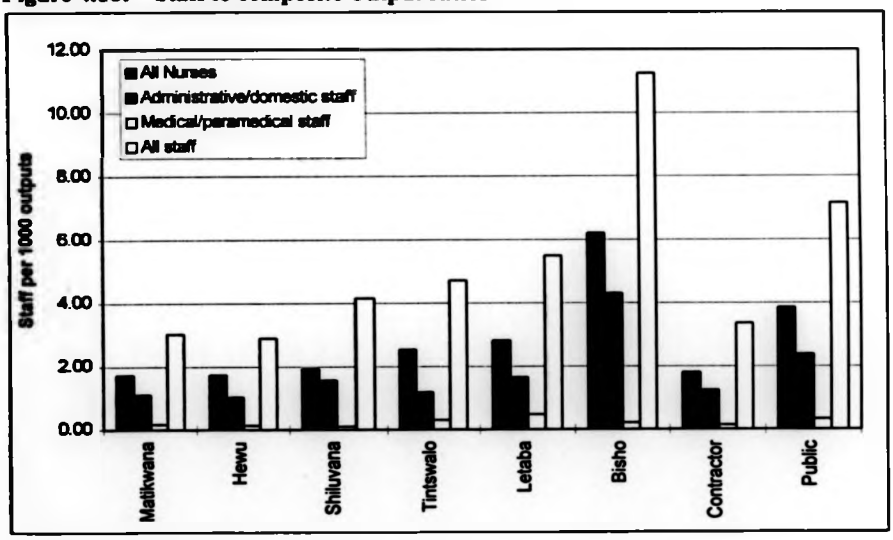
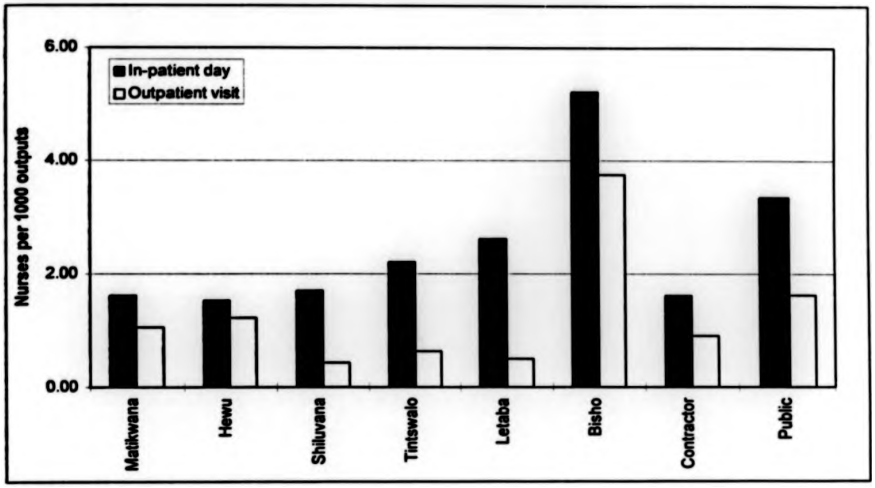


Figure 4.17: Nurse to in-patient day and OPD visit ratios



While the staff to output ratio data presented thus far seem to corroborate the patterns observed in the unit cost data, they do not as yet permit distinctions between the effects of staff numbers, staff mix and remuneration levels on unit staff costs. Figure 18 addresses the issue of remuneration levels, showing the average annual cost per staff member in the various staff categories. The figure shows that mean salary costs per doctor and per paramedical[109] staff member at the contractor hospitals substantially exceed those at the public hospitals, with mean annual salaries per doctor of R91,026 in the contractor hospitals and R59,697 in the public hospitals, with the equivalent figures for paramedical staff being R42,526 and R19,543. In the case of nurses, the contractor and public hospitals show mean annual salary costs in a similar range, with contractors being slightly higher on average (R24,376 and R22,355 respectively), while this pattern is reversed in the case of administrative and domestic staff (mean annual salaries of R12,875 in the contractor hospitals and R14,733 in the public hospitals). The figure also shows that average salaries for nursing, administrative and domestic staff at the private hospitals are higher than those in the other two groups.

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109 Paramedical staff include physiotherapists, occupational therapists, radiologists, pharmacists or assistant staff in any of these categories.

Figure 4.18: Mean annual salary cost per staff member

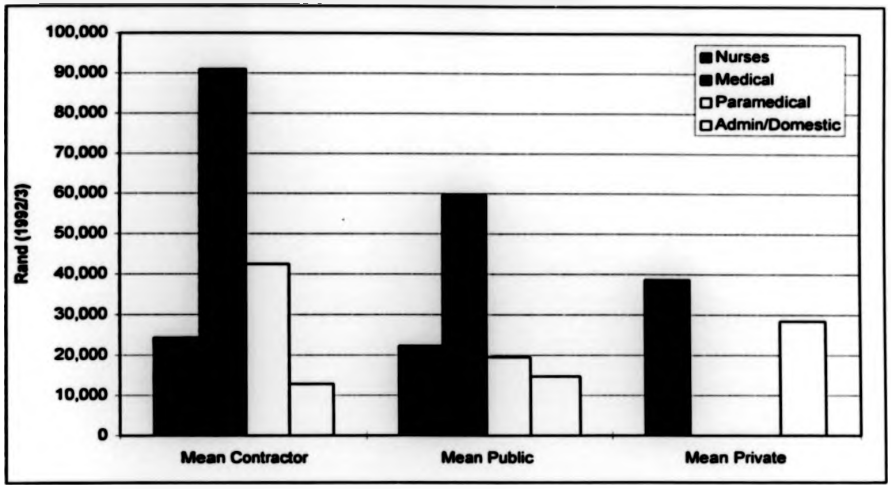

Figure 19 shows the distribution of nursing staff between Professional nurses, Staff nurses and Assistant/pupil nurses at each of the hospitals.[110] As expected from the analysis of mean costs per nurse, the figure confirms a relatively similar nursing mix between the contractor and public hospitals, with the contractor hospitals appearing to employ a slightly more expensive mix, with marginally higher proportions of Professional and Staff nurses than their public sector counterparts. The mean proportions of Professional nurses are 33% and 30% in the contractor and public hospital groups respectively, while the figures for Staff nurses are 24% and 20%.[111] The figure also shows the somewhat different picture at private hospitals, which are characterised by a significantly higher proportion of Professional nurses (mean of 57%) with the balance evenly distributed between the other two categories.

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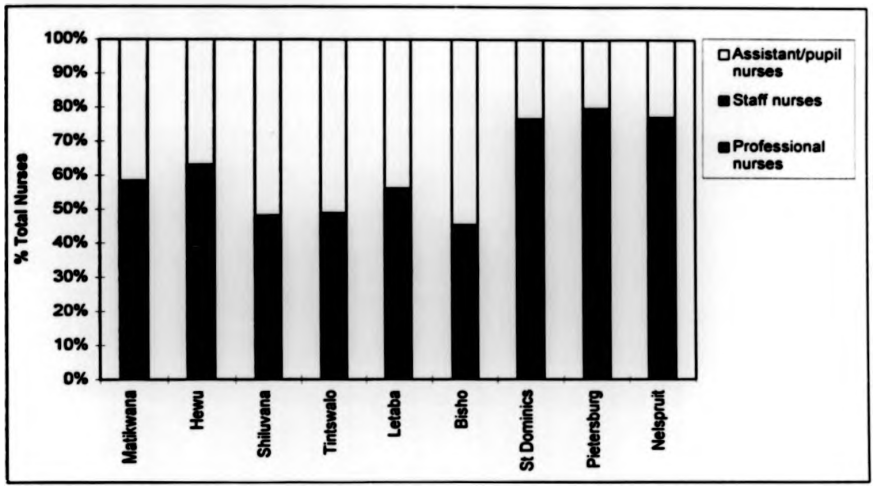
110 These categories of nurses are distinguished by the duration of their training, subsequent professional status and levels of remuneration. Professional nurses are the highest paid category, and undergo a three year formal training. Staff nurses undergo a two year training, while Assistant nurses undergo a one year training. The Pupil nurse category comprises a varying mix of nurses in training, either to become staff or professional nurses.

111 In addition to questions of staffing policy, one explanation for the relatively lower proportions of more qualified staff at the public hospitals is the presence of larger numbers of Pupil nurses at these hospitals due to their more substantial training function. Note also the similarity in nursing staff profile between Shiluvana hospital and the public hospitals, which is explained by the fact that all nursing staff at Shiluvana are employed by the government, and also by the fact that the hospital undertakes a greater teaching load than do the other two contractor hospitals.

Figure 4.19: Nursing staff mix



Taken together, these data allow some conclusions concerning the effects of employment patterns and remuneration on the observed differences in unit costs at the study hospitals. As noted above, differences in unit staff cost explain a significant proportion of the total public-contractor margin in the various unit staff costs analysed here. This analysis has shown that this occurs despite the relatively more expensive staff mix (in all categories except administrative and domestic staff) at the contractor hospitals, and therefore suggests that the relatively higher unit staff costs at the public hospitals are entirely attributable to their relatively higher staff to output ratios in most staff categories. The one exception to this pattern is found in the administrative and domestic staff categories, where the higher public hospital costs are attributable to a combination of higher staff output ratios and a more expensive staff mix.

4.4.3. Tracer conditions

Table 4.6 presents the median values of the data on the total production costs per case, as well as on the composition of these costs, for the four tracer conditions. These data represent median values of the data for each parameter. Tables A19.16 - A19.19, Appendix 19 present more detailed data on each of these parameters for the individual tracer conditions.[112] Table 4.7 shows the results of a statistical analysis of the pooled group data for the contractor and public hospitals only, while Table 4.8 shows the results of a similar analysis for all nine hospitals, on this occasion adjusted for comparison with the private hospitals. The results obtained for each of the tracers are discussed separately below. Table A19.20, Appendix 19 presents the results of regression analyses undertaken to investigate the relationship between age and sex and costs per case. As the table demonstrates, no significant relationship between either of these parameters and costs per case were noted for any of the tracer conditions, and the data were consequently not adjusted for age or sex.

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112 As Tables A19.16 -A19.19, Appendix 19 demonstrate, the median values of the data are lower than the mean values for most of the parameters, reflecting, in general, the influence of a few outliers at the higher ends of the ranges of values. For this reason, the median values were chosen for detailed analysis here. Comparison of pooled data for the different groups however relies on statistical comparisons of sample means.

Table 4.6: Tracer cost analysis — comparison of contractor and public hospitals (costs per case - Rand, 1992/93)

	Contractor			Public		
	Matik.	Hewu	Shil.	Tints.	Letaba	Bisho
Caesarean Section						
Length of Stay (days)	11	10	10	8	6	8
Lab Costs	5	4	0	0	4	4
Drug Costs	9	13	39	9	19	17
Theatre Costs	1,742	1,304	1,422	1,221	932	5,580
Hotel and Staff Costs	1,530	2,077	1,758	1,074	1,591	2,677
Total production cost	3,272	3,411	3,216	2,295	2,552	8,262
Total Contract Cost	3,942	3,968	4,061			
Normal Deliveries						
Length of Stay (days)	2	3	4	3	2	4
Lab Costs	0	4	0	0	4	0
Drug Costs	2	0	17	1	3	67
Hotel and Staff Costs	278	623	615	403	530	1,258
Total production cost	283	631	631	404	530	1,325
Total Contract Cost	405	799	927			
Appendectomies						
Length of Stay (days)	12	11	7	8	6	
Lab Costs	64	23	0	45	52	
Drug Costs	24	50	26	12	21	
Theatre Costs	1,888	1,849	2,098	1,140	956	
Hotel and Staff Costs	904	1,145	798	792	707	
Total production cost	2,962	3,082	2,925	2,022	1,746	
Total Contract Cost	3,358	3,390	3,309			
Hernia Repair						
Length of Stay (days)	7	10	13	6	9	
Lab Costs	0	4	0	0	28	
Drug Costs	3	2	32	6	4	
Theatre Costs	2,482	1,452	1,502	1,136	1,182	
Hotel and Staff Costs	528	1,041	1,536	633	1,002	
Total production cost	3,085	2,538	3,046	1,779	2,215	
Total Contract Cost	3,349	2,818	3,785			

Table 4.7: Tracer cost analysis - pooled group data for contractor and public hospitals (costs per case - Rand, 1992/93)

	Contractor			Public				Adjusted Public[a]			
	Mean	CI[b]	Median	Mean	CI	Median	P value	Mean	CI	Median	P value
Caesarean Section	3,655	161	3,290	4,727	409	2,839	<0.01	2537.45	89.24	2429.44	<0.01
Normal Delivery	636	89	439	870	69	694	<0.01	550.79	79.22	404	<0.05
Appen-dectomy	3,223	387	2,964	2,061	284	1,983	<0.01	n/a[c]	n/a	n/a	n/a
Hernia Repair	2,983	141	2,959	2,453	387	2,040	<0.01	n/a	n/a	n/a	n/a

Notes: a: The public hospital data were adjusted by removing the caesarean section and NVD cases at Bisho hospital from the pooled sample, in order to assess the impact of the removal of the high costs at this hospital on the performance of the remaining two public hospitals.
b: 95% confidence interval
c: n/a - not applicable (since no appendectomy and hernia repair cases were carried out at Bisho during the study year).

Table 4.8: Tracer cost analysis - pooled group data for all hospitals (costs per case - Rand, 1992/93)

	Contractor			Public			Private			P values	
	Mean	CI[a]	Median	Mean	CI	Median	Mean	CI	Median	P (Pvte-Pub)	P (Pvte-Con)
Caesarean Section	3,592	156	3,261	4,647	412	2,678	4,845	343	4,353	0.23	<0.01
Normal Delivery	617	87	423	773	72	510	2,415	138	2,320	<0.01	<0.01
Appen-dectomy	3,110	363	2,856	1,938	258	1,881	1,775	51	1,704	0.11	<0.01
Hernia Repair	2,941	143	2,916	2,342	358	1,958	1,578	56	1,554	<0.01	<0.01

Note: a. 95% confidence interval

4.4.3.1. Caesarean sections

Table 4.6 shows that the total production costs per caesarean section case at all of the contractor hospitals are higher than the costs at two of the public hospitals, but substantially lower than those at Bisho hospital. This pattern is reflected in the comparison of means and medians for the pooled data shown in Table 4.7, which shows lower means and medians for the contractor group (with a statistically significant difference between the mean values). When the cases from Bisho hospital are removed, however, the mean and median values for the contractor hospitals are in fact higher than those of the public hospitals, the difference between the means again being statistically significant. Examination of the component costs in Table 4.6 suggests some explanations for these observations. The extremely high cost per case at Bisho is largely attributable to the very high theatre costs at that hospital, although the higher hotel and staff costs[113] per in-patient day observed earlier combine with the longer LOS to give the highest hotel and staff costs per case of all hospitals. A comparison of the contractors with the remaining public hospitals shows that the longer LOS in the contractors overrides the effect of their lower costs per maternity in-patient day observed earlier, resulting in higher hotel and staff costs per case. Theatre costs are also higher in the contractor hospitals. Table 4.8 shows that the mean costs per case at the private

113 As defined in Chapter 3, hotel and staff costs include all costs besides the costs of laboratory tests, drugs and operating theatre time, which were estimated separately.

hospitals exceed the means of the other two groups, although the difference between the private and public hospital data is not statistically significant.[114]

4.4.3.2. Normal Deliveries

As in the case of caesarean sections, analysis of the pooled data (Table 4.7) shows that the contractors had a lower mean cost per case than the public hospitals with the difference being statistically significant, although this pattern is reversed when the effect of Bisho is removed from the public hospital data.[115] Table 4.6 shows that LOS for normal deliveries falls into a similar range for the two groups, so that differences in hotel and staff costs per case are attributable mainly to differences in underlying production costs. Table 4.8 shows that private hospital costs per delivery exceed those of both of the other groups, in this case by a factor of between 3 and 4.[116]

4.4.3.3. Appendectomy

Table 4.6 demonstrates that the costs per appendectomy case at all three of the contractor hospitals exceed those at the two public hospitals for which data were available,[117] and Table 4.7 shows the higher mean and median costs per case for the contractor group, with the difference between the means again occurring at a statistically significant level. Table 4.6 demonstrates that the higher total costs at the contractors are attributable to a combination of longer LOS (which counteracts their lower hotel and

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114 As demonstrated in Table A19.16, Appendix 19, the higher private hospital costs occur despite these hospitals having shorter LOS and lower theatre costs per case than the other hospitals, and are attributable to a combination of the higher costs per maternity in-patient day demonstrated earlier, and to substantially higher drug costs per case.

115 Table 4.6 again shows Bisho hospital as an outlier, with costs per case more than double those of the next highest hospital. In this case, the major factor appears to be the higher costs per in-patient day in the maternity ward. The table shows a more variable pattern in respect of total costs per case at the remaining hospitals, with one contractor hospital (Matikwana) demonstrating the lowest total costs, but with the remaining two showing higher costs than at the remaining public hospitals.

116 Table A19.18, Appendix 19, shows that this occurs despite similar LOS to that of the other hospitals, and is again attributable to the much higher drug costs per case, as well as to the higher underlying hotel and staff costs per maternity in-patient day at the private hospitals.

117 No appendectomies or hernia repair operations were carried out at Bisho hospital during the study year.

staff costs per in-patient day) and significantly higher theatre costs per case. Table 4.8 shows the data for private hospitals and demonstrates a very different pattern to that observed for maternity cases. In this case, the costs per case are lower at the private hospitals than in both of the other groups, although the difference in the means between private and public hospitals is not statistically significant.[118]

4.4.3.4. Hernia Repair

Table 4.6 demonstrates that costs per hernia repair case follow a very similar pattern to that observed for appendectomy cases, with the total costs per case at each of the contractor hospitals being higher than those at the two public hospitals for which data were available. Once again, this is reflected in the higher mean and median costs per case at the contractor hospitals (see Table 4.7). Table 4.6 also suggests a similar set of explanations for this pattern, with LOS and theatre costs being higher in the contractor hospitals. As noted previously, the higher LOS in the contractor hospitals is sufficient to override the effects of their lower costs per surgical in-patient day, so that total hotel and staff costs per case are significantly higher in the contractor than in the public hospitals. Table 4.8 shows that mean and median costs per case at the private hospitals are lower than in both of the other groups, with differences between the means being statistically significant in both cases.[119]

4.4. Comparison of total contract costs and public sector production costs

This section reviews the relationships between the various components of total contract cost and public sector production cost, before presenting comparative data on these cost

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118 As Table A19.18, Appendix 19 shows, the lower costs per case at the private hospitals occur despite the much higher drug costs per case and the higher underlying hotel and staff costs per in-patient day at these hospitals, and are attributable to significantly shorter LOS and to much lower total theatre costs per case.

119 Table A19.19, Appendix 19 shows that the lower private hospital costs occur despite higher drug costs per case, and are attributable to shorter LOS and to substantially lower theatre costs per case.

parameters. As in the previous sections, these comparisons are made separately for in-patient days, admissions and other measures of output, as well as for the four tracer conditions.

Table 4.9 presents the data on the elements of total production cost and total contract costs at each of the contractor hospitals, and also shows the price of the contract and consequent contractor profit levels and margins at each hospital. The table shows that the relative contribution of the government and contractor cost elements of total production cost vary significantly between hospitals, which is attributable to variations in the nature of the contract in place at each hospital. As further discussed in Chapter 6, variations in the contract concern three main issues: the inclusion or exclusion of capital costs in the price, the distribution of staff costs between the contractor and the government, and the presence or absence of a minimum occupancy clause. The inclusion of capital costs in the contract price at Matikwana and Shiluvana increases the contribution of the contractor cost element of total contract cost at these hospitals, although the government's role as the major employer of staff at Shiluvana overrides this effect by significantly increasing the government component of total production cost. The relatively low government component at Matikwana reflects the absence of capital costs, and the minimal government role in employment of staff, while the relatively high government component at Hewu, despite its employing no full-time staff at the hospital, is attributable to its bearing the full cost of capital at that hospital.

The profit levels and margins shown in the table reflect the difference between the contract price and contractor production cost, adjusted to exclude the effect of VAT.[120] The lower estimated profit margin at Hewu than at the other two hospitals is likely to be attributable to a combination of relatively higher underlying production costs[121], the

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120 VAT is included in the contract price, but does not contribute to contractor profits, since it is paid back to the government.

121 Cost per in-patient day at Hewu was shown above to be substantially higher than the cost at Matikwana, but slightly lower than the cost at Shiluvana.

absence of a minimum occupancy clause, and the absence of capital charges from the price at Hewu.[122]

Table 4.9: Elements of production and total contract costs (Rand, 1992/93)

	Contractor production cost (A)	Govt. element of production cost (B)	Total Production costs (A+B)	Per diem rate	Contract Price (C)	Total contract cost (B+C)	Contractor Profit (C-A)	Contractor profit margin (D/A)
Matikwana	6,839,261	472,817	7,299,762	158.88	10,043,661	10,516,477	3,017,476	44%
Hewu	9,013,525	2,275,506	11,141,624	167.47	12,044,785	14,320,291	2,854,437	32%
Shiluvana	4,123,748	5,122,345	7,943,798	118.21	7,203,152	12,325,498	2,899,772	70%
Mean							2,923,895	49%

Table 4.10 shows the effect of the minimum occupancy clause on the contract price and on contractor profit margins, and shows that the minimum occupancy clause led to an effective increase in the contract price (relative to the charge in the absence of the clause) of 14% and 17% at Matikwana and Shiluvana respectively. Removal of the clause would in turn reduce the profit margins at the two hospitals by 41% and 36% respectively, indicating the extent to which this component of the contract contributes to profit margins at these two hospitals.

Table 4.10: Effect of minimum occupancy clause on total contract price and profit margins

	Days produced	Days charged	Excess days charged	Effective price increase due to occ. clause	Profit margin after removal of occ clause
Matikwana	50229	58530	8301	14%	26%
Shiluvana	49170	59292	10122	17%	45%

The high margin at Shiluvana, even after removal of the effect of the minimum occupancy clause, is not attributable to lower unit production costs at that hospital since, as demonstrated above, these are in fact higher than those at Matikwana for all outputs except OPD visits. Instead this margin is attributable, at least in part, to the contract price not fully reflecting the reduced costs borne by the contractor through the government's bearing of a substantial burden of total staff costs at the hospital. This is confirmed by an analysis of the relative prices and production costs at Matikwana and

122 The extent to which this latter factor affects the profit margin would depend on the extent of differential returns earned by the contractor on capital and recurrent expenditure. This study did not produce the data required to distinguish the relative returns earned on each of these components of expenditure.

Shiluvana hospitals. The elimination of the costs of the staff employed by the government at Shiluvana represents a reduction in production costs of at least 107% relative to the costs the contractor would have incurred had it employed the same staff complement at the same salary costs.[123] However, the price per in-patient day charged at Shiluvana was only 30% below that charged at Matikwana. If we assume that the pattern of all other production costs incurred by the contractor is similar at the two hospitals, these figures do suggest that the high margin at Shiluvana may be attributable to the price factor postulated here.[124]

Figure 4.20 compares total contract costs per in-patient day with production costs per in-patient day, and indicates that the total contract costs at all three contractor hospitals fall below the production costs of two of the public hospitals, but exceed the production costs at Tintswalo hospital. The figure also shows that the mean and median total contract costs are below the equivalent values for public hospital production costs, although the margins in this case (19% and 8% in the mean and median values respectively) are less than those observed in the comparison of production costs at these hospitals. Table 4.11 shows that service-mix adjustment does not alter the pattern observed here, although the margins are affected to some extent, increasing to 22% in the mean values and decreasing to 3% in the median values. The table also shows that the same general pattern is observed when VAT is excluded from the total contract cost, but that the margins are increased to 22% and 12% in the mean and median values respectively.

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123 The estimated reduction in costs of 107% may deviate from the actual figure, since the government and the contractor have different employment practices, affecting both numbers of staff and salary levels. Were the contractor to employ the staff at Shiluvana, total staff costs could be expected to be lower since, as shown above, the contractor tends to utilise a lower staff to output ratio than do public hospitals. As a result, the reductions in costs could be expected to be lower than those postulated here.

124 Observations undertaken during the study suggest that aside from capital costs, and contractual differences (such as the range of staff employed), the general structure of production costs is similar at all three of the contractor hospitals. This is particularly the case for Matikwana and Shiluvana. In the case of capital costs, the study estimated a lower annual cost for Shiluvana than for Matikwana. This margin is however substantially higher when the contractor's own estimates of the annual cost of capital at these hospitals are taken into account. In this case, the cost of capital at Shiluvana is just over half of that at Matikwana. In either case, these data suggest an even greater discrepancy between price and production cost at these two hospitals than is the case when capital costs are not considered.

Figure 4.20: Total contract costs vs. public sector production costs — in-patient days

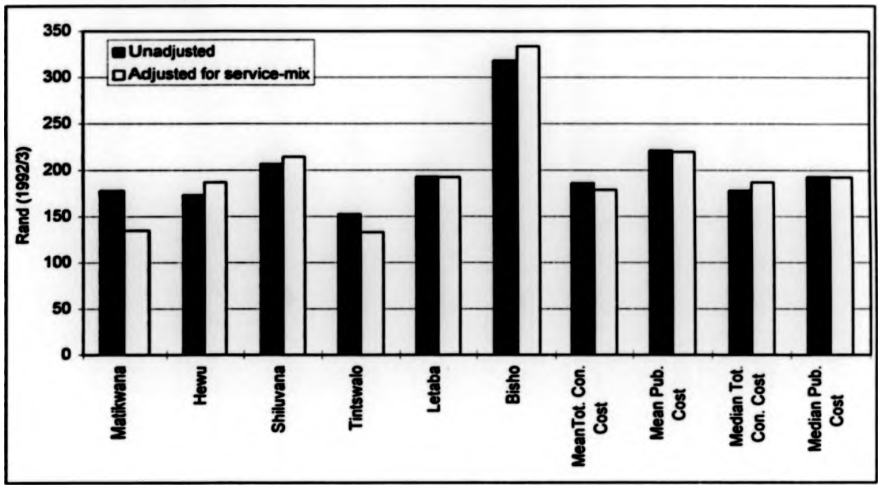

Figure 4.21 shows the same data for admissions. In this case, there is a narrower gap between total contract costs and public hospital production costs, with total contract costs falling into a higher range of values than public hospital production costs (R1,458-R1,945 and R1,269-R1,632 respectively), and with a significant overlap between these ranges. As the figure shows, both mean and median total contract costs exceed the equivalent values of public hospital production costs by approximately 15%. Table 4.11 again shows that service-mix adjustment does not affect this general pattern, and in fact increases the observed margins to 19% and 21% in the mean and median values respectively. The exclusion of VAT from the total contract cost does not affect the direction of the margins, but reduces them to 13% and 12% in the mean and median data respectively.

Table 4.11: Total contract costs vs. contractor and public sector production costs (Rand, 1992/93)

	Matikwana			Hewu			Shiluvana			Tints.	Let.	Bisho	Mean				Median			
													Contractor			Public	Contractor			Public
	Price	Price ex VAT	Prod. Cost	Price	Price ex VAT	Prod. Cost	Price	Price ex VAT	Prod Cost	Production cost			Price	Price ex VAT	Prod. Cost	Prod. Cost	Price	Price ex VAT	Prod. Cost	Prod. Cost
In-patient days	178	172	124	174	168	137	207	203	140	153	193	318	186	181	133	221	178	172	140	193
In-patient days - adjusted	135	131	94	187	182	148	214	211	145	133	193	334	179	174	129	220	187	182	145	193
Admissions	1,458	1,410	1,014	1,945	1,887	1,533	1,860	1,828	1,256	1,269	1,632	1,586	1,755	1,708	1,268	1,496	1,860	1,828	1,256	1,586
Admissions - adjusted	1,579	1,527	1,098	1,951	1,894	1,538	1,970	1,922	1,330	1,320	1,570	1,533	1,833	1,781	1,322	1,474	1,951	1,922	1,330	1,533
Outpatient visits	173	168	121	195	190	154	n/a	n/a	n/a	53	88	227	184	179	137	140	184	179	137	140
Composite output	177	171	123	178	172	140	154	151	108	107	157	288	169	165	124	184	177	171	123	157
Composite output - adjusted	141	137	98	189	183	149	157	155	111	99	157	297	163	158	119	184	157	155	111	157

Figure 4.21: Total Contract Costs vs. Public Sector Production Costs — Admissions

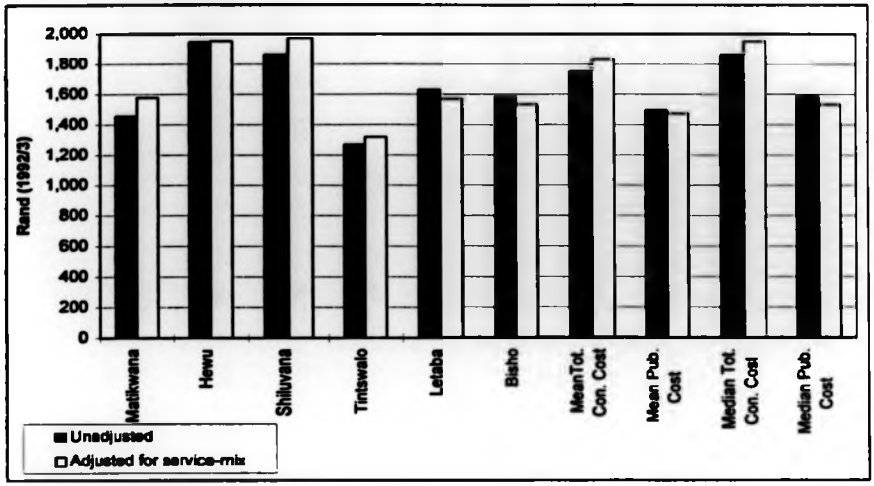

Table 4.11 also shows these data for OPD visits. This indicates, as noted previously, that public hospital production costs per OPD visit vary widely, and that the total contract costs at the two contractor hospitals at which this figure is relevant fall within this wide range.[125] However, mean and median total contract costs exceed the equivalent values for public hospital production cost by 24% and 52% respectively, the higher margin in the median values reflecting the effect of the removal of the very high production costs per OPD visit at Bisho hospital.

Figure 4.22 shows the same comparisons for composite hospital outputs. This indicates that total contract costs per composite output at the contractor hospitals fall within a relatively narrow range (R154-R177), which itself falls entirely within the wider range of values observed for public hospital production costs (R107-R288). In this case, the total contract costs at all three contractor hospitals fall below production costs at two of the public hospitals, but exceed those observed at Tintswalo hospital. The figure also shows that mean total contract costs fall below mean public hospital production costs by

125 As noted above, OPD visits are not charged for at Shiluvana hospital, so that a comparison between total contract cost and public hospital production costs is not relevant in this case.

a margin of 8%. However, this margin is reversed in the case of the median data, in which case total contract costs exceed public hospital production costs by 11%. As noted previously, this reversal is due mainly to the elimination of the bias in the mean values which results from the high unit costs at Bisho hospital. Table 4.11 shows that service-mix adjustment increases the observed margin in the mean values to 13%, but eliminates it in the case of the median data, in which case total contract costs exceed public hospital production costs by only 0.5%. The elimination of VAT from the total contract price does not affect the margins observed in either the mean or median data. Tables A19.21 - A19.23, Appendix 19, show the effects on total contract costs and public sector production costs of the same set of sensitivity analyses carried out in the analysis of production costs. Table A19.21, Appendix 19 shows the effect of reductions in the discount rate. Because total contract cost is not related to the discount rate, these variations affect public sector production costs only in this analysis. The positive public-contractor margins in costs per in-patient day and costs per composite output are thus reduced as discount rates are reduced, while the negative margins in costs per admission and per OPD visit are increased.

Figure 4.22: Total Contract Costs vs. Public Sector Production Costs — Composite Outputs

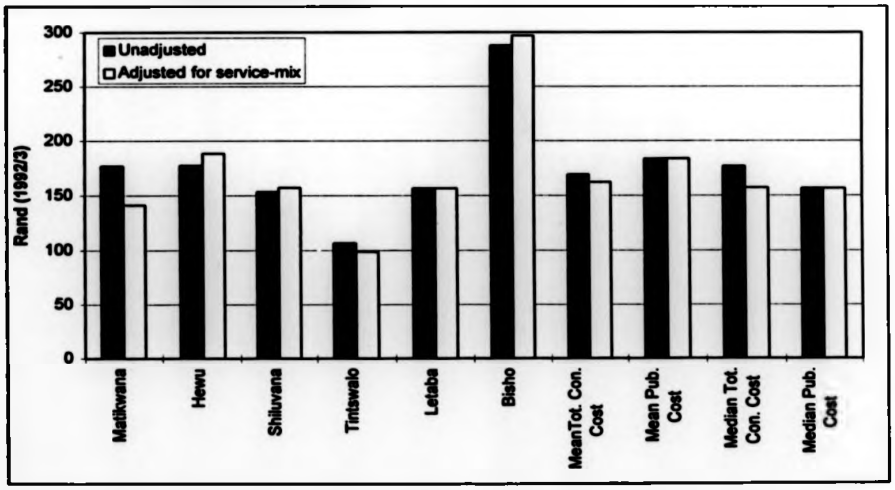

Table A19.22, Appendix 19 shows the effects of the extreme high and low sets of capital cost assumptions used earlier. These data illustrate a similar pattern to that observed for discount rates, with the low assumptions increasing the positive public-contractor margins and reducing the negative margins, and with high assumptions having the converse effect. In all cases except costs per composite output, the direction of the margin remains constant. In this latter case, the positive margin in the mean values is eliminated on the low capital cost assumptions, while in the median values, the positive margin is in fact converted into a negative margin, indicating that total contract costs exceed public sector production costs.

Table A19.23, Appendix 19 shows the effects of removal of capital costs on these comparisons. As expected, this has the effect of reducing the positive public-contractor margins in costs per in-patient day, and of increasing the negative margins in costs per admission and per OPD visit. The direction of all margins, however, remains constant.

Table 4.12 shows the mean and median values of the estimated total contract cost per case for the tracer conditions. This shows that, in the case of caesarean sections, the mean total contract cost remains below that of the mean public hospital cost, with the difference being statistically significant. As would be expected, however, removal of the effect of the high costs at Bisho hospital (as reflected in the median data) reverses this observation, so that total contract costs per case now exceed mean public hospital costs by a statistically significant margin. In the case of normal deliveries, the table shows that mean total contract cost exceeds mean public hospital costs, although the difference is not statistically significant. When the effects of Bisho are removed, however, the difference becomes statistically significant at the 1% level. As would be expected from the previous data for appendectomy and hernia repair cases, total contract costs per case exceed those of the public hospitals, in both cases by statistically significant margins.

Table 4.12: Pooled Tracer Data - Total contract costs vs. public sector production costs (Rand, 1992/93)

	Contractor			Public				Adjusted Public[a]			
	Mean	CI	Median	Mean	CI	Median	P value	Mean	CI	Median	P value
Caesarean Section	4431	209.7	3952	4600	411.41	2799	<0.05	2541.78	89.61	2432.58	<0.01
Normal Delivery	879.81	119.74	650.81	869.55	68.55	693.94	>0.05	544.79	78.96	404.2	<0.01
Appendectomy	3884.56	682.75	3365.37	2060.54	284.46	1983.14	<0.01	n/a[b]	n/a	n/a	n/a
Hernia Repair	3261.19	167.06	3260.76	2452.58	386.64	2040.05	<0.01	n/a	n/a	n/a	n/a

Notes: a: The public hospital data were adjusted by removing the caesarean section and NVD cases at Bisho hospital from the pooled sample, in order to assess the impact of the removal of the high costs at this hospital on the performance of the remaining two public hospitals.
b: not applicable (since no appendectomy and hernia repair cases were carried out at Bisho during the study year).

4.5. Data Envelopment Analysis

As discussed in Chapter 3, the DEA analysis was applied separately to an analysis set comprising the six public and contractor hospitals, and to one comprising all nine hospitals. Unless otherwise indicated, all results discussed refer to those obtained using input model 1 (the base model).[126] As noted in Chapter 3, a score of 1 represents a point on the efficiency frontier, and thus, maximum relative efficiency within the group being analysed. The difference between any other score and 1 represents the distance between that DMU and the efficiency frontier, so that a lower score represents a less efficient DMU.

Table 4.13 shows the efficiency scores emerging from the DEA applied to the contractor and public hospitals, and shows the mean values for the two groups as well as the scores obtained by the individual hospitals. The results are shown for input models 1 and 2[127], with all analyses assuming CRS. The table indicates that where model 1 specifications were used, and where the individual wards were treated as the DMU, the contractor group obtained higher mean scores than the public group in all cases, and that this

126 The base model aggregated total production costs into two input variables, total recurrent costs and capital costs.

127 Input model 2 specified four input variables: administrative/domestic services costs, drugs/other clinical services costs, total staff costs, and total capital costs.

pattern is repeated when all wards combined were analysed as the DMU. Examination of the mean data for model 2, indicates similar results to those obtained using model 1, except in the case of the maternity ward, where the use of model 2 specifications results in the contractors obtaining a slightly lower score than the public group, due to the higher score obtained by Tintswalo hospital in the latter analysis.

In the case of the OPD analysis, model 1 data again shows a higher mean contractor score which is reversed by the use of model 2 data, again due to the higher score obtained by Tintswalo. The operating theatre analysis shows almost identical mean scores for the two groups, with the mean public score being marginally higher than that obtained by the contractors.

Examination of individual hospital performance in these various analyses indicates two key patterns; the first is the variable performance of the hospitals across the different analyses, echoing the results of the production cost analysis reported above. The second is that in all of the analyses, the use of model 2 specifications results in a lower proportion of hospitals emerging as inefficient than when model 1 specifications are used. This confirms the expectation, discussed in the Chapter 3, that the sensitivity of DEA is reduced when larger numbers of input and/or output variables are specified, as occurs with model 2.

Table 4.13: DEA results - comparison of contractor and public hospitals only (CRS)

	Contractor			Public			Mean	
	Matik.	Hewu	Shilu.	Tints.	Letaba	Bisho	Con.	Pub.
Medical/Surgical wards								
Model 1	1.0000	0.8770	1.0000	1.0000	0.6893	1.0000	0.9590	0.8964
Model 2	1.0000	1.0000	1.0000	1.0000	0.6893	1.0000	1.0000	0.8964
Paediatric ward								
Model 1	0.9562	0.5787	1.0000	0.8178	0.6341	0.4778	0.8450	0.6432
Model 2	1.0000	0.5787	1.0000	0.8178	0.6341	0.4778	0.8596	0.6432
Maternity ward								
Model 1	0.7164	1.0000	0.3853	0.7337	1.0000	0.3651	0.7006	0.6996
Model 2	0.7164	1.0000	0.3853	1.0000	1.0000	0.3651	0.7006	0.7884
All wards								
Model 1	1.0000	0.6066	1.0000	0.9193	0.8091	0.7028	0.8689	0.8104
Model 2	1.0000	0.6232	1.0000	0.9151	0.8051	0.6018	0.8744	0.7740
Outpatient Dept.								
Model 1	0.3328	0.2604	1.0000	0.7590	0.4575	0.1765	0.5311	0.4644
Model 2	0.3328	0.2604	1.0000	1.0000	0.4575	0.1765	0.5311	0.5447
Operating theatres	0.4748	0.6162	0.8637	1.0000	0.7811	0.1855	0.6516	0.6555
Whole hospital								
Model 1	1.0000	0.6943	1.0000	1.0000	0.7551	0.6030	0.8981	0.7860
Model 2	1.0000	0.6943	1.0000	1.0000	0.7551	1.0000	0.8981	0.9184
Whole hospital - SQOC quality adjusted								
Model 1	1.0000	0.6985	1.0000	1.0000	0.8359	0.6652	0.8995	0.8337
Model 2	1.0000	0.7021	1.0000	1.0000	0.8368	1.0000	0.9007	0.9456
Whole hospital - NQOC[a] quality adjusted								
Model 1	1.0000	0.4711	1.0000	1.0000	0.5609	0.3842	0.8237	0.6484
Model 2	1.0000	0.4711	1.0000	1.0000	0.5609	1.0000	0.8237	0.8536
Whole hospital - Combined quality adjusted								
Model 1	1.0000	0.5642	1.0000	1.0000	0.6729	0.4901	0.8547	0.7210
Model 2	1.0000	0.5642	1.0000	1.0000	0.6729	1.0000	0.8547	0.8910

Notes: a: Adjusted for quality of nursing care

Table 4.13 also presents the results of the DEA using the whole hospital as the DMU. In this instance again, the model 1 data shows a higher mean contractor score, which is reversed when model 2 data are used (in this case due to the better performance demonstrated by Bisho hospital in the latter analysis). Examination of the results obtained when the output variables were adjusted for the various quality of care measures indicates a very similar pattern to that observed with the unadjusted outputs, indicating that none of the quality adjustments affect which hospitals are identified as inefficient, although they do impact on the extent of inefficiency observed. In the case of adjustment for structural quality of care, the affected hospitals in fact appear relatively

more efficient than when outputs are not adjusted.[128] When outputs are adjusted for quality of nursing care, the inefficient hospitals appear relatively more inefficient, suggesting that they are affected more adversely than the other sample hospitals by this adjustment. The adjustment for both elements of quality of care shows scores in between those obtained by the individual adjustments, and reflects the heavier weighting given to quality of nursing care in the combined adjustment.

Table A20.1, Appendix 20 shows the results of a similar analysis, in this case allowing for VRS. These data suggest the important finding that the results are sensitive to the treatment of economies of scale in the DEA models. As would be expected, the allowance of VRS benefits the generally larger public hospitals through the effect of economies of scale, with the result that the mean contractor scores are lower than those of the public group across most of the DMUs analysed, an observation that is robust to the input model specification used. Important exceptions to this observation are noted in the OPD and operating theatre analyses, where the very poor scores obtained by Bisho overwhelm the beneficial effects of VRS for the public hospitals, so that the mean public score remains below that of the contractor group.[129]

Table A20.2, Appendix 20 shows the results of a model 1 analysis, in this case substituting in-patient days for admissions. The inclusion of in-patient days as the key output variable significantly benefits the contractor hospitals (due to the longer LOS in this group), which maintain higher mean scores across all the ward related DMUs, and in the whole hospital, and with substantially higher margins than was previously the case.

In summary, this analysis of the relative economic efficiency of the contractor and public hospitals demonstrates that the contractor hospitals are, on average, more efficient than the public hospitals, when the most sensitive model specifications are

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128 This observation suggests that some of the other sample hospitals are affected more adversely than the inefficient hospitals by the adjustment for structural quality of care, but not by a sufficient margin to affect which hospitals are identified as inefficient.

129 The general pattern is also reversed when the whole hospital is analysed after adjustment for nursing quality of care. In this case, the mean contractor score is slightly higher than that of the public group, with the gap decreased when model 2 is specified, due to the higher score obtained by Bisho in the latter analysis.

used, and when CRS are assumed. However, a more mixed picture emerges when the less sensitive model 2 specifications are used, and when the model allows for VRS, the public hospitals appear more efficient. The efficiency scores obtained by both groups are relatively high in most cases, with all scores being above 0.75 in seven of the ten analyses conducted (and eight out of ten cases in the VRS analyses). Important exceptions to this latter observation occur in the case of the OPD and operating theatres, in which the efficiency scores are generally lower in both groups. Sensitivity analysis also demonstrates that the results are sensitive to the use of in-patient days rather than admissions, with contractor performance substantially enhanced when in-patient days are used in the analysis.

Table 4.14 shows the results of the DEA analysis of all nine hospitals, again using the two input models and assuming CRS. Analysis of the individual wards and combined wards as the DMU, using model 1 specifications, demonstrates that the private hospitals obtain the highest mean scores of all three groups in the medical/surgical and paediatrics wards, and the lowest mean scores in the maternity wards and when all wards combined were analysed. In the analysis of the OPD, the private hospitals demonstrate the worst performance of the three groups, a result that is consistent across both input models. This pattern is reversed in the case of the operating theatres, where, as expected, the private hospitals demonstrate far superior performance, with the other two groups showing very similar scores. The analysis of the whole hospital as the DMU again demonstrates superior performance by the private hospitals, results which are again robust to both model specification and adjustment for the various measures of quality of care.[130] Table A20.3, Appendix 20 shows the results of the same analysis, on this occasion allowing for VRS. These data again demonstrate the sensitivity of the results to the treatment of economies of scale, although the effects of the VRS assumption are less

130 These latter results are attributable mainly to the inclusion of operations within the output specifications in the whole hospital analysis, since the private hospitals carried out substantially higher numbers of operations than all other sample hospitals, and also demonstrated significantly superior efficiency within the operating theatres themselves.

substantial here than was the case in the comparison of the contractor and public hospitals alone.[131]

Tables A20.4 and A20.5, Appendix 20 present further evidence of the sensitivity of the results of DEA to the specification of input and output variables. Table A20.4, demonstrates the effect of higher numbers of output variables by comparing the model 1 analyses of the combined wards and the whole hospital, using total admissions as a single output variable in the first analysis, and admissions broken into four service-mix categories (and hence four output variables) in the second analysis.[132] The table demonstrates that for both DMUs, the use of four output variables results in only two of the nine hospitals being identified as inefficient, while the use of a single output variable results in six of the nine hospitals being identified as inefficient. Table A20.5 compares the results of DEA analyses using input models 1 and 3.[133] Once again, this table demonstrates numerous instances in which the model 1 analysis, which specified two inputs, is able to identify inefficient hospitals which are identified as fully efficient when model 3 specification (with five inputs) is used, highlighting the sensitivity of the DEA analysis to the number of input and/or output variables specified.

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131 In this instance, the relative position of the private hospitals is not affected in any of the DMUs assessed, with the exception of the OPD, where the allowance of VRS results in a significant increase in the observed efficiency of the two private hospitals which operate OPDs.

132 This analysis assumed CRS, and was applied to all nine hospitals. Very similar results were obtained when the analysis was applied to the contractor and public hospitals alone, and when VRS was assumed.

133 Input Model 3 divided production costs into 8 variables: administrative costs, domestic services costs, drug costs, X-ray and laboratory investigations costs, theatre costs, nursing staff costs, medical, paramedical and other staff costs, and capital costs.

Table 4.14: DEA results - comparison of all study hospitals (CRS)

	Contractor			Public			Private			Mean		
	Matik.	Hewu	Shilu.	Tints.	Letaba	Bisho	St. Doms.	Piet.	Nels.	Con.	Pub.	Pvte.
Medical/Surgical wards												
Model 1	1.0000	0.8798	0.9180	1.0000	0.7281	0.9812	1.0000	1.0000	1.0000	0.9326	0.9031	1.0000
Model 2	1.0000	1.0000	1.0000	1.0000	0.9473	1.0000	1.0000	1.0000	1.0000	1.0000	0.9824	1.0000
Paediatric ward												
Model 1	0.7062	0.4154	0.7358	0.6118	0.4553	0.3440	0.5091	1.0000	0.8076	0.6191	0.4704	0.8076
Model 2	1.0000	0.4783	1.0000	1.0000	0.5890	0.4417	0.6329	1.0000	0.7817	0.8261	0.6769	0.7817
Maternity ward												
Model 1	0.6902	1.0000	0.3802	0.7076	1.0000	0.3506	0.1701	0.1524	0.1751	0.6901	0.6860	0.1701
Model 2	1.0000	1.0000	0.4404	1.0000	1.0000	0.3764	0.1905	0.1726	0.1973	0.8135	0.7921	0.1905
All wards												
Model 1	0.5224	0.3173	1.0000	1.0000	0.8551	0.3681	0.2735	0.3488	0.3940	0.6132	0.7411	0.3488
Model 2	1.0000	0.6260	1.0000	0.9380	0.8328	0.8073	0.6062	0.5690	1.0000	0.8753	0.8594	0.6062
Outpatient Dept.												
Model 1	0.2909	0.2297	1.0000	0.6801	0.4104	0.1332	n/a	0.0708	0.1673	0.5069	0.4079	0.1190
Model 2	0.2909	0.2297	1.0000	0.6801	0.4014	0.1332	n/a	0.0708	0.1672	0.5069	0.4049	0.1190
Operating theatres	0.3207	0.4161	0.5833	0.6753	0.5275	0.1253	0.4056	1.0000	0.8391	0.4400	0.4427	0.8391
Whole hospital												
Model 1	1.0000	0.6979	1.0000	1.0000	0.7596	0.5916	n/a	1.0000	1.0000	0.8993	0.7837	1.0000
Model 2	1.0000	0.6979	1.0000	1.0000	0.7596	1.0000	n/a	1.0000	1.0000	0.8993	0.9199	1.0000
Whole hospital - SQOC quality adjusted												
Model 1	1.0000	0.6859	1.0000	1.0000	0.8324	0.6526	n/a	1.0000	1.0000	0.8953	0.8283	1.0000
Model 2	1.0000	0.6931	1.0000	1.0000	0.8739	1.0000	n/a	1.0000	1.0000	0.8977	0.9580	1.0000
Whole hospital - NQOC quality adjusted												
Model 1	1.0000	0.4611	1.0000	1.0000	0.5620	0.3774	n/a	1.0000	1.0000	0.8204	0.6465	1.0000
Model 2	1.0000	0.4611	1.0000	1.0000	0.5620	1.0000	n/a	1.0000	1.0000	0.8204	0.8540	1.0000
Whole hospital - Combined quality adjusted												
Model 1	1.0000	0.5454	1.0000	1.0000	0.6428	0.4805	n/a	1.0000	1.0000	0.8485	0.7078	1.0000
Model 2	1.0000	0.5454	1.0000	1.0000	0.6428	1.0000	n/a	1.0000	1.0000	0.8485	0.8809	1.0000

Table 4.15 presents the results of a DEA analysis applied to the contractor and public hospitals, in this instance substituting total contract cost for production costs at the contractor hospitals. The analysis was applied using the whole hospital as the DMU, with and without adjustments for quality of care, and once again using both model 1 and model 2 specifications and assuming CRS. For purposes of comparison, the table also presents the data emerging from the comparison of production costs discussed above. As would be expected in the light of the cost analysis results, the table indicates that the use of total contract costs has a significant effect on the overall assessment of relative efficiency of the two groups. In all but two instances, the mean score obtained by the public hospitals now exceeds the mean contractor score. In two of these cases (unadjusted, model 1 and adjusted for structural quality of care, model 1), the use of total contract cost reverses the results observed when production costs were used, while in the remaining analyses, the margins between the higher mean public and the lower contractor scores are increased when total contract costs are used.

An important exception to this pattern is found in the analysis of hospital outputs adjusted for quality of nursing care, in which model 1 data show a higher mean contractor score even when total contract costs are used. As the table shows, however, the use of total contract costs reduces the previously observed margin between the two groups. The other exception occurs in the analysis of hospital outputs adjusted for both structural and nursing quality of care. In this case, the previously observed higher contractor score in the model 1 analysis is significantly reduced so that the mean scores of the two groups are almost identical, with the contractor score remaining marginally higher.

Table 4.15: DEA results — Total contract cost vs. public sector production costs

	Contractor			Public			Mean	
	Matik.	Hewu	Shilu.	Tints.	Letaba	Bisho	Con.	Pub.
Whole hospital								
Model 1								
Production Costs only	1.0000	0.6943	1.0000	1.0000	0.7551	0.6030	0.8981	0.7860
Total Con. Cost vs. Pub sector prodn. costs	0.9254	0.6926	0.9524	1.0000	1.0000	0.7612	0.8568	0.9204
Model 2								
Production Costs only	1.0000	0.6943	1.0000	1.0000	0.7551	1.0000	0.8981	0.9184
Total Con. Cost vs. Pub sector prodn. costs	0.9403	0.7417	0.9524	1.0000	1.0000	1.0000	0.8781	1.0000
Whole hospital - SQOC quality adjusted								
Model 1								
Production Costs only	1.0000	0.6985	1.0000	1.0000	0.8359	0.6652	0.8995	0.8337
Total Con. Cost vs. Pub sector prodn. costs	0.8268	0.6239	0.6904	1.0000	1.0000	0.7569	0.7137	0.9190
Model 2								
Production Costs only	1.0000	0.7021	1.0000	1.0000	0.8368	1.0000	0.9007	0.9456
Total Con. Cost vs. Pub sector prodn. costs	0.8396	0.7254	0.6645	1.0000	1.0000	1.0000	0.7432	1.0000
Whole hospital - NQOC quality adjusted								
Model 1								
Production Costs only	1.0000	0.4711	1.0000	1.0000	0.5609	0.3842	0.8237	0.6484
Total Con. Cost vs. Pub sector prodn. costs	1.0000	0.5067	1.0000	1.0000	0.6568	0.5201	0.8356	0.7256
Model 2								
Production Costs only	1.0000	0.4711	1.0000	1.0000	0.5609	1.0000	0.8237	0.8536
Total Con. Cost vs. Pub sector prodn. costs	1.0000	0.5067	1.0000	1.0000	0.6568	1.0000	0.8356	0.8856
Whole hospital - Combined quality adjusted								
Model 1								
Production Costs only	1.0000	0.5642	1.0000	1.0000	0.6729	0.4901	0.8547	0.7210
Total Con. Cost vs. Pub sector prodn. costs	1.0000	0.5801	0.8139	1.0000	0.7216	0.6555	0.7980	0.7924
Model 2								
Production Costs only	1.0000	0.5642	1.0000	1.0000	0.6729	1.0000	0.8547	0.8910
Total Con. Cost vs. Pub sector prodn. costs	1.0000	0.5556	0.8349	1.0000	0.7472	1.0000	0.7968	0.9157

Table 4.16 shows the results of the DEA analysis applied separately to each of the four tracer conditions at the contractor and public hospitals only, assuming CRS. The table also shows the results of the same analysis, adjusted to reflect total contract cost, rather than production costs, at the contractor hospitals. The caesarean section data show that one hospital in each group was judged to be inefficient, with the very low score obtained by Bisho resulting in a lower mean score for the public group. This result is not affected

by the use of total contract cost at the contractor hospitals. In the case of normal deliveries, one of the public hospitals is shown to be inefficient, and the mean contractor score again exceeds that of the public group. The use of total contract cost again does not reverse this observation, but does reduce the observed margin between the two groups.

A different pattern emerges from the analysis of appendectomy cases. Here, one of the contractors appears inefficient, so that the mean contractor score is lower than that of the public group. This pattern is repeated in the hernia repair analysis, where two of the contractor hospitals are identified as inefficient. Neither of these results are significantly affected by the use of total contract costs in the analysis. In the former case, the observed contractor public margin is marginally increased, while in the latter it is increased to a greater extent.

Table 4.16: DEA analysis of tracer conditions - contractor and public hospitals only

	Contractor			Public			Mean	
	Matik.	Hewu	Shilu.	Tints.	Letaba	Bisho	Con.	Pub.
Caesarean section								
Production costs only	1.0000	0.5896	1.0000	1.0000	1.0000	0.2832	0.8632	0.7611
Total contract cost. vs. pub. sector prodn. cost	1.0000	0.5018	1.0000	1.0000	1.0000	0.2832	0.8339	0.7611
Normal Deliveries								
Production costs only	1.0000	1.0000	1.0000	1.0000	0.5431	1.0000	1.0000	0.8477
Total contract cost. vs. pub. sector prodn. cost	1.0000	1.0000	1.0000	1.0000	0.7773	1.0000	1.0000	0.9258
Appendectomy								
Production costs only	1.0000	0.7519	1.0000	1.0000	1.0000	n/a[a]	0.9173	1.0000
Total contract cost. vs. pub. sector prodn. cost	1.0000	0.7350	1.0000	1.0000	1.0000	n/a	0.9117	1.0000
Hernia Repair								
Production costs only	0.5586	1.0000	0.5829	1.0000	1.0000	n/a	0.7138	1.0000
Total contract cost. vs. pub. sector prodn. cost	0.5142	1.0000	0.4731	1.0000	1.0000	n/a	0.6624	1.0000

Notes: a. not applicable, since no appendectomy or hernia repair cases were undertaken at Bisho during the study year.

Table 4.17 shows the results of the DEA applied to the four tracers, with all nine hospitals included in the analysis. These data show that the private hospitals demonstrate the best performance of the two groups in the caesarean section and

appendectomy analyses (in the latter case, tied with the public group), and a similar high mean score to that obtained by the public group in the hernia repair analysis. However, in the case of normal deliveries, the private hospitals show the worst performance.

Table 4.17: DEA analysis of tracer conditions - all hospitals

	Contractor			Public			Private			Mean		
	Matik.	Hewu	Sbilu.	Tintu.	Letabo	Bisho	St. Doms	Piet.	Nels.	Con.	Pub.	Pvte.
Caesarean sections	1.0000	0.5899	0.6694	1.0000	1.0000	0.2826	0.6377	1.0000	1.0000	0.7531	0.7609	0.8792
Normal Delivery	1.0000	1.0000	0.3567	0.8252	0.5486	0.2358	0.1176	0.0821	0.0685	0.7856	0.5365	0.0894
Appendectomy	1.0000	0.5956	1.0000	1.0000	1.0000	n/a[a]	0.7923	1.0000	1.0000	0.8652	1.0000	1.0000
Hernia Repair	0.5608	1.0000	0.5830	1.0000	1.0000	n/a	0.8348	1.0000	1.0000	0.7146	1.0000	0.9449

Notes: a. not applicable, since no appendectomy or hernia repair cases were undertaken at Bisho during the study year.

Table A20.6, Appendix 20 shows the results of the same analyses, in this case assuming VRS, and again demonstrates the sensitivity of the results to assumptions regarding scale. In the case of the contractor/public comparisons, the assumption of VRS improves the mean efficiency performance of hospitals in both groups, and eliminates most of the variation between the groups noted above, with the differences being consistently maintained only in the cases of normal deliveries (production cost analysis only) and hernia repairs (production and total contract cost analyses).

Table 4.18 shows a comparison of the results obtained by the contractor and public groups in the general cost analysis and in the DEA. Examining the data for DEA model 1 first, the table shows a qualitative correlation between the general cost analysis and DEA for all DMUs aside from the maternity ward and operating theatres, and a reasonable quantitative correlation in all cases besides the operating theatre and whole hospital analyses. When model 2 specifications are used, there is again good qualitative and quantitative correlation in the medical/surgical and maternity wards, as well as for total admissions, but poor correlation for the OPD, operating theatre and whole hospital analyses.

Table 4.19 shows the results of a similar comparison, in this case including all nine hospitals, and showing the rankings obtained by the three groups in the cost and DEA

analyses. When DEA model 1 specifications are used, there is a close correlation between the two sets of results in the maternity, total admissions, OPD and operating theatre categories. In all of these cases, the three groups obtained the same ranking in both analyses (the only exception being the operating theatre, where the contractors and public hospitals reversed positions between the two analyses). The table also shows, however, that the correlation is much poorer in the case of the medical/surgical ward, and the whole hospital, in both of which cases the position of the private hospital changes from the least efficient in the general cost analysis to the most efficient in the DEA. The use of model 2 specifications does not alter these observations significantly.

Table 4.18: Comparison of general cost analysis and DEA (contractor and public hospitals only)

	Cost analysis[a] (% margin)	DEA[b] (% margin)	
		Model 1	Model 2
Medical/ Surgical ward	Con (12)	Con (7)	Con (10)
Maternity ward	Pub (3)	-[c]	Pub (13)
Total admissions	Con (18)	Con (7)	Con (16)
OPD	Con (17)	Con (13)	Pub (3)
Operating theatres	Con (57)	n/a[d]	Pub (1)
Whole hospital	Con (49)	Con (12)	Pub (2)

Notes: a. Most efficient group as measured by lowest mean unit production cost per admission (absolute value of the percentage margin between the two groups).
b. Most efficient group as measured by lowest mean efficiency score (absolute value of the percentage margin between the two groups).
c. No difference in mean values obtained by the two groups.
d. No alternative model specifications applied in operating theatre analysis.

Table 4.19: Comparison of general cost analysis and DEA (all hospitals)

	Cost analysis			DEA (Model 1)			DEA (Model 2)		
	Con.	Pub.	Pvte.	Con.	Pub.	Pvte.	Con.	Pub.	Pvte.
Medical/ Surgical ward	1	2	3	2	3	1	1	2	1
Maternity ward	1	2	3	1	2	3	1	2	3
Total admissions	1	2	3	2	1	3	1	2	3
OPD	1	2	3	1	2	3	1	2	3
Operating theatres	2	3	1	3	2	1	n/a[a]	n/a	n/a
Whole hospital	1	2	3	2	3	1	3	2	1

Note: numbers represent ranking of groups in each analysis, with 1 indicating lowest cost (in cost analysis) or most efficient score (in DEA), and 3 indicating highest cost or lowest DEA score.
a: not applicable, since operating theatres not separately analysed in this analysis

Similar comparisons can be applied to the cost and DEA analysis of the tracer conditions. Table 4.20 shows this comparison for the contractor and public hospitals

alone, and shows that the direction of observed differences between the groups is correlated for all four tracers, although the magnitude of the observed margins differ to some extent, being lower in the DEA in all cases aside from hernia repair. Comparison of the two analyses applied to all nine hospitals (Table 4.21) shows a lesser degree of qualitative correlation. In this case, the results of the two analyses are identical only in the NVD analysis, and are similar in the appendectomy analysis, but differ significantly in the other two conditions.

Table 4.20: Comparison of cost analysis and DEA in tracer conditions (contractor and public hospitals only)

	Cost analysis[a] (% margin)	DEA[b] (% margin)
Caesarean section	Con (29)	Con (12)
Normal Delivery	Con (37)	Con (15)
Appendectomy	Pub (36)	Pub (9)
Hernia Repair	Pub (18)	Pub (41)

Notes: a. Most efficient group as measured by lowest mean unit production cost per admission (absolute value of the percentage margin between the two groups).
b. Most efficient group as measured by lowest mean efficiency score (absolute value of the percentage margin between the two groups).

Table 4.21: Comparison of cost analysis and DEA in tracer conditions (all hospitals)

	Cost analysis			DEA		
	Con.	Pub.	Pvte.	Con.	Pub.	Pvte.
Caesarean section	1	2	3	3	2	1
Normal Delivery	1	2	3	1	2	3
Appendectomy	3	2	1	2	1	1
Hernia Repair	3	2	1	3	1	2

Note: numbers represent ranking of groups in each analysis, with 1 indicating lowest cost (in cost analysis) or most efficient score (in DEA), and 3 indicating highest cost or lowest DEA score.

4.7 Summary of results

Table 4.22 provides a brief summary of the results presented in this chapter.

Table 4.22: Summary of results of utilisation statistics, cost analysis and Data Envelopment Analysis

Analysis	Comparison between public and contractors	Comparison between private and other hospitals
Hospital utilisation statistics	Contractors demonstrated relatively inferior utilisation patterns, with higher turnover rates, and longer LOS, leading to higher bed occupancy rates.	Private group demonstrated relatively superior utilisation pattern, with highest occupancy rate of the three groups, due to very high turnover rates, and very short LOS.
Cost analysis		
Analysis of production costs	Contractors demonstrated lower unit production costs per in-patient day, per admission, and per composite output (defined to include in-patient days). These results were robust to adjustment for service-mix, and across most service-mix categories. Contractor production costs higher per OPD visit, per operation, and marginally higher per composite output (defined to include admissions). The generally lower contractor production costs were due mainly to lower unit staff costs, themselves explained by lower staff to output ratios, which more than compensate for higher average salaries and the more expensive staff mix in the contractor hospitals.	Private hospitals demonstrated highest unit production costs for all outputs besides operations, with substantial margins in costs per in-patient day and OPD visit. These results were robust to service-mix adjustment. Higher private hospital production costs were due to high unit staff costs (due to higher staff-output ratios, higher average salaries and more expensive staff mix), and to substantially higher drug costs.
Tracer cost analysis	Contractors demonstrated lower costs than public hospitals for caesarean sections and NVDs, and higher costs for appendectomies and hernia repair cases. All differences were statistically significant.	Private costs higher than other two groups for caesarean sections (differences not statistically significant) and NVDs (differences statistically significant). Private costs lowest of the three groups for appendectomy (differences not statistically significant) and hernia repair cases (differences statistically significant)
Total contract cost versus public sector production costs	General cost analysis: TCC remained below public sector production cost per in-patient day, and per composite output defined to include in-patient days (latter result in mean values, but reversed in median values). TCC higher than public sector production costs for all other outputs These results robust to service-mix adjustment, and to removal of VAT from TCC. Tracer cost analysis: TCC remained lower than public sector production cost for caesarean sections (differences statistically significant). TCC higher than public sector production costs for other three tracers (NVD not statistically significant; other two statistically significant).	

Table 4.22: Summary of results of utilisation statistics, cost analysis and Data Envelopment Analysis (contd.)

DEA		
Applied to general cost analysis	Contractors obtained higher efficiency scores for all DMUs besides operating theatres, when most sensitive specifications (Model 1) used. Results robust to adjustments for quality of care, but sensitive to model specifications. Model 2 (two output variables) led to more mixed picture of efficiency. Using VRS assumption led to public hospitals obtaining higher efficiency scores for most DMUs, due to scale effect.	Private group obtained highest scores in some wards (med/surg and paediatrics), theatres and whole hospital, but lowest scores in maternity wards and OPD.
Applied using TCC instead of contractor production costs	Contractors obtained lower efficiency scores in most analyses, besides when data adjusted for quality of nursing care (contractor score remained higher than public), and when adjusted for quality of nursing care and SQOC (identical scores obtained).	
Applied to tracer cost analysis	Contractors obtained higher scores for caesarean section and NVD cases, for both general production costs and when TCC used. Contractors obtained lower scores for appendectomy and hernia repair cases, again irrespective of whether general production costs or TCC used.	Private hospitals obtained highest scores for caesarean section and appendectomy cases, and lowest scores for NVD and hernia repair cases.

CHAPTER FIVE: RESULTS - EVALUATION OF QUALITY OF CARE

This chapter presents the results of the evaluations of various aspects of quality of care. It begins with the evaluation of structural aspects of quality of care (SQOC), followed by the evaluation of the quality of nursing care, and of the quality of clinical record keeping. The final section presents the results of the evaluation of the outcomes of care in the tracer conditions.

5.1. Evaluation of structural aspects of quality of care

This section presents the results of the evaluation of SQOC using the instrument described in Chapter 3. Figure 5.1 shows the mean values of the cluster and grand total scores for the three hospital groups, while Table 5.1 shows these data for the individual hospitals. In all these data, scores represent percentages of the maximum possible score obtainable in each case. An initial observation from these data is that all of the study hospitals performed relatively well, as suggested by the generally high mean grand total and cluster scores. While individual hospitals performed more poorly than these figures suggest in some areas, this general pattern is maintained throughout the analysis. As Figure 5.1 shows, the contractors obtained a lower grand total score than the public hospitals, a pattern which is repeated for all clusters aside from x-ray and administration. The figure also shows that the private hospitals obtained the highest grand total score of all three groups, as well as the highest cluster scores in all cases aside from operating theatres and pharmacy.

Figure 5.1: Evaluation of structural quality of care - mean cluster and grand total scores

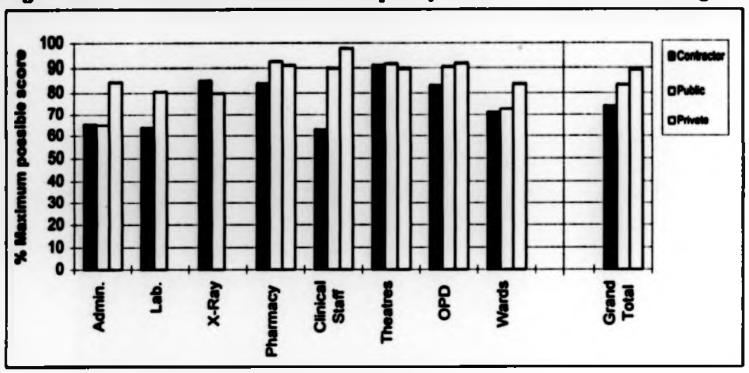

Table 5.1: Evaluation of structural quality of care - cluster scores for individual hospitals (% max. possible score)

	Contractor			Public			Private		
	Matik.	Hewu	Shil.	Tintz.	Letaba	Bisho	St. Doms.	Piet.	Nels.
Admin./management	61	75	60	74	54	68	92	76	86
Laboratory	56	70	66	78	75	88	0	0	0
Radiology Dept.	87	83	86	76	75	88	0	0	0
Pharmacy	89	89	74	96	95	86	95	86	92
Clinical Staff	66	57	66	91	94	84	93	100	100
Operating theatres	98	88	87	97	88	90	100	85	84
Outpatients Dept.	86	93	71	81	97	93	0	92	92
Maternity Ward	77	84	71	78	79	80	100	77	89
Other wards	66	73	57	58	64	77	68	92	77
All Wards	71	78	64	68	72	79	84	85	83
Grand Total	75	76	71	84	82	84	92	86	89

Table 5.2 shows the mean scores obtained by each hospital group for the individual categories within each cluster. The table indicates that within the administration cluster, the contractor group obtained higher scores than the public group in all categories aside from MIS.[134] The lower contractor score in the laboratory cluster is attributable to the significantly lower scores in the staff and functions categories, which override the effects of the relatively higher contractor scores in the supplies/equipment and buildings categories. In the radiology cluster, on the other hand, the higher mean contractor score is explained by the higher scores obtained in all categories aside from staff, where the contractor score is substantially lower than the public hospital score. In the pharmacy cluster, the lower contractor score is due to lower scores on the staff and supplies/equipment categories, which outweigh the higher contractor scores in both the functions and buildings clusters. The significantly lower contractor score in the clinical staff cluster is attributable to lower scores on all individual categories within this cluster, although the margin is particularly noticeable in the case of paramedical staff.[135]

The contractor and public groups show very similar scores in the operating theatre cluster, with the marginally lower contractor score attributable to a lower score in the functions category overriding the better contractor score in the buildings category. In the OPD cluster, the lower contractor score is explained by the lower scores on the functions and supplies/equipment categories. The maternity ward and general ward clusters demonstrate similar patterns to those observed above, with the lower contractor score being attributable to the lower scores in the supplies/equipment category outweighing the effect of the higher scores in the buildings category.

This comparison of mean contractor and public scores for individual categories has demonstrated some consistent patterns. Most noticeable among these is that the contractor group shows higher scores in the buildings category in all 7 clusters where this category is analysed, and lower scores in the staff category in 4 of the 7 clusters in

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134 The higher mean public score for MIS is entirely attributable to the 100% score obtained by Tintswalo hospital, since both other public hospitals obtained the same low score as the three contractor hospitals (see Table A21.3, Appendix 21).

135 This category is not heavily weighted within the cluster, explaining its relatively small impact on the cluster total.

which this category is analysed (the exceptions being in the administration, operating theatre and OPD clusters). Performance in the other common categories, functions/services and supplies/equipment is more even, although the public hospital group demonstrates superior scores in more cases than does the contractor group. These patterns are clearly demonstrated in Figure 5.2, which shows mean values of the aggregated scores for each of these common categories.[136] As expected from this analysis, Figure 5.2 shows that contractors have a lower mean grand total score for the aggregated staff category, and a higher score for the aggregated buildings category, than do the public hospitals. In the remaining two aggregated categories, the contractor group shows lower scores than the public group, although the margins are somewhat smaller than those observed in the aggregate staff and buildings categories. Table A21.1, Appendix 21 shows the scores obtained by individual hospitals in all categories, while Table A21.2, Appendix 21 shows the individual hospital data obtained from the analysis of the aggregate categories.

136 These scores are calculated by taking the weighted sum of the scores obtained from the relevant categories in all clusters. Weights used were the same as those used in the general analysis.

Table 5.2: Evaluation of structural quality of care: mean category and cluster scores by hospital group

	Contractor	Public	Private
Admin./Management			
Staff	66	62	78
Functions	77	62	80
MIS	17	44	100
Patient record system	88	85	77
Utilities/services	91	82	95
Total	66	65	85
Laboratory			
Staff	32	78	n/a
Functions	63	82	n/a
Supplies and equipment	100	80	n/a
Buildings	90	84	n/a
Total	64	81	n/a
Radiology Dept.			
Staff	59	72	n/a
Functions	88	79	n/a
Supplies and equipment	95	92	n/a
Buildings	100	71	n/a
Total	85	80	n/a
Pharmacy			
Staff	89	93	94
Functions	96	80	81
Supplies and equipment	70	100	92
Buildings	91	89	95
Total	84	92	91
Clinical Staff			
Medical staff	68	80	n/a
Nursing staff	77	97	98
Ancillary services	14	100	n/a
Total	63	90	98
Operating theatres			
Staff	100	100	67
Functions	70	83	100
Supplies and equipment	90	90	99
Buildings	100	89	100
Total	91	92	90
Outpatients Dept.			
Staff	83	83	n/a
Functions	91	100	71
Supplies and equipment	67	88	100
Buildings	100	95	100
Total	83	91	92
Maternity Ward			
Supplies and equipment	73	76	86
Buildings	95	93	100
Total	77	79	89
Other wards			
Supplies and equipment	58	62	74
Buildings	95	84	99
Total	65	66	79
All Wards	71	73	84
Grand Total	74	83	89

Notes: n/a - not applicable, since laboratory and radiology services are not provided directly by the private hospitals, and clinical staff working in the private hospitals are self-employed, and not considered part of the hospital staff.

Figure 5.2: Structural Quality of Care - Analysis of aggregated categories

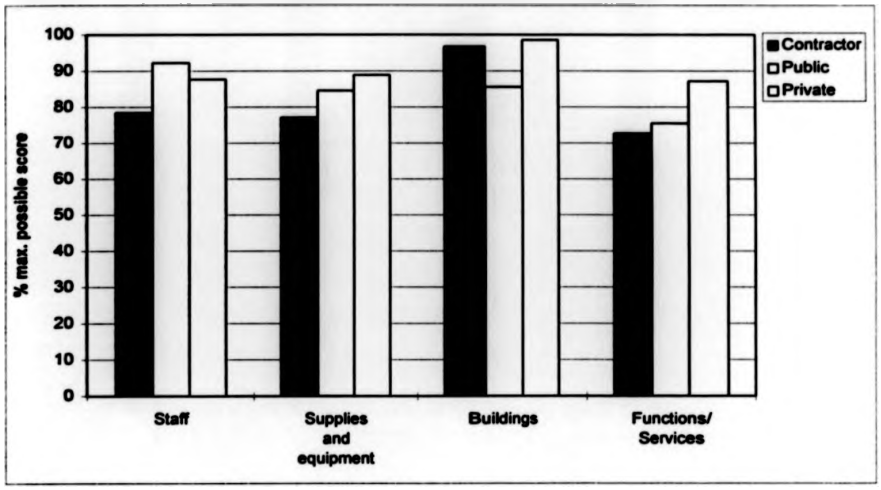

Table 5.2 and Figure 5.2 also show some consistent patterns in the performance of the private hospitals, and demonstrate that this group obtained the highest mean scores of all three groups in the supplies/equipment, buildings and functions/services categories, but obtained lower scores than the public hospitals in the staff categories.

Further insights into the various patterns observed here can be obtained from an examination of these data at a more disaggregated level. Table A21.3, Appendix 21 shows the mean values of the raw scores for individual criteria, and provides an analysis of these data.

5.1.1. Sensitivity analysis

As discussed in Chapter 3, the calculation of the various aggregated scores reported here relied on the use of the median values of a sample of criteria scores and category and cluster weights obtained on a consensus basis from a group of experts. Table A21.4, Appendix 21 presents the results of the same analysis reported above, on this occasion

using the mean rather than the median values of the criteria scores and category and cluster weights. The table shows that the use of mean data does not materially affect any of the observations made here. While the grand total score, and individual cluster and category scores are all modified slightly, the direction of the margins between the groups is not affected in any case, and the extent of these margins is either left unchanged, or modified only slightly. Where the margins do change, the average change involves a shift of less than 2 percentage points. In the case of the private-public margins, the use of mean data has the effect of reversing the direction of the observed margin only in the case of operating theatres. In all other categories, there are either minor increases or decreases in the extent of the margin, or no changes at all.

Similar conclusions can be drawn from the analysis of the aggregated categories using mean data, as shown in Table A21.5, Appendix 21. This indicates that the direction of the observed public-contractor margins remains constant across all four aggregate categories, and that the extent of the margin remains constant in two of these (staff and supplies/equipment) and increases by 1 percentage point in the remaining two categories. Similarly, analysis of the private-public margins shows no change in the direction of these margins in any of the aggregate categories, and only slight changes in the extent of the margins.

Tables A21.6 and A21.7, Appendix 21 show the effects of using a weighted sum approach, rather than the geometric mean, in the calculation of category total scores. These data show that this variation does not materially affect any of the observations made here. In the case of the comparisons between the contractor and public hospitals, the previously observed margin changes direction only in the case of the other wards cluster (where the contractor score shifts from 1 percentage point below that of the public hospitals to an equal score).

5.2. Evaluation of the quality of nursing care

5.2.1. Evaluation of the quality of nursing care using the survey instrument

Table 5.3 shows the mean category, cluster and grand total scores obtained by the three hospital groups, while Table A22.1, Appendix 22 presents the same data for the individual hospitals. As with the SQOC instrument, all data represent the percentage of the maximum possible score obtainable in each case. Table 5.3 shows that the mean grand total score for the contractors exceeds that of the public hospitals, as do the scores for the maternity, medical/surgical and all ward components of the nursing care cluster. This pattern is reversed in the case of the nursing management cluster, where the mean contractor score is slightly lower than that of the public hospital group. Table 5.3 also shows that the grand total and all cluster totals of the private hospital group exceed those of both the other groups by substantial margins.

Analysis of the categories within the nursing care cluster shows that the mean contractor scores exceed mean public scores for all categories and in all the wards assessed. In the case of the *nursing care planning* and *equipment* categories, the observed margins remain fairly constant in both the maternity and medical/surgical wards. There is however greater variation in the other two categories - *nursing assessment/diagnosis* and *diet*. In the former case, the substantial margin observed in the maternity wards is reduced in the medical/surgical wards, while the converse is true for the *diet* category. Several of the differences between individual hospitals and groups noted here are further illuminated by examination of the raw scores achieved on each of the individual criteria. These data, followed by a brief commentary, are shown in Table A22.2, Appendix 22.

Table 5.3: Evaluation of the quality of nursing care: mean category and cluster scores, by group (% max. possible score)

	Contractor	Public	Private
Nursing care: Maternity ward			
Nursing Assess/Diagnosis	70	19	86
Nursing care planning/monitoring/control	50	40	83
Equipment	39	24	88
Diet	72	71	100
Total	56	34	86
Nursing care: Medical/Surgical wards			
Nursing Assess/Diagnosis	37	32	81
Nursing care planning/monitoring/control	46	38	70
Equipment	42	25	91
Diet	72	46	100
Total	44	35	79
Nursing Care: All wards			
Nursing Assess/Diagnosis	53	26	84
Nursing care planning/monitoring/control	48	37	76
Equipment	40	25	90
Diet	72	50	100
Total	50	33	82
Nursing management	48	51	83
Overall Total	50	39	83

5.2.1.1. Sensitivity analysis

Table A22.3, Appendix 22 shows the scores obtained by individual hospitals and groups when category totals are calculated using weighted sums, rather than geometric means. As the table shows, this approach has minimal effect on the general conclusions reported here. Comparing the contractor and public scores, the table shows that this method of calculation serves to increase the observed scores for both groups in all categories and clusters, although the public hospital scores are increased to a greater extent in all cases aside from that of the nursing management cluster. The directions of the margins between contractor and public hospital scores reported above however remain unchanged in all categories of both wards in the nursing care cluster. As would be expected, though, the observed margins are reduced, by 2 percentage points in the cluster totals, and by varying margins in all of the category totals aside from the equipment category in the medical/surgical ward (which shows a 1 percentage point increase).

5.2.2. Subjective evaluation of the quality of nursing care

As with the survey instrument, the subjective evaluation of the quality of nursing care examined nursing at the ward level, including ward management and the nursing care process, as well as aspects of nursing management at the hospital level. Tables 5.4 and 5.5 present the findings on the nursing at the ward level, while Table 5.6 summarises the findings in respect of nursing management at the hospital level.

Table 5.4 indicates that, with some exceptions, the contractor and private hospitals performed relatively well in the evaluations of the physical appearance of the wards, as well as in the availability and control of supplies and linen, and that the private hospitals generally demonstrated the best performance of all the groups in these areas. In the public hospitals, on the other hand, the evaluations of these aspects were far less favourable, and were highly critical in several instances. The evaluations of the availability, organisation and monitoring of medical equipment presents a less homogenous picture, with variation both within and between groups being noted. In this case, essential equipment was noted to be complete in most hospitals, although the private hospitals were clearly the best equipped of all the groups, and the public hospitals were noted to be somewhat better equipped than the contractor hospitals. Regarding the organisation, monitoring and control of equipment, the private hospitals were again regarded as superior to the other two groups, which presented a more mixed picture.

Table 5.4: Subjective evaluation of ward management issues

	Physical appearance of wards	Availability and control of ward supplies	Ward Linen	Medical equipment
Matikwana	Wards create good impression. All clean and tidy. Staff appearance professional.	No apparent shortages. Adequate control systems in place.	Staff complain of shortages of linen over week-ends. No shortages apparent. Linen clean and neat. Linen supplies not strictly controlled, although control superior to public sector hospitals.	Equipment supply, organisation and monitoring satisfactory. Oxygen equipment satisfactory in maternity ward, but poor in other wards - equipment dirty and components missing.
Hewu	Wards clean, tidy and well organised	No shortages. Extremely tight control over all drugs and supplies.	Staff complain of week-end shortages. Adequate supplies in most wards besides maternity ward. All linen clean and neat, although not of good quality.	Equipment requirements complete in most wards aside from shortage of baumanometers. Equipment appears untidy and disorganised. Checking of equipment satisfactory. Oxygen equipment poor - components missing, and much of the equipment dirty.
Shiluvana	All wards clean and well organised, and create good impression.	Some shortages of stocks and supplies noted. Control adequate, but not as well organised as other Lifecare hospitals.	Staff complain of shortages but none apparent. Linen clean.	Equipment in most wards complete and well organised. Monitoring of equipment is adequate. Oxygen equipment satisfactory in all wards.
Tintswalo	Several wards dirty and disorganised. General air of neglect, with nothing appearing to be in order.	No shortages noted. Very poor control systems - all storerooms noted to be unlocked and disorganised.	Severe shortages of linen noted in several wards. Sheets appear shabby and dirty. Linen stock rooms empty in several wards. Shortage of water appears to be important cause of these problems.	Equipment in most wards complete but untidy and poorly organised. Monitoring of equipment generally satisfactory. Oxygen equipment present in all wards, but poorly maintained and noted to be dirty in several wards.
Letaba	Wards have unkempt air. Maternity ward cluttered and dirty. Medical and surgical wards untidy but clean.	as Tintswalo	Significant shortages noted in several wards. Staff complain that problem worse on week-ends.	Equipment complete in most wards but often poorly organised. Monitoring of equipment variable between wards - satisfactory in maternity ward and surgical wards, but poor in medical wards. Oxygen equipment incomplete and poorly maintained in all wards.
Bisho	Wards and corridors untidy, dirty and noisy. Toilets and sluice rooms dirty in all wards examined.	No shortages noted. Control generally poor.	Staff complain of shortages. Most wards appeared well stocked with linen of good quality.	Equipment complete, clean but disorganised in all wards; monitoring of equipment unsatisfactory. Oxygen equipment generally unsatisfactory - some equipment missing and often dirty.
St. Dominics	Wards well organised, tidy and clean.	No shortages noted. Control is strict and efficient. Full-time staff allocated to this function.	No shortages noted. Linen clean and of high quality.	All equipment present and monitored appropriately in all wards. Oxygen equipment complete and clean in all wards.
Pietersburg	Maternity ward clean and neat. Female medical/surgical ward clean, but disorganised.	Full-time staff for control and monitoring of usage of supplies. All storerooms locked and well controlled.	Wards well stocked with linen. Dedicated linen supervisor ensures adequate supplies to all wards.	Equipment variable between wards. Complete in maternity ward, but disorganised and not monitored satisfactorily. Equipment in medical and surgical wards complete and well organised but also poorly monitored. Oxygen equipment complete and clean in all wards.
Nelspruit	Medical, surgical and other general wards clean and well organised. Maternity ward clean but appears disorganised. Pleasant atmosphere in all wards.	as Pietersburg.	Supplies adequate. Staff complain of some shortages in the past and occasionally at present, but no evidence of this.	Equipment complete, well organised and appropriately monitored in all wards. Oxygen equipment complete, clean and well organised in all wards.

Table 5.5 indicates that the conduct of nursing assessment and diagnosis was judged to be either good or satisfactory in most wards at the contractor and private hospitals, although nursing diagnosis was noted to be poorly conducted in one of the wards at Hewu and in two of the wards at Shiluvana. The public hospitals again performed relative poorly here, although Tintswalo hospital appears superior to the other two public hospitals in some of the aspects evaluated. The process of nursing diagnosis was also noted to be poorly conducted in most wards at all of the public hospitals. A general problem, which was noted to occur in many of the wards at most hospitals, was the emphasis of the nursing assessment and diagnosis on medical as opposed to nursing problems and issues, as well as a general reliance on the doctors' diagnosis in place of the development of an independent nursing diagnosis.

Table 5.5 also shows the findings concerning the processes of nursing care planning, implementation, monitoring and control, and upgrading of the nursing care plan, as well as record keeping. In this instance, the variability within individual hospitals, as well as within and between groups, makes it more difficult to identify consistent patterns in comparing the three groups. Nevertheless, it is again possible to discern generally superior performance among the private hospital group relative to the other two, both of which show a similarly poor overall performance profile. Although the private group appears superior to the other two, it is important to note that several problems were noted in these hospitals as well, as illustrated by the poor ratings obtained in some of the wards at Pietersburg and Nelspruit hospitals.

Consistent with evaluations of the conduct of nursing assessment and diagnosis, one of the key problems identified concerns the reliance of nursing care planning and implementation on the orders issued by doctors, with very little initiative taken by nurses themselves. This is reflected in the fact that in many cases, no nursing care plan is formulated, and that often only medical treatments and procedures are recorded and upgraded. The evaluation also detected several instances of potentially serious errors in elements of the nursing care process.[137] In all of the public hospitals, the evaluators

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137 Examples of these include inaccurate transcription of doctors' orders into the nursing records (surgical ward at Hewu hospital), evidence of inappropriate nursing care being delivered (maternity ward at Tintswalo and

noted that the poor monitoring and control of nursing care could possibly be attributed to shortages of the appropriate forms.

Regarding the standards of record keeping at ward level, Table 5.5 shows that, with some exceptions, these were regarded as being of an acceptable standard at the contractor and private hospitals and somewhat problematic at the public hospitals. The evaluators also reported the general impression that the standards of record keeping were clearly best at the private hospitals, followed by those at the contractor hospitals.

Table 5.6 shows that in the case of the staff numbers and skill levels, all hospitals were judged to meet adequate standards, with the exception of Hewu hospital, where there appeared to be insufficient registered nurses, resulting in some wards being run by staff nurses. Concerning the contractor group generally, the evaluators noted that although staffing levels were adequate for current patient numbers and acuity levels, any increases in patient acuity levels would place severe strains on the nursing staff and might lead to compromises in the quality of nursing care. Importantly, only the private hospitals were noted to be able to adjust staffing levels to cope with fluctuations in demand, either through use of outside agency staff or through the employment of part-time staff.

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medical ward at Letaba), doctors' orders not being carried out (medical ward at Letaba), patients not receiving medicines as ordered (various wards at Bisho), and inadequate monitoring (medical/surgical ward at Pietersburg).

Table 5.5: Subjective evaluation of the nursing process

	Nursing assessment and diagnosis	Nursing care planning, implementation and control	Record keeping
Matik.	**Maternity**: Good assessments with full examination and assessment of new patients. Satisfactory and safe level of information collected. Diagnoses good, although not specifically related to nursing care problems. **Medical and surgical wards**: Assessments of good standard, and satisfactory information collected. Nursing diagnosis limited and unsatisfactory.	**Maternity**: NCP satisfactory - use a limited NCP for problem patients. Implementation satisfactory - carry out and document doctors' orders effectively. Monitoring and control satisfactory - nurses dependent on doctors' instructions to monitor and treat. NCP upgrading satisfactory. **Medical and surgical wards**: NCP satisfactory - limited to doctors' instructions. Implementation, monitoring and control and NCP upgrading all satisfactory. Use simple cardex system.	Good: records available and properly completed in all wards.
Hewu	**Maternity**: Assessments satisfactory, with only some patients seen by nurses, others by doctors. Information collected satisfactory. Nursing diagnosis satisfactory, but emphasis placed on doctors' orders and diagnosis. **Medical ward**: Assessment satisfactory; diagnosis satisfactory with focus mainly on doctors orders and physical needs. **Surgical ward**: Low level of information collected - mainly related to physical needs. Diagnosis satisfactory - nurses allowed some latitude by doctors in diagnosis and treatment.	**Maternity**: NCP poor - not properly formulated. Implementation limited to doctors' orders. Monitoring and control poor. **Medical ward**: NCP incomplete in many instances. Nursing records partial and elementary. Mainly medical treatments recorded. Implementation satisfactory - appears uneven. One case identified where nursing treatment not regarded as appropriate for needs. Monitoring, control and upgrading of NCP poor. **Surgical ward**: NCP at basic level. Implementation satisfactory. Monitoring and control poor. Upgrading satisfactory. Nurses transcribe doctors' orders, often inaccurately.	**Maternity**: Good; records available and completed. **Medical and surgical wards**: Not of adequate standard. Some deviations between doctors orders and actual execution noted. Recording of dependence producing drugs inadequate in some cases.
Shil.	**Maternity**: Assessments very good - based on clear policies and regimens for different patient categories. Information collected of high standard. Nursing diagnoses good, with emphasis on nursing care aspects. Nurses make own diagnoses of routine cases. **Medical ward**: Assessments and information collected satisfactory, although based on medical notes. No nursing diagnosis made. **Surgical ward**: Satisfactory nursing assessment. Information collected unsatisfactory as relates only to medical treatment. Poor or no nursing diagnoses carried out.	**Maternity**: NCP good in routine cases. Rely on doctors in complex cases. Implementation satisfactory - record only routine implementation. Control and monitoring poor due to lack of records, therefore may be satisfactory under the circumstances. Upgrading of NCP satisfactory. **Medical ward**: No formal NCP. Implementation satisfactory - mainly medical treatment recorded. Monitoring and control poor - incompletely written up, no documentation of nursing orders. Upgrading of NCP poor - only medical treatment upgraded. **Surgical ward**: No NCP done. Implementation poor - only doctors' orders carried out. Monitoring and control poor. NCP upgrading satisfactory - relies on medical staff assessments.	Records available, neat and complete in maternity and medical wards. Some records not accurate in surgical wards.

Table 5.5: Subjective evaluation of the nursing process (contd.)

	Nursing assessment and diagnosis	Nursing care planning, implementation and control	Record keeping
Tintu.	**Maternity**: Good assessments and information collected. Nursing diagnosis poor. **Medical ward**: Satisfactory assessment, information collection and nursing diagnosis, although all based entirely on doctors' orders. **Surgical ward**: Assessments good, information collected satisfactory, but nursing diagnosis poor.	**Maternity**: NCP, implementation, monitoring and control satisfactory. Evidence of poor care noted in one case. **Medical ward**: NCP satisfactory - hampered by lack of appropriate forms. Implementation, monitoring and control satisfactory. **Surgical ward**: No NCP - simply carry out doctors' orders. Monitoring and control are as good as possible under circumstances, since forms lacking.	**All wards**: Records often not available and poorly photocopied. Record keeping generally inadequate, with resulting dangers of medico-legal problems. Particularly poor record keeping in medical wards.
Letaba	**Maternity**: Nursing assessments rely on doctors' notes, although these not adequately interpreted or used. Information collected unsatisfactory for patient care. No nursing diagnoses carried out. **Medical/surgical wards**: Poor assessments, information collection and nursing diagnoses.	**Maternity**: No NCP - use doctors' orders only. Implementation satisfactory, but poor monitoring and control, with scrappy recording of activities. **Medical wards**: Poor implementation of NCP. Several instances noted of doctors' orders not being carried out, or inappropriate or inadequate nursing care being applied. Only medical treatments implemented in several wards. Monitoring good, and upgrading satisfactory. **Surgical ward**: No NCP formulated (staff claim due to lack of forms) or implemented - only medical orders implemented. Poor control and monitoring - staff allocation books not completed for whole week.	Records available and satisfactorily completed in most wards. Some records not available, and staff make own forms where this occurs.
Bisho	No nursing assessments carried out in any wards. All rely only on doctors' orders and some interviews. Information collected inadequate.	**All wards**: No NCP used. Use NCP method inappropriately and on rote basis. Nursing staff don't appear to understand NCP concepts. All care related to medical treatment. Poor monitoring and control of implemented care. Some evidence of patients not receiving prescriptions ordered.	Records often not available. Poorly completed in some wards and satisfactorily completed in others. Some discrepancies between orders and execution of dependence producing drug prescriptions noted.

Table 5.5: Subjective evaluation of the nursing process (contd.)

	Nursing assessment and diagnosis	Nursing care planning, implementation and control	Record keeping
St. Doms.	**All wards**: Nursing assessments, information collection and diagnoses very good.	**Maternity**: NCP good - always up to date. Implementation good. Monitoring and control very good, although a little complex. NCP upgrading good. Nursing staff responsible for keeping up to date with all changes in care. **Medical/surgical ward**: NCP good - appropriate to medical diagnosis and to nursing needs. Comprehensive, precise sticker system used, as well as short and long term records. Implementation of NCP good. Monitoring and control unsatisfactory since forms not always up to date or complete - may be due to large numbers of admissions and emergencies. NCP upgrading very good. Frequent special nursing rounds as well as doctors' rounds. Records assessed more than once daily.	Complex record system. Perhaps too many forms with some duplication. Forms well understood by staff, and well completed in all wards.
Piet.	**Maternity**: Good assessments and information collection. Well developed protocols and forms. Diagnosis satisfactory - based only on doctors' orders and standing orders. **Medical/surgical wards**: Assessments good; information collected and diagnoses satisfactory. Poor information on nursing care aspects, and strong emphasis on medical diagnosis.	**Maternity**: NCP satisfactory. Rely on protocols, so very little initiative encouraged. Implementation satisfactory. Monitoring and control unsatisfactory - only document drugs and special treatments. No documentation of nursing care. NCP upgrading satisfactory - frequent upgrading, but only of changes in doctors' orders. **Medical/surgical wards**: NCP satisfactory - mainly focused on doctors' orders, and not documented, but left to discretion of nurse in charge. Implementation satisfactory. Monitoring and control poor - no documentation of nursing actions. One case identified where monitoring clearly inadequate. NCP upgrading satisfactory.	Forms well completed in maternity ward. In medical and surgical wards, some forms well completed, but some not adequately completed.
Nels.	**Maternity**: Nursing assessments and information collection good. Diagnoses satisfactory, since based only on medical treatment. **Medical wards**: Assessments satisfactory, mainly from doctors' notes, with occasional examinations. Use brief assessment form. Diagnosis good, but rely mainly on doctors' prescriptions. **Surgical wards**: Assessments satisfactory; good information collected - based mainly on doctors' orders but some nursing information collected as well. Nursing diagnoses good.	**Maternity**: NCP satisfactory - based on medical treatment and standing orders. Implementation good - nursing staff able to carry out wide range of interventions. Monitoring and control poor - antenatal and delivery records poorly recorded. Labour progress badly recorded. Reports mainly focused on medical treatments and doctors' orders. NCP upgrading good - do 3 -4 nursing rounds per day. **Medical wards**: NCP and implementation satisfactory. Monitoring and control good - good system of recording and reporting with special forms in use. NCP upgrading satisfactory - mainly related to doctors' orders. **Surgical wards**: NCP good - use simple recording book, and document all nursing actions. Implementation, monitoring and control systems good - use effective communications systems. NCP upgrading good.	Forms available and well completed in all wards.

Recruitment, placement and nurse allocation mechanisms were judged to be good at all hospitals with the exception of Bisho, where the allocation of nurses to wards was reported as being haphazard. The evaluation of nurse training and career development policies and programmes, also summarised in Table 5.6, shows some variation in the quality of in-service training programmes at the contractor and public hospitals. It is important to note, however, that where these were judged to be poor, the hospitals in fact had good formal training programmes in place, but problems of staff morale and recent industrial action had undermined interest and attendance. All of the private hospitals were noted to have adequate in-service training programmes in place. Attendance at outside courses and seminars, and other aspects of career development, were noted to be encouraged in the public hospitals and in the contractor hospital in which staff are public sector employees. However, this was not the case at the other two contractor hospitals, nor at the private hospitals.

The evaluation of staff satisfaction with reimbursement and promotion procedures elicited interesting differences between the groups. In two of the contractor hospitals (Matikwana and Hewu), staff expressed dissatisfaction with the reimbursement package, which was not perceived as competitive with comparable public sector packages, as well as with the promotion process, which was regarded as lacking transparency. In the case of Shiluvana hospital, staff were generally satisfied with the reimbursement package, but were less happy about the promotion process.[138] In the public hospitals, staff were again noted to be dissatisfied with their reimbursement packages as well as with the system of promotions. In these latter cases, however, the dissatisfaction was related to discrepancies between current pay levels and those of equivalent staff at hospitals controlled by the South African government.

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138 As noted earlier, nursing staff at Shiluvana hospital are employed by the government, which would explain the fact that their attitudes to reimbursement issues differs from that of nurses at the other Lifecare hospitals.

Table 5.6: Subjective evaluation of nursing management

	Adequacy of staff numbers and skills	Recruitment, placement and allocation of staff.	Reimbursement and promotion	Training and career development	Staff morale, turnover and absenteeism
Matikwana	Adequate. Limited flexibility in staffing numbers.	Good recruitment and placement mechanisms.	Staff dissatisfied with reimbursement - perceived as inferior to public sector package. Some suspicion as to methods of merit assessment and promotion, as process not transparent.	In-service training programme poor at present. May relate to recent strikes. Attendance at seminars/courses is allowed if motivated.	Staff morale generally low. Turnover high due to accommodation problems for nursing staff. Absenteeism low.
Hewu	Adequate, although some wards not run by registered nurses.	Good recruitment and placement mechanisms, but difficulties in recruiting skilled staff. May relate to location and lack of accommodation.	Staff dissatisfied with reimbursement - perceived as inferior to public sector package.	Good in-service training programme. Career development not actively encouraged.	Staff morale appears reasonable. Turnover high. Absenteeism high.
Shiluvana	Adequate. Limited flexibility in staffing numbers.	Good recruitment and placement mechanisms.	Staff satisfied with most aspects of salary package. Some dissatisfaction with cash bonuses, promotion system, and merit rating system.	In-service training poor at present. Two sessions per week, but staff do not attend. May relate to recent strikes. Good career development policies - staff allowed to attend seminars, courses.	Staff morale is low, with general dissatisfaction since recent strikes. Turnover and absenteeism low.
Tintswalo	as Shiluvana	Recruited and placed according to required qualifications wherever possible.	Some staff dissatisfaction since pay package not comparable with staff employed by South African authorities. Also dissatisfied with promotions system.	Good in-service training programme. Some problems of attendance since strikes. Satisfactory policies on career development.	Morale is poor, and is affecting quality of work. This has occurred since the recent strikes. Turnover and absenteeism low
Letaba	as Shiluvana	Formalised, effective recruitment and allocation process. Frozen posts interfering with efficiency of staffing system.	as Tintswalo.	Poor in-service training programme at present due to low staff interest. Good policies on career development. Generous study leave allowances.	Since strikes, morale has been low. Some tension between hospital and community which aggravates problems of morale. Turnover at satisfactory levels. Absenteeism presents a significant problem.

Table 5.6: Subjective evaluation of nursing management (contd.)

	Adequacy of staff numbers and skills	Recruitment, placement and allocation of staff.	Reimbursement and promotion	Training and career development	Staff morale, turnover and absenteeism
Bisho	as Shiluvana	Allocation to wards appeared haphazard.	General dissatisfaction among staff over pay package	Good in-service training programme. Good career development policies.	Staff appear generally dissatisfied. Several strikes recently. Absenteeism high.
St. Dominics	Adequate. Use agency staff to allow for flexibility.	Good recruitment and placement system. Use part-time staffing pool when additional staff needed. Use flexible shift system in maternity ward so that nursing staff remain with patient throughout delivery.	Staff appear satisfied with pay packages and promotions system.	Good in-service training programmes. Career development policies satisfactory. Long study allowances not permitted.	Staff appear satisfied and well motivated. Staff turnover very low. Absenteeism at satisfactory level.
Pietersburg	Adequate. No use of agency staff, but employ part-time staff to allow for flexibility	Good recruitment and placement system.	as St. Dominics	Good in-service training. Not formal, but frequent informal activities linked to staff meetings. Poor career development policies.	Staff well motivated. Some initial problems of transition from public hospital employment, but no problems at present. Turnover and absenteeism low.
Nelspruit	as Pietersburg	Excellent recruitment and placement system. Have part-time staff which allows flexibility.	as St. Dominics	Satisfactory in-service training programme. Limited encouragement of career development.	Staff morale very good. Turnover low. Absenteeism satisfactory.

Table 5.6 also indicates that staff morale was noted to be satisfactory at one of the contractor hospitals (Hewu), but low at the remaining contractor and at all of the public hospitals. The evaluators noted that in all cases, these findings may have been attributable to recent industrial action, as well as to uncertainty among the nursing staff concerning the future of the hospitals and their employment, as a result of the process of political transition underway during the period of this study. In the private hospitals, on the other hand, staff morale was uniformly found to be good. The findings concerning levels of staff turnover and absenteeism correlate with those of staff morale in the private hospitals, in which both turnover and absenteeism were found to be generally low. In the contractor and public hospitals, however, there appears to be no correlation between these factors and staff morale, or between these factors themselves, which were found to vary within individual hospitals, as well as within and between groups.

The evaluators also made general comments on their impressions of the style of management adopted by the nursing management teams. In this regard, the management styles at all of the public hospitals were found to be highly bureaucratic and rule-bound, with relatively little attention being focused on the needs of staff, or on systems aimed at maximising staff productivity. A similar pattern was noted at Shiluvana hospital. In the remaining contractor and the private hospitals, by contrast, the management style was reported as noticeably more open and flexible, with much greater concentration on increasing both staff satisfaction and productivity.

A final set of comments concerned the overall impression of standards of patient care from a nursing perspective. Patient care was judged to be of an acceptable standard at all of the contractor and private hospitals, with the possible exception of the maternity ward at Nelspruit hospital, where problems in ward management and record keeping were regarded as having the potential to compromise patient care. In the public hospitals, on the other hand, standards of patient care were generally considered to be inferior to those of the other two groups, and in some wards, to be of an unacceptable standard in absolute terms.

5.3. Evaluation of clinical record keeping

Table 5.7 presents the data on the evaluation of clinical record keeping for the hospital groups, while Table A23.1, Appendix 23 presents the same data for the individual hospitals. Table 5.7 indicates a similar pattern of problems in the contractor and public groups, although there were statistically significant differences between the two groups in the *unable to interpret diagnosis/treatment* and in the *doctor visits* categories, the contractors performing worse than the public hospitals in both cases. The table also shows a generally superior performance from the private hospital group with the exception of the *inadequate description of diagnosis/treatment* category, in which the private hospital group shows very similar performance to the other two groups, and the *unable to interpret diagnosis/treatment* category, in which the private hospitals occupy an intermediate position between the other two groups. The table also shows that, with the exception of these latter two categories, the observed differences between the private hospitals and the pooled contractor and public hospital data were statistically significant at the 5% level.

These data are generally consistent with those concerning patient records observed in the evaluation of structural aspects of quality of care. As noted in Appendix 22, the contractor and public hospitals show similar performance profiles on the criteria relating to the recording of patient details in patient records, as well as to the internal organisation of records, and in both cases, these groups showed inferior scores to those of the private hospitals. In this instance, however, the contractors scored slightly higher than the public hospitals, a reversal of the pattern observed previously.

Table 5.7: Evaluation of clinical record keeping, by group

	Contractor	Public	Private	Con. vs. Pub. chi-square (P)	Pvte. vs. Pub./Con. chi-square (P)
N	96	96	96		
Records disorganised	21% (20)	20% (19)	3% (3)	0 (>0.5)	13.83 (<0.05)
Inadequate description of diagnosis/treatment	60% (58)	61% (59)	58% (56)	0 (>0.5)	0.09 (>0.5)
Unable to interpret diagnosis/treatment	15% (14)	4% (4)	11% (10)	4.97 (<0.05)	0 (>0.5)
Laboratory results not recorded	5% (5)	8% (8)	0%	0.33 (>0.5)	5.31 (<0.05)
No evidence of Dr. visit last 48 hrs	34% (33)	10% (10)	2% (2)	14.50 (<0.05)	18.52 (<0.05)

The section on NVDs in Table 5.8 shows the data on the use of the partograph in the NVD cases included in the analysis of outcomes of care in the tracer conditions, while Table A23.2, Appendix 23 shows the same data for the individual hospitals. Table 5.8 shows a similar pattern to that observed for the other aspects of clinical record keeping, with the contractors demonstrating inferior performance to the public hospitals (with the observed difference being statistically significant at the 5% level). The private hospitals again showed the best performance of the three groups, with the observed difference between the mean private hospital data and the pooled contractor/public data being statistically significant at the 5% level.

5.4. Evaluation of outcomes of care in tracer conditions

This section presents the results of the analysis of the outcomes of care in samples of cases of the four tracer conditions. As discussed in Chapter 3, this analysis involved an initial record review which allowed calculation of the prevalence of indicators of potential problems in the outcomes of care, followed by further evaluation of a sub-sample of cases by expert clinicians. The findings of both of these elements of the analysis are presented jointly for each of the tracer conditions, with the exception of the analysis of peri-natal and maternal mortality, which is presented separately. Table 5.8 presents the data on the prevalence of indicators for the hospital groups, while Table

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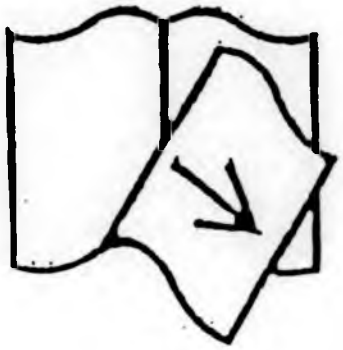

inconvenience to the patient, as well as longer LOS and hence higher costs, rather than poor medical outcome, since the majority of these cases are chronic hernias which do not require urgent surgical intervention. Cases such as that identified at Matikwana are exceptions to this observation.

Table 5.8: Prevalence of indicators of possible poor outcome, by group

	Contractor	Public	Private	Con vs. Pub[a] chi-square (P)	Pvte. vs. Pub/Con[b] chi-square (P)
Hernia Repair					
N	24	45	173		
Delay between admission and operation	12.5% (3)	26.7% (12)	0%	1.107 (>0.25)	19.088 (<0.05)
Inadequate pre-op assessment	54.2% (13)	42.2% (19)	29% (51)	0.482 (>0.25)	2.308 (>0.1)
Wound sepsis	0%	2.2%(1)	0.58% (1)	0.103 (>0.25)	0.073 (>0.5)
Other complications	4.2% (1)	6.7% (3)	0%	0.014 (>0.45)	1.478 (>0.1)
Mortality	0%	0%	0%	n/a	n/a
Appendectomy					
N	21	15	196		
Delay between presentation and operation	14.3% (3)	0%	0%	0.840 (>0.25)	10.662 (<0.05)
Delay between admission and operation	23.8% (5)	0%	0%	2.395 (>0.1)	21.625 (<0.05)
Inadequate pre-op investigation	28.6% (6)	13.3% (2)	76.5% (150)	0.459 (>0.25)	38.832 (<0.05)
Histology results absent	71.4% (15)	100% (15)	94.9% (186)	3.29 (>0.05)	4.662 (<0.05)
Negative histology[c]	50% (3)	n/a	40% (4)	n/a	0.017 (>0.5)
Peritonitis	14.3% (3)	0%	0%	0.032(>0.5)	16.087 (<0.05)
Wound sepsis	9.5% (2)	6.7% (1)	0%	0.093 (>0.5)	10.662 (<0.05)
Other complications	0%	6.7% (1)	1.5% (3)	0.032 (>0.5)	0.817 (>0.05)
Mortality	4.7% (1)	0%	0%	0.029 (>0.5)	0.911 (>0.25)
NVD					
N	254	266	213		
Third degree tears	0.4% (1)	1.1% (3)	0.5% (1)	0.208 (>0.5)	0.008 (>0.5)
Failed assisted deliveries	0%	0%	0%	n/a	n/a
Puerperal sepsis	0.4% (1)	1.9% (5)	0%	1.381 (>0.1)	1.276 (>0.25)
Other complications	0.8% (2)	1.9% (5)	0.5% (1)	0.490 (>0.25)	0.429 (>0.5)
Partograph absent or not completed	44.5% (113)	33.1% (88)	23.0% (49)	6.655 (<0.025)	15.777 (<0.001)
Caesarean sections					
N	191	205	247		
Wound sepsis	8.4% (16)	4.9% (10)	0.4% (1)	1.444 (>0.1)	12.862 (<0.001)
Anaesthetic complications	0%	0%	0%	n/a	n/a
Other complications	1.0% (2)	3.9% (8)	0.4% (1)	2.218 (>0.1)	2.904 (>0.05)
Elective cases	26.2% (50)	20.5% (42)	68.4% (169)	1.490 (>0.1)	126.94 (<0.001)

Notes: a. chi-square test for significance of difference between the contractor and public hospitals.
b. chi-square test for significance of difference between the private hospitals and combined contractor and public hospitals.
c. Percentage of histology records on file which are negative.
n/a - chi square test not applicable where no differences identified.

Inadequate pre-operative assessment has more serious consequences than operative delay in most hernia cases, since many patients presenting with hernias tend to fall within older age groups in whom the risks of anaesthetics may be significant. It is not clear whether the lack of records of pre-operative assessment implies that such

assessments were not done, or simply not recorded. In the case of the private hospitals, for example, all anaesthetics are carried out by specialist anaesthetists, and pre-operative assessment is standard practice. In these hospitals, it is therefore likely that the high rate of inadequate assessments is attributable to poor recording of these assessments, rather than to failure to carry out such assessments.

Tables 5.9, and A23.4, Appendix 23 show the results of the analysis of the surgical cases by the expert clinicians, the former presenting the data for the hospital groups and the latter for the individual hospitals. These tables indicate that of the three cases submitted for analysis, one was assessed to involve a poor outcome that was probably unavoidable (the case involving bowel obstruction at Tintswalo), one to be possibly avoidable (relapsed hernia at Matikwana) and one to be clearly avoidable (testicular infarction at Tintswalo hospital). This latter case appears to be a particularly serious example of a surgical error with severe consequences for the patient. The two clinical experts concurred on these findings in all three cases. The very small number of cases submitted for analysis prevents adequate comparison between the hospital groups, and the differences in the rates of possible and clearly avoidable cases between the groups were not statistically significant at the 5% level.

Table 5.9: Results of expert analysis of tracer conditions, by group

	Contractor	Public	Private	chi-square (P)	chi-square (P)
Hernia Repair					
Cases submitted	1	2	0		
Not avoidable	0	1	n/a	n/a	
Possibly avoidable	1	0	n/a	0.104 (>0.5)	n/a
Clearly avoidable	0	1	n/a	0.103 (>0.5)	n/a
Insufficient data to assess case	0	0	n/a	n/a	n/a
Appendectomy					
Cases submitted	1	0	0	n/a	n/a
Not avoidable	0	n/a	n/a	n/a	n/a
Possibly avoidable	0	n/a	n/a	n/a	n/a
Clearly avoidable	0	n/a	n/a	n/a	n/a
Insufficient data to assess case	1	n/a	n/a	n/a	n/a
Normal deliveries					
Cases submitted	4	13	2		
Not avoidable	0	0	0	n/a	n/a
Possibly avoidable	2	3	1	0.003 (>0.5)	0.144 (>0.5)
Clearly avoidable	0	1	0	0.001 (>0.5)	0.145 (>0.5)
Insufficient data to assess case	2	7	0	1.627 (>0.25)	2.962 (>0.05)
No evidence to suggest poor outcome	0	2	1	n/a	n/a
Caesarean sections					
Cases submitted	2	8	1		
Not avoidable	2	2	1	n/a	0.488 (>0.25)
Possibly avoidable	0	5	0	2.965 (>0.05)	2.56 (>0.1)
Clearly avoidable	0	1	0	0.001 (>0.5)	0.008 (>0.5)
Insufficient data to assess case	0	0	0	n/a	n/a

Notes: n/a - not applicable

5.4.2. Appendectomy

Table 5.8 shows a somewhat different picture of the treatment of appendectomy cases from that observed in the hernia repair cases. The contractor hospitals show a poorer pattern of care than the public hospitals across all indicators aside from the absence of histology results and the 'other complications' category, in which the pattern is reversed. Once again, none of these differences were statistically significant at the 5% level. As in the hernia cases, the private hospitals show a generally superior pattern to the other two groups, with lower prevalence rates of all indicators besides the absence of histology results and a negative histology finding. With the exceptions of negative histology, other complications and the mortality category, the differences between the

prevalence rates in the private group compared to the pooled data from the other two groups were statistically significant at the 5% level. Table A23.2, Appendix 23 again shows marked variation between individual hospitals for all of the indicators measured here.

The relatively high rates of delay between presentation and operation, as well as between admission and operation, at the contractor hospitals provide cause for concern, since delay in the treatment of acute appendicitis may have severe medical consequences. At Matikwana hospital, the one identified case of delay between initial presentation and operation was particularly disturbing. The patient had presented to the hospital with features of acute appendicitis almost exactly one year prior to the admission analysed here. An appendectomy was carried out, but the histological results noted that no appendeceal tissue was in fact removed. The patient then presented one year later with acute peritonitis following a ruptured appendix, requiring emergency surgery. At Shiluvana hospital, both cases in which a delay between presentation and operation were noted appeared to be due to poor initial diagnosis. In one case, the patient presented at the outpatient clinic with symptoms and was sent home. This episode was repeated two days later, and the patient was finally admitted to the hospital 16 days after initial presentation to the outpatient clinic. In the second case, the patient was admitted to the hospital on the day of initial presentation, but was misdiagnosed as having faecal impaction. As a result, the operation was delayed, and an emergency appendectomy had to be performed 2 days after admission.

The delays between admission and operation noted at Hewu and Shiluvana hospital were poorly explained in most cases, and appear to be attributable to worrying logistical problems within the hospital. Two of the cases at Hewu were particularly disturbing; in one, a patient was operated on for a ruptured appendix, but only peritoneal lavage and not an appendectomy were performed, following which the patient was discharged. Following a recurrence of symptoms, the patient was re-admitted 6 months later with acute appendicitis, for which an emergency appendectomy was performed. In the second case, the patient was admitted with a diagnosis of acute appendicitis, but not operated

on. The delay resulted in a ruptured appendix which again necessitated emergency appendectomy.

The 50% rates of negative histology at Matikwana and Pietersburg hospitals are hard to interpret in the light of the substantial proportion of cases in which no results were found in the patient records, since there may be some bias in those records that are in fact filed. In the contractor and public hospitals, the high proportions of cases in which there are no records of this kind is likely to reflect poor record keeping, rather than failure to request histological examination, which appears to be done routinely. In the private hospitals these records are likely to be sent to the patients' doctors, rather than filed in the hospital record.

The higher rates of wound sepsis in the contractor and public hospitals relative to those found in the private hospitals are cause for some concern. While none of the case records involving wound sepsis contained sufficient information to allow evaluation by the expert clinicians, hospital acquired infections are generally regarded as preventable through strict infection control techniques, so that high rates of post operative wound sepsis can be interpreted as indicative of failures in infection control, and therefore of important problems in the quality of surgical care.

Tables 5.8 and A23.4, Appendix 23 show that of the four appendectomy cases submitted for analysis by the expert clinicians, three showed poor outcomes that were judged to be unavoidable (one case of peritonitis at Matikwana, and two cases of peritonitis at Hewu). In all of these cases, there was evidence that the patient had presented so late to the hospital that peritonitis could not be attributable to the actions of the hospital staff. In the fourth case (death in 19 year old male at Hewu), there was judged to be insufficient information on which to evaluate the case. Both experts concurred on the findings in all four cases.

5.4.3. Normal deliveries

Table 5.8 shows a fairly similar pattern of problems at the contractor and public hospitals, with generally low prevalence rates for all indicators aside from those relating to the use of the partograph. The public hospitals show slightly higher prevalence rates than the contractors for all indicators except those related to the partograph, although none of these differences were statistically significant at the 5% level. As in the other tracers discussed above, the private hospitals show generally lower prevalence rates than do the other groups across most of these indicators, although the differences between these rates and those of the pooled contractor and public hospitals were not statistically significant.

Table A23.3, Appendix 23 details the cases identified in the 'other complications' category, all of which were submitted for analysis by the expert clinicians. Tables 5.8 and A23.4, Appendix 23 show that a total of nineteen cases[139] were submitted for expert analysis, of which six were assessed as involving poor outcomes that were possibly avoidable (the case of splenomegaly discharged without investigation at Matikwana, and the cases of third degree tears at Shiluvana, Tintswalo, Bisho and St. Dominics[140]). Of the remaining thirteen cases, one was assessed as having a clearly avoidable poor outcome (the puerperal sepsis due to gauze being left *in situ* following delivery, at Bisho), while three cases of post-partum haemorrhage (two at Bisho and one at Nelspruit) were assessed as showing no evidence of poor outcome. The final nine cases were assessed as containing insufficient information on which to judge the avoidability of the poor outcome. This group included the cases of puerperal sepsis at Hewu, Tintswalo, and Bisho, as well as the case of the shoulder injury sustained by the baby during delivery at Hewu. Table 5.9 also indicates that none of the differences noted between the contractor and public hospitals, nor between the private hospitals and the pooled public and contractor groups were statistically significant at the 5% level.

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139 This number excludes the cases involving perinatal and maternal mortality, which were also evaluated and are discussed separately below.

140 All cases of 3rd degree tears identified were related to an episiotomy.

5.4.4. Caesarean sections

Table 5.8 shows relatively low prevalence rates for all indicators measured, with the contractor hospitals showing higher rates than the public group in the case of wound sepsis, and with this pattern being reversed for the 'other complications' category. Once again, none of the observed differences between the public and contractor groups were statistically significant at the 5% level. The data for the private hospital group show a lower prevalence than the other two groups for both of the indicators for which data were available, and the table shows that the difference between the mean private hospital prevalence rates and those of the pooled public and contractor rates was statistically significant in the case of wound sepsis, but not in the case of the 'other complications' category. As noted in the discussion of wound sepsis in the appendectomy cases, the higher rates in the contractor and public hospitals relative to those in the private hospitals give some indication of a problem in the quality of patient care, even though these were not evaluated by the expert clinicians. Table A23.2, Appendix 23 again shows some variability between the individual hospitals within each group.

The nature of the cases included in the 'other complications' category are presented in Table A23.3, Appendix 23, and further analysed in Tables 5.8 and A23.4, Appendix 23. As the latter tables show, eleven cases were submitted for analysis by the expert clinicians. Of these, five were assessed as unavoidable (the acute respiratory distress and post partum haemorrhage cases at Hewu, the typhoid fever and disseminated intravascular coagulation cases at Letaba, and the chest infection case at Pietersburg). A further five cases were assessed as showing poor outcomes that were possibly avoidable. All of these involved cases of wound dehiscence requiring secondary suturing, and all occurred at two of the public hospitals (two cases at Tintswalo and three at Letaba). The final case, in which a patient sustained a bladder injury during the operation was evaluated as a clearly avoidable poor outcome. Table 5.9 indicates that, in common with all of the other tracer conditions, the differences between the groups in the proportions

of cases regarded as either possibly or clearly unavoidable were not statistically significant at the 5% level.

5.4.5. Analysis of peri-natal mortality

Table 5.10 shows the analysis of peri-natal mortality for each of the hospital groups, while Table A23.5, Appendix 23 shows the same data for the individual hospitals. Table 5.10 indicates that both the public and the contractor groups have high mean peri-natal mortality rates, with the public hospitals showing the highest rate of the three groups, and with the private hospitals showing a much lower rate than the other two groups. The table also indicates that the difference in mean rates between the public and contractor group was not statistically significant at the 5% level, while the difference between the private and pooled public/contractor rates was statistically significant. These data however mask very noticeable differences in these rates at the individual hospitals, as shown in Table A23.5, Appendix 23.

Table 5.10 also shows the mean data for each group on the attribution of avoidable factors to different causes. These data indicate that in both the contractor and public groups, over 80% of avoidable factors were attributable to hospital related problems (defined here as including hospital related administrative factors and medical management factors). Within this group, the table indicates that a higher proportion of avoidable factors was attributable to hospital administrative problems in the contractor than in the public group, with the converse applying in the case of problems related to medical management. In this latter case, it is worth noting the high percentages of avoidable factors attributable to medical management (actions undertaken or omitted by hospital staff) in both of the groups, with the figure for the public group being particularly disturbing. A low percentage of avoidable factors in both groups was attributable to patient related factors, with the remainder of avoidable factors attributable to the other administrative category, in this case relating primarily to clinic transport systems. As the table indicates, only the difference between the proportions of avoidable factors attributable to hospital administrative problems was statistically significant at the

5% level. Table A23.5, Appendix 23 again shows some variation between individual hospitals in these analyses of avoidable factors, although the degree of variability is somewhat less than that noted in the analysis of mortality rates.

Table 5.10: Analysis of peri-natal and maternal mortality, by group

	Contractor	Public	Private	Con. vs. Pub. chi-square (P)	Pvte. vs. Pub./Con. chi-square (P)
Births	5093	7641	2608		
Peri-natal deaths	196	330	35		
Maternal deaths	8	10	0		
Peri-natal mortality rate (per 1000)	38.01	50.59	14.48	1.59 (>0.05)	46.995 (<0.05)
Maternal mortality rate (per 100 000)	160.66	162.27	0.00	0.021 (>0.05)	2.583 (>0.05)
Analysis of peri-natal mortality					
N	48	57	19		
Poor notes	9	9	19		
Avoidable factor/s[a]	29 (74.4%)	24 (50%)	n/a[b]	4.39 (<0.05)	n/a
Grade I	7	6	n/a	0.17 (>0.05)	n/a
Grade II (% of total AF)	22 (76%)	18 (75%)	n/a	0.06 (>0.05)	n/a
Attribution of avoidable factors					
Total avoidable factors	38	36			
Patient related	2 (5.3%)	3 (8.3%)	n/a	0.004 (>0.05)	n/a
Administrative factors (hospital related)	14 (36.8%)	5 (13.9%)	n/a	3.972 (<0.05)	n/a
Medical management	17 (44.7%)	25 (69.4%)	n/a	3.647 (>0.05)	n/a
Hospital total	31 (81.6%)	30 (83.3%)	n/a	0.012 (>0.05)	n/a
Admin. factors (non hospital)	5 (13.2%)	3 (8.3%)	n/a	0.086 (>0.05)	n/a

Notes: a. Cases in which notes which were too poor to analyse were excluded from the denominator (total number of cases analysed) for the purposes of calculating the proportions of avoidable factors.
b. Not applicable, since patient records at private hospitals prevented identification of avoidable factors.

5.4.6. Analysis of maternal mortality

The data on maternal mortality rates (Table 5.10) show a similar pattern to that of peri-natal mortality, with the contractor and public hospital groups showing similar and very

high mean rates, but with no statistically significant difference between them. The table also shows that the difference between the pooled mean rates for these two groups and the mean rate of zero at the private hospitals was not statistically significant at the 5% level. Table A23.5, Appendix 23 shows that the variation between individual hospitals is greater than was observed for peri-natal mortality rates.

Table 5.11 summarises the evaluations of the cases of maternal death analysed by the University of Pretoria group. In this case, only six of the eighteen maternal deaths identified could be analysed (two of eight cases in the contractor group, and four of ten cases in the public group), since permission was denied to copy files at Shiluvana, and the remaining files in the other hospitals could not be located. This analysis differs from that of the peri-natal mortality cases in that it does not use a detailed classification system, but instead adopts a more subjective approach to the evaluation of cause of death, and whether or not the death was avoidable.

The table indicates that in both of the analysed cases at the contractor hospitals, there was evidence of poor quality of care, and the maternal death would probably have been avoidable had the clinical staff acted differently. In Case 1, the poor management undertaken at the hospital was aggravated by the late arrival of the patient, as well as by the failure to refer appropriately. In case 2, on the other hand, the clinical interventions appeared to show clear evidence of poor, and even negligent care. One of the cases at the public hospitals (case 4) similarly indicates evidence of poor clinical care resulting in a maternal death that could probably have been avoided, while a second (case 1) shows evidence of poor examination and possible anaesthetic problems, suggesting that the death might possibly have been avoided. In the remaining two cases, the notes were not adequate to assess the causes of death in sufficient detail to decide whether or not the deaths were avoidable.

Table 5.11: Analysis of maternal mortality cases

Contractor Hospitals	
Case 1:	Cause of death: eclampsia Overall impression of care: 'too little, too late' Problem was detected the day before at the antenatal clinic and patient referred to hospital, but only arrived a day later. No explanation for this delay. Patient should have been referred to a tertiary centre as soon as possible after admission, but was not referred. Management at the hospital was inadequate, and suggests inadequate knowledge on part of clinical staff: 1. Notes do not indicate awareness of severity of condition 2. The high blood pressure was never controlled 3. Inexplicable delay in delivery of baby Probably avoidable.
Case 2:	Cause of death: Eclampsia complicated by post-partum haemorrhage. Overall impression of care: management totally inappropriate for the condition. Antenatal clinic performed well in referring patient to the hospital. Convulsions not diagnosed as eclampsia, and managed inappropriately. Appears as if doctor in charge of case did not know what was going on. Post partum haemorrhage controlled with syntometrine - totally inappropriate. Probably avoidable.
Public Hospitals	
Case 1	Cause of death: cardiac arrest during anaesthesia for caesarean section. Patient died under anaesthesia during caesarean section for severe pre-eclampsia. Post mortem showed severe bilateral lobar pneumonia, calcific valvular disease and enlarged heart, as well as liver cirrhosis. No evidence that any of these problems were diagnosed in the antenatal period, or prior to anaesthesia, suggesting inadequate examination. Possible problem with anaesthesia, although good attempt at resuscitation. Possibly avoidable.
Case 2	Causes of death: not indicated. Eclampsia and acute renal failure and possible malaria noted in file. Very difficult to interpret events in this case. Eclampsia not well controlled. No other details provided. Note that death occurred on 17th December and notes made on 19th December. Unable to judge avoidability.
Case 3	Cause of death: post partum haemorrhage; probably due to septicaemia from pyelonephritis. Notes scanty but clinical management appears to have been good. Unable to judge avoidability.
Case 4	Cause of death: post partum bleeding due to poor surgical technique during caesarean section. Severe haemorrhage after caesarean section. Patient taken back to theatre, but unable to stop bleeding (probably due to disseminated intravascular coagulation). Probably avoidable.

5.5. Summary of results of evaluations of quality of care

Table 5.12 provides a brief summary of the main results discussed in this chapter.

Table 5.12: Summary of results of evaluations of quality of care

Analysis	Comparison between public and contractor hospitals	Comparison between private and other hospitals
Structural quality of care	Contractors performed worse in grand total score, across most clusters, and on staffing and other aggregated categories, but better in buildings cluster. Results robust to sensitivity analyses.	Private group performed better than both other groups in grand total score and across most clusters and aggregated categories.
Quality of Nursing Care		
Evaluation using survey instrument	Contractors performed better in grand total score, and for all wards in the nursing care cluster. Public hospitals better in nursing management cluster. Results robust to sensitivity analyses.	Private group better than both groups by substantial margins in both clusters.
Subjective evaluation	Contractors performed better in most assessed categories, besides management of medical equipment and staff numbers and skill levels. Overall standards of nursing care acceptable at contractors, but inferior and, in some cases, unacceptable at public hospitals.	Private group better than both other groups across most categories analysed.
Quality of clinical record keeping	Contractors performed worse than public hospitals by statistically significant margins in two categories, and in use of partograph in NVD cases.	Private group superior to other two groups by statistically significant margins for most indicators, including use of partograph.
Outcomes of care in tracer conditions		
Hernia Repair	Public hospitals show higher prevalence of indicators of poor outcomes, but differences not statistically significant. No statistically significant differences in expert analysis.	Private hospitals show lowest prevalence of indicators of poor outcomes, but statistically significant difference for one indicator only.
Appendectomy	Contractors show higher prevalence of indicators of poor outcomes, but differences not statistically significant. No statistically significant differences in expert analysis.	Private hospitals show lowest prevalence of indicators of poor outcomes. Differences were statistically significant for majority of indicators.
NVD	Public hospitals show slightly higher prevalence of indicators of poor outcomes, but differences not statistically significant. No statistically significant differences in expert analysis, but of nine cases analysed, evidence of possibly avoidable outcomes in cases at contractor and public hospitals, and one clearly avoidable outcome at one public hospital.	Private hospitals show lowest prevalence of indicators of poor outcomes, but differences not statistically significant.
Caesarean section	Public hospitals show higher prevalence in one of the indicators of poor outcome, and lower prevalence in the other. Differences not statistically significant. No statistically significant differences in expert analysis, but analysis identified five cases of possibly avoidable outcomes, all at public hospitals, and one clearly avoidable outcome, also at a public hospital.	Private hospitals show lower prevalence of indicators than the other groups. Difference was statistically significant for one indicator, but not for the other.

Table 5.12: Summary of results of evaluations of quality of care (contd.)

Analysis	Comparison between public and contractor hospitals	Comparison between private and other hospitals
Peri-natal mortality	High mean rates in both groups; public hospital rate higher, but difference not statistically significant. ICA Audit showed that contractor hospitals had higher proportion of cases with one or more avoidable factors, with difference between the groups being statistically significant.	Private group showed lowest rate, with difference being statistically significant.
Maternal mortality	High mean rates in both groups, but difference not statistically significant. No statistically significant differences in expert analysis, but evidence of poor quality of care, and possibly avoidable death in two cases at contractor hospitals, and in two cases at public hospitals.	Private group showed lowest mean rate, but difference not statistically significant.

CHAPTER SIX: RESULTS - ANALYSIS OF CONTRACTS AND THE CONTRACTING PROCESS

This chapter presents the results of an analysis of the contracts and the contracting process in the three contractor hospitals, and examines the historical reasons for the emergence of different contractual models, as well as the impact of these on efficiency. As discussed in Chapter 2, efficient contracts are those in which the balance of incentives for the contracting parties is such that it creates the appropriate trade-offs between the risk of opportunistic behaviour by the contractor, the transactions costs faced by the purchaser, and the number of contractors willing to bid for the contract. These incentives, and their impact, are in turn a function of the design, and the resulting incentive structure of the contract, the mechanics of the contracting process, and the attitudes of the contracting parties to risk. The following sections examine each of these aspects of the prevailing contractual arrangements.

6.1. Contract design and incentive structure

The theory of contracts discussed in Chapter 2 suggests that one of the major determinants of the incentive effects of contracts is the distribution of risk between the contracting parties. In the context of public sector contracts, the government's major risks are those associated with the cost of the contract, and the quality of services delivered, while those of the contractor relate to the predictability of total revenues and total costs. A number of specific features of contracts will impact on these dimensions of risk for each of the parties, including the services and obligations specified in the contract, the reimbursement mechanism employed, the extent of capital risk faced by the contractor, the duration of the contract, the degree of detail in the specification of the contract, and provisions for monitoring and sanctions in case of breach of contract. Each of these specific aspects of the contracts are discussed in the following sections.

6.1.1. Services covered by the contract

Table 6.1 summarises the key structural features of the three contracts, and indicates some similarity in the services covered. At Matikwana and Hewu, the contract covers both in-patient and outpatient services, while at Shiluvana, the contract is limited to in-patient services. The exclusion of out-patient services from the Shiluvana contract was at the insistence of the government, which took the view that it had adequate outpatient service provision through its district PHC facilities. In all three contracts, the contractors' obligations are limited to delivery of patient and support services within the hospital grounds, and do not cover other services such as patient transport, or clinical and administrative support to PHC services in the surrounding districts.

Table 6.1: Key features of the contracts

	Matikwana	Hewu	Shiluvana
Services covered by the contract	In-patient and out-patient services.	In-patient and outpatient services.	In-patient services only.
Personnel obligations	Contractor employs all personnel aside from medical staff.	Contractor employs all personnel.	Contractor employs only senior management personnel. Govt. employs all other administrative, ancillary, nursing and medical personnel.
Reimbursement method	Fixed per diem rate for in-patient care. OPD visit at 1/3 of in-patient day rate.	Fixed per diem rate for in-patient care. OPD visit at 1/3 of in-patient day rate.	Fixed per diem rate.
Price adjustment mechanism	Automatic annual price escalation. Provision for interim price increases.	As Matikwana	As Matikwana
Minimum Occupancy Clause	Initially specified at 90%. Subsequently reduced to 80%.	None.	Initially specified at 90%. Subsequently reduced to 80%.
Capital risk	Capital for hospital construction and equipment provided by contractor.	Hospital built and equipped by government.	Capital for hospital construction and equipment provided by contractor.
Contract duration	10 years, renewable for further 10 years.	5 years; renewed for further 3.	10 years, renewable for further 10 years.
Specification of the contract	Minimal specification of contractor's obligations and performance review.	As Matikwana	As Matikwana
Penalties for breach of contract	Provision for cancellation and penalty in event of breach.	As Matikwana	As Matikwana
Method of awarding contract	Direct negotiation.	Direct negotiation for initial 5 years, then competitive tender for subsequent 3 years.	Direct negotiation.

6.1.2. Personnel obligations

As Table 6.1 also shows, the three contracts differ quite substantially in terms of the contractor's personnel obligations. At Matikwana, the contractor is required to provide all hospital personnel aside from the medical staff, who are employed by the government. In this case, the contract does not require that either party consult with the other on the appointment of its own staff. At Hewu, the contractor is required to provide the full complement of hospital staff, including medical staff, and must consult with the government prior to appointment of medical or paramedical personnel, but not for other staff. The contract for Shiluvana is different again; in this case, the contractor is required to supply only senior management personnel and some limited domestic staff, with the government supplying most administrative staff, and all nursing and medical personnel, with no obligation on either of the parties to consult with the other prior to appointment of staff. None of the contracts specify required numbers or skill mix in the staffing of the hospitals, leaving these decisions entirely in the hands of the contractor.

It should be noted here that these personnel obligations expose the contractor to some specific risks: all staff employed by the contractor are regarded by it as permanent employees, despite the fact that the hospital management contracts have limited terms. The contractor thus assumes the risk of finding further employment for its staff, or of negotiating acceptable retrenchment packages, in the event that contracts are terminated or not renewed. In addition, the contractor faces the risk of not being able to adequately control government employed staff, which may undermine its ability to meet its contractual obligations.

6.1.3. Obligations in respect of other inputs

As with personnel obligations, none of the contracts specify in any detail obligations or constraints in regard to the deployment or use of inputs such as equipment, drugs or other supplies. In two of the hospitals (Matikwana and Shiluvana), the contractor has access to the government drug supply and distribution system, and the government

employed medical staff are required to adhere to the government formulary.[141] These arrangements do not apply in the case of Hewu, where drug purchasing and distribution is undertaken by the contractor, and where the medical staff are not restricted to a government formulary. Procurement of all other supplies and equipment is undertaken by the contractor, using its strong central purchasing capability to ensure low prices and good quality. Laundry services are provided at the hospital in all cases, while catering services at all three hospitals are sub-contracted by the contractor to a specialist catering company.

6.1.4. Reimbursement mechanisms

Table 6.1 shows that in all three contracts, reimbursement for in-patient care is based on a fixed per diem rate, and that OPD visits are charged at one third of the per diem rate in the Matikwana and Hewu contracts.[142] Where demand for services is uncertain, as is the case with acute hospital services, a per diem reimbursement mechanism distributes the risk between the two parties to some extent, since the government is usually unable to predict its total costs, while the contractor is similarly unable to predict total revenues. This situation applies in the case of the Hewu contract, but not in the other two contracts, which both included a minimum occupancy clause which specified that, where average bed occupancy falls below 90% for more than two weeks, the per diem rate will be payable at an assumed bed occupancy rate of 90%.[143] This clause shifts much of the risk in the contract to the government by protecting the contractor against the risk of periods of low demand, ensuring a high degree of predictability of revenues.

All three contracts also include provisions for price adjustments which further reduce the risk faced by the contractor. As the table notes, the contracts make provision for automatic annual price adjustments to account for inflationary increases in production costs, and also allow the contractor to request interim price increases, in case of other

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141 These arrangements are not included in the contracts, but were arranged subsequent to their implementation.

142 At Hewu, dental OPD visits are also included in the contract, and are charged at one fifth of the per diem rate.

143 The minimum occupancy level of 90% was reduced to 85% during 1993/94 and again to 80% in 1994/95.

unpredicted cost increases. The contracts also make provision for arbitration in the case of price disputes, thus limiting the power of the government to deny price increases. Interviews with Lifecare and government officials indicate that, in all three contracts, the government has always accepted the annual price increases, and has also accepted all requests for interim price adjustments.

6.1.5. Capital risk

Table 6.1 indicates important variations in the extent of capital risk faced by the contractor in the three contracts. At both Matikwana and Shiluvana, the contractor was required to fund (and undertake) the construction and equipping of the hospitals. This higher capital risk is however compensated for in the contracts. This is reflected firstly in the contract prices, which are higher than they would otherwise be expected to be since the capital invested by the contractor is amortised within the contract price.[144] Similarly, these two contracts provide for a long initial contract term, as well as for renewal for a further period. In both cases, the contracts also state that after a 20 year period, the buildings and equipment in the hospital will revert to the ownership of the government. Should the contract be canceled prior to this, however, the government will be obliged to purchase the hospital from the contractor, at a value determined by a formula in the contract. Thus, while the contract in theory allows the government to decide whether or not to renew the contract at the end of the first ten year period, the inclusion of the penalty clause effectively locks the government into a 20 year contract. Taken together, these clauses suggest that the contracts fully compensate the contractor for the capital risk assumed, and might in fact be argued to overcompensate for this, thus further shifting risk towards the government.

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144 Direct comparison of contract prices is complicated by the variation in personnel obligations of the contractor at the different hospitals. Thus, the price per day at Shiluvana is the lowest of the three (despite inclusion of a capital element in the price) since the contractor has the smallest personnel obligations there. Similarly, the price at Hewu is slightly higher than at Matikwana, despite the latter including a capital element, because the Hewu contract requires that the contractor employ medical staff, who contribute significantly to the contractor's total wage bill.

The situation is somewhat different at Hewu hospital, where the contractor faced no capital risk since it took over the management of a hospital that was already fully built and equipped. This contract therefore requires the contractor to maintain all facilities and equipment, and to purchase new equipment as required, although such equipment will remain the property of the contractor at the end of the contract. The lower capital risk faced by the contractor in this contract is reflected in a relatively lower contract price, a shorter contract term, and the absence of a minimum occupancy clause.

6.1.6. Specification of contracts and performance review mechanisms

None of the contracts specify the contractor's obligations in terms of quantity or quality of services in any detail, including only vague and general provisions that the contractor will deliver services of an acceptable standard. This poor specification of the contractor's obligations shifts contractual risk substantially towards the government, by making it difficult for the government to monitor whether or not the contractor is actually fulfilling its obligations. More importantly, these contracts render it almost impossible for the government to identify any failure on the part of the contractor as a litigable breach of contract.

Similarly, while the right of the government to inspect the premises and monitor performance of the contractor is noted in all contracts, none of the contracts provide any detail on the nature and frequency of monitoring to be undertaken, or on the nature or scale of penalties for non performance by the contractor. The contracts do however provide for termination of the contract should either party be in breach of contract.

6.1.7. Overview of the incentive structure of the contracts

In summary, this analysis has demonstrated that the incentive structure in all three of the contracts substantially favours the contractor, with much of the risk in the contracts shifted towards the government. This is seen specifically in the reimbursement

mechanism used, particularly in combination with a minimum occupancy clause and price adjustment provisions; and in the minimal degree of specification of inputs, outputs and of monitoring and performance review. While the contracts do pose some risk to the contractor, specifically in the capital risk assumed, and in the engagement of permanent staff establishments, this analysis suggests that the contracts more than adequately compensate the contractor for this risk.

6.2. The contracting process

6.2.1. Mechanics of the contracting process

The contracts for both Shiluvana and Matikwana were directly negotiated between the government and the contractor. In both cases, the initial contract was drawn up by the contractor, and this was followed by rapid and straightforward negotiations and review of the contracts by government legal staff, prior to signature. In both cases, it appears as if the contractor was able to secure all of its requirements with minimal resistance. In the case of Hewu hospital, the initial contract was awarded to the contractor after an open, competitive tender, in which it bid against two other private for-profit hospital companies. While government officials were unable to recall the specific details of the different bids, the contractor's view is that it was awarded the contract because it was the cheapest bidder, and perhaps because it was already managing another hospital under contract to the same government. This initial contract was granted for a five year period, and included a clause stating that the incumbent contractor should be given preference if a second contract term was entered into. At the end of the 5 year period, a new 3 year contract was therefore negotiated directly with the contractor. In this case, the contractor again drew up the contract, and was able to secure all of its requirements after a simple and rapid negotiation.

6.2.2. Attitudes and reactions to contractual risk

Interviews with contractor and government officials demonstrated important differences in attitudes and reactions to perceived risk in the contractual situation. On the government side, perceptions of risk were not explicitly articulated, but appeared to be limited mainly to concerns with the cost of the contract. No explicit concern with quality of care issues was raised. Importantly, government officials evinced a surprisingly passive approach to these risks and contractual problems, and did not appear to perceive the connections between the provisions of the contract and these risks. More specifically, government officials seemed not to perceive their own power to influence the negotiating and contract writing process, despite their concerns that the contracts were biased against them.

The contractor, on the other hand, demonstrated a much more sophisticated understanding of the various sources of risk in the contract, of the connections between these and the contract itself, as well of the manifestations of these risks in each of the specific contracts. As would be expected, the contractor identified its capital investment at Matikwana and Shiluvana as one of its main risks in those contracts, and had insisted on the long contract terms and minimum occupancy clauses as compensation for this risk. Thus, while it was prepared to accept risk on its operating costs, it explicitly required that the government assume some share of the risk on the capital investment. It also identified unpredictability of demand as another risk, and as expected, has a clear sense of the specific relationships between levels of demand and profitability at each of the hospitals. Fluctuating demand was identified as a major problem at Hewu, in which the absence of a minimum occupancy clause exposes the contractor to the risk that revenues may fall below its fixed costs. This had in fact occurred during the year prior to the study, resulting in losses. A further risk, noted above, relates to the hiring of large permanent staff establishments for each hospital, despite the fact that the contracts are for limited terms.

As noted in the previous section, the contractor was able to write and negotiate contracts which compensated it adequately for most of these perceived risks. In addition, each

new contract is subjected to intensive risk and feasibility analysis, using both in-house and outside research capability, prior to the decision to enter into the contract negotiation.

A number of elements in the attitudes of the parties to contractual risk, and in the contracting process, have led to the development of contracts which tend to favour the contractor to a significant extent. As shown above, the contractor appears to be more risk averse, and more aware of contractual risk, than the government. Direct negotiations, as occurred in two of the three original contracts (and in the second round of the third contract) provided greater scope for the contractor to influence the shape of the contract than a competitive tendering process would have, and this tendency was further strengthened by what appears to have been extremely weak negotiating capacity on the part of the government. Together, these factors led to a situation in which the government in effect became a passive 'taker' of prices and contractual conditions in all three contracts.

There is also a complex relationship between these various factors and the extent of actual or potential competition for these contracts. The government appears to have a confused understanding of competition in this context - in the contracts for Matikwana and Shiluvana, the government believed that no other competitors existed and therefore negotiated directly with the contractor, whereas in the Hewu case, the initial contract was awarded through an open competitive tender. Interviews with government officials elicited the general sense of some degree of dependency on the contractor, despite awareness of the existence of potential competition. This is in contrast with the contractor itself, which appears to take the threat of competition seriously both in bidding for the contracts initially, and also in its annual price adjustments.

In summary, analysis of the contracting process provides some compelling explanations for the fact that the prevailing contracts heavily favour the contractor. The government appears not to have been sufficiently aware of the impact of the design of the contract on its own risks, nor on its transactions costs. Similarly, it appears to have underestimated its own ability to influence the terms and conditions of the contract, in part because of an

exaggerated sense of its dependence on this particular contractor to undertake the required tasks.

6.3. Explanations for variations in contractual models

When these various features of the contracts and the contracting process are integrated, two major contractual models emerge. The first may be termed a 'build, operate and transfer' contract; here the contractor invests capital for the construction and equipping of the hospital, in return for a management contract, with some variation in the personnel and other obligations within the contract. Ownership of the hospital is initially in the hands of the contractor, but is transferred to the government at the end of the contract, through amortisation of the capital cost within the contract price. In the second model, which may be termed a 'management contract', the contractor obtains a contract to manage an existing publicly owned hospital, and is required to provide some or all of the staff required to manage the hospital.[145] Interviews with government and contractor officials suggest that these alternative models, and their specific and variable features, are attributable to a combination of particular historical circumstances, as well as to explicit intentions in contract design, mainly on the part of the contractor. These factors are clearly illustrated by examining the background to the development of each of the contracts.

The first of these contracts to be signed was for Shiluvana hospital. This hospital had previously been a mission hospital, and by 1985, was in desperate need of major investment in new buildings and equipment. The government at the time faced major capital constraints, and approached the contractor (but no other companies) to rebuild, equip and run the hospital. Government officials indicate that they approached this contractor alone because the company had very successfully and rapidly responded to a request to build and manage a large chronic psychiatric institution, and because 'they believed that no other companies were capable of rendering the required services'. As

145 Interviews with Lifecare officials indicate a third model, applied in several of its other contracts, in which the contractor leases a hospital from a third party, and uses it to provide services on contract to the government.

indicated above, the contractor responded to this request by designing a contract which would compensate it for its capital risk, and this was accepted by the government, and the contract was signed in 1986.

In the original contract, the contractor was obliged to manage the entire health district, including the hospital and its surrounding PHC facilities. However, the contractor encountered logistical and administrative difficulties in managing the non-hospital PHC facilities, and found itself unable to 'run these services on business lines', leading it to request that the government re-assume control over the district PHC services, which the government agreed to do, some 2 years after the original contract was signed.

The staffing model used at Shiluvana also emerges from this particular history. Since the new hospital replaced an existing one which already had a full staff establishment, the original contract stated that the contractor would take over the employment of all hospital staff aside from the medical staff. This approach lasted 2 years, after which the contractor requested that the government re-assume employment of all nursing and most domestic staff, a request which was again readily acceded to by the government. According to the contractor, it requested this change since it found itself unable to control staff costs or productivity due to entrenchment of public sector practices, despite the fact that it was the formal employer of all hospital staff. The original decision to leave medical staff in the employ of the government was also at the insistence of the contractor, which took the view that this would be preferable for the doctors themselves, since they could retain the option of transferring to other government hospitals.

The development of the contract for Matikwana followed a similar pattern. Based on the success of its previous two arrangements with the contractor, and facing similar capital constraints, the same government in 1987 requested the company to finance, construct and equip a new district hospital. Again the contractor agreed to this and drew up a very similar contract to that used at Shiluvana, which was again accepted by the government. In this case, the absence of a pre-existing staff establishment led to a contract requiring the contractor to employ all staff aside from medical staff. Management of the district PHC services was on this occasion omitted from the contract altogether.

The contract for Hewu followed a different trajectory. In this case, the hospital had been built and equipped in 1984, but by 1986, the Ciskei government had not yet been able to commission the hospital, which was lying empty. The contractor approached the government suggesting that it manage the hospital on contract, and this led to the competitive tender which was won by Lifecare. In the case of staffing, the administrative difficulties faced by the government led to a request that the contractor employ the full staff complement, although as with the previous contracts, the contractor agreed only to provide hospital management services, rather than to assume control of all district facilities.

6.4. Impact of contract structure and process on efficiency

The previous sections have indicated that both contract design and the contracting process led to contracts in which risk is substantially shifted towards the government, and in which there are opportunities for exploitation of the contracts by the contractor. This section examines the relationship between these various factors and the efficiency of the contractual arrangements.

6.4.1. Impact of the split between hospital and district services

The split in the management of hospital and district PHC services was identified as one of the critical problems experienced by government officials in all three contracts. A number of specific problems were identified in this context. The first is a lack of coordination between hospital and district services; in the normal public sector rural hospital model, hospitals act as the hub of an 'hub and spoke' system, providing direct support to surrounding clinics, and resulting in a fairly high degree of integration and coordination between the hospital and district PHC facilities. The model applied in these contractor hospitals however resulted in fragmentation, lack of coordination, and in some cases, conflict between hospital and district staff. These problems create numerous

inefficiencies. In the case of Matikwana, for example, clinics a few kilometres from the hospital have to be supported and supervised by staff from another public hospital over 50 km away, when they ought to be supervised by staff at Matikwana hospital itself.

A second problem emerges from the perverse incentives that result from the separation of hospital and district services. Under the current contractual arrangements, the contractor has an incentive to encourage OPD visits at the hospital (at Matikwana and Hewu) as well as hospital admissions, since these increase revenues. The contractor appears to have responded with a high level of integrity in the case of Matikwana, where it financed and built a clinic at the gate of the hospital, at which public sector staff examine and screen patients, referring only serious cases to the hospital. In the other two hospitals, however, patients often bypass public sector clinics and are seen directly at the hospital. There is also an incentive for the contractor to engage in cost-shifting, since the contracts specifically exclude the transport and other costs of patient referrals, encouraging the contractor to refer all relatively complex (and hence costly) cases to other hospitals. Several of the government officials interviewed perceived these specific problems to be so serious as to undermine almost all of the perceived efficiency gains from contracting out.

6.4.2. Impact of alternative staffing models

Two elements of the alternative staffing models used in these contracts are relevant from an efficiency perspective. The first is the separation of medical staff, who remain in the employ of the government, from the management staff employed by the contractor. Government officials perceive this approach to have a strongly positive effect, since it provides safeguards against any tendency of the contractor to reduce costs at the expense of quality, and/or to prolong length of stay in order to increase revenues. While the medical staff working in these two hospitals agreed with these sentiments, they had differing views on the overall efficiency effects of this arrangement. Those working at Shiluvana, for example, argued that they experienced conflicting loyalties, and that this led to conflict and sub-optimal management of the hospital. This view was not shared by

the medical staff at Matikwana, who experienced a smooth and effective working relationship with the contractor's management team. As discussed further below, the problem at Shiluvana may have more to do with the more general 'dual employment' arrangements at that hospital, than with the specific separation of medical from general management staff.

Contractor officials also had mixed views on this arrangement; while all those interviewed conceded that this arrangement provided some safeguards against possible conflicts of interest on the part of the doctors, some felt strongly that employment of doctors by the government undermined the coherence and efficiency of the hospital management team. This point was argued with particular reference to Hewu hospital, where the full integration of medical and management staff was perceived to create a more coherent management team, and to ensure that medical staff were more cost conscious in their use of resources. Overall, however, the balance of views on this arrangement was in favour of its retention.

The second issue of relevance here is the more general 'dual employer' situation, as occurs at Shiluvana hospital. As noted above, this occurred for historical reasons rather than by design, and is universally regarded as hindering efficiency within the hospital. Specifically, this model leads to a split between the clinical aspects of care, provided by government employed medical and nursing staff, and hospital administration and domestic services, which are provided by the contractor's staff. This split undermines integration and coordination of service delivery, and is perceived to be responsible for tensions between hospital staff. Some public sector employees also appear to exploit the situation by playing the two employers off against each other. As importantly, this arrangement prevents the contractor from effectively managing resources which account for over 60% of total hospital costs, thus limiting the capacity of the management team to generating any meaningful efficiency gains.

6.4.3. Impact of reimbursement methods, pricing mechanisms and contract duration

Considered alone, the use of a per diem payment method creates problematic incentives for the contractor to prolong length of stay in order to maximise revenues. However, the minimum occupancy clauses at Matikwana and Shiluvana, as well as the fact that that the doctors in these hospitals are employed by the government, are likely to mitigate this effect to some extent. Interviews with these doctors suggested that they experience no pressure whatever from the contractor to prolong length of stay beyond what is necessary. Doctors at Hewu, who are employed by the contractor, expressed a similar sentiment, although other statements made during the course of the interviews suggested that they are highly conscious of issues affecting the financial performance of the hospital. This is not surprising, considering the close working relationship between the management and medical staff at Hewu (see below), and the fact that hospital managers at the contractor hospitals are rewarded in part on the basis of the financial performance of their hospital. In this environment, it is possible that medical staff do experience subtle pressures to ensure high occupancy rates, particularly where revenues are not guaranteed by a minimum occupancy clause, as is the case at Hewu.

The per diem method was also regarded as problematic by government officials because of the administrative difficulties encountered in auditing claims submitted by the contractor. Both contractor and government officials recalled instances where the contractor had submitted incorrect claims, which were subsequently corrected after a government audit. Auditing of this kind increases the transactions costs faced by the government, and officials of both parties agreed that under current arrangements, auditing was irregular, incomplete, and therefore often ineffective. These various problems led some government officials to suggest that some form of global budget would be a preferable method of reimbursement.

While the incentive effects of these reimbursement mechanisms are ambiguous, the price adjustment clauses in all three contracts more clearly undermine the efficiency incentives faced by the contractor. If all cost increases can simply be passed onto the

purchaser, the contractor faces few incentives to improve productivity, or to change its input factor mix, in response to changes in factor prices. While none of the price increases requested by the contractor have ever been resisted, interviews with government officials indicated mixed feelings on price levels and the price adjustment mechanism. Officials in the Ciskei government felt that prices and the adjustments were reasonable, while those in the Gazankulu government argued that prices did not accurately reflect resource use, and that the various price increases were not always justified. They could not however explain why such increases had always been granted, in spite of their views.

While most elements of the reimbursement mechanism therefore appear to favour the contractor, the interviews also identified slow payment by the government as an important element of risk faced by the contractor. The contractor's experience was that the government was often 3-4 months in arrears, and often up to 12 months in arrears for retrospective payment when tariffs were adjusted.

As with the price adjustment provisions, the long contract terms in two of the contracts also weaken the contractor's incentive to demonstrate efficiency on an ongoing basis.

6.4.4. Impact of poor contract specification

The absence of detailed specifications of the contractor's obligations and of performance review mechanisms is reflected in a complete lack of formal auditing of contractor performance at all three hospitals. Instead, the government relies on a variety of relatively superficial formal and informal monitoring mechanisms which appear to give it some degree of insight into contractor performance. The most important of these mechanisms is the use of government staff (particularly medical and senior administrative staff) employed at the hospitals to observe contractor performance. Additional mechanisms include formal inspection visits by government officials (which occur at irregular intervals), formal nursing inspections (annually), and formal meetings between the contractor and government officials, which usually take place four times a

year. While monitoring is thus superficial, it is regarded by both sides as fairly effective, particularly at identifying problems in staff satisfaction and serious problems in quality of care.

6.4.5. Transparency of trading and transactions costs

The theoretical rationale for contracting, as discussed in Chapter 2, postulates increased transparency in the trading relationship between government and contractors as a contributor to the potential efficiency gains from contracting. Transparency in the trading relationship can be analysed from both the purchaser's and the provider's point of view. Contractor officials expressed the view that government scrutiny of contractor hospitals was substantially greater than that applied to public hospitals, and that this was an important stimulus to efficiency in the contractor hospitals. This scrutiny took the form of the monitoring discussed above, as well as of close examination of price adjustments requested during the contract period. In the latter case, contractor officials argued that the close scrutiny of price adjustments encouraged the company to maximise cost savings wherever possible, in order to maintain its profit margins.

The interviews also highlighted other, less direct evidence of the impact of transparency of trading from the contractor's perspective. As discussed further in Chapter 7, managers of the contractor hospitals and corporate head office officials are clearly aware of efficiency issues in the production of services, and some efficiency criteria are central determinants of the organisation of production in these hospitals. This is in strong contrast with the situation in public hospitals, where managers articulated some awareness of these issues, but in fact have access to almost no specific cost, output and quality information. It is important to note, however, that managers in the contractor hospitals in turn pay much less attention to these and other efficiency issues (such as quality of care) than do their counterparts in the private hospitals, which is reflected in the much less sophisticated information systems and consequent level of detail in management information available in the contractor hospitals. This pattern suggests that the trading relationship per se does have some impact on efficiency from the provider's

perspective, as illustrated by the stark differences between contractor and public hospitals in the use of information and the understanding of the determinants of efficiency. It also suggests, though, that the particular nature of the trading relationship is crucial; where this relationship is relatively crude, with an unsophisticated buyer who exerts limited pressure on the provider, as occurs in the contracts analysed here, the provider is likely to respond by generating and using the minimum information required. Where however a much more sophisticated buyer is involved, and/or where a more demanding reimbursement mechanism is in place, both of which occur in the private hospitals, the provider's response is to invest much more heavily in obtaining and using detailed cost, output and quality information.

As regards the purchaser's perspective, government officials also took the view that the monitoring mechanisms they applied to the hospitals contributed to efficiency, although none of them argued specifically that the monitoring of contractor hospitals was more effective than was the case with public hospitals. As noted above, however, they expressed a different view from the contractor as regards scrutiny of requests for price adjustments; in this case, their experience was that they had always simply accepted requests for price adjustments, rather than encouraging greater efficiency through scrutiny and negotiation.

To the extent that the government's purchasing decisions and behaviour are based on explicit cost effectiveness or other efficiency criteria, this might provide further support for some impact of the trading relationship on efficiency. However, the interviews provided no evidence that this was the case; for example, decisions to contract out the services in question were based on very limited, if any, needs assessments, and were in fact based more on the inability of the government to deliver the service itself than on a conscious choice about the efficiency gains from this approach. In addition, and as described above, the contracts are vaguely specified, the reimbursement mechanism is linked to crudely defined outputs, there is very limited monitoring of contractor performance, and no assessment whatever of the impact of the contracts on quality of care or health outcomes.

These data therefore demonstrate an uneven contribution of the trading relationship to hospital efficiency in the contractual environment. On the contractor side, the trading relationship seems to provide some incentive for more efficient behaviour, at least in contrast with that observed in the public hospitals, where no trading relationship exists at all. This pattern is not however evident on the purchaser's side, where the government appears to treat contractor hospitals in almost the identical way to their treatment of public hospitals.

While transparency of trading is argued to be a benefit of contracted services, the consequent transactions costs are recognised as a specific cost which may reduce the potential efficiency gains of contracting. As discussed in Chapter 3, this study attempted to quantify those elements of the transactions costs which were measurable, and, in addition, interviews were conducted to assess other aspects of transactions costs. The cost analysis and interviews made it clear that government officials have no information on the incremental costs they incur in managing contracted out hospitals. While no staff are employed specifically to manage the contracts in either of the government departments, officials were not able to identify the proportion of time spent by key officials in negotiating and managing the contracts. They were also not able to point to any specific or systematic differences between contracted out and public sector hospitals in the volume and nature of monitoring conducted by the government. The only unique transaction cost identified was that of the additional time required to manage the intermittent problems consequent on the fragmentation between hospital and district services, discussed above. In this case, too, however, officials were not able to quantify the amount of time involved. These interviews thus did not assist in assessing the extent to which transactions costs undermine any efficiency gains from contracting.

6.4.6. Impact of competition

Although the impact of competition on the efficiency of the study hospitals was not studied in detail here, the interviews did seek the views of government and contractor officials on the relationship between competition and hospital efficiency. Government

officials did not attribute much importance to competition as a determinant of either public or contractor hospital performance. In the case of public hospitals, this was attributed to the lack of any incentive for hospitals to attract patients (since they do not retain any revenues so generated), while in the case of contractor hospitals, the contractor was perceived as dominating the market. This latter perception seemed to prevail despite the experience of the Ciskei government in the competitive tendering for the initial contract at Hewu. There was also limited understanding of the potential or actual effects of competition on either contractor efficiency or on the prices obtained by government.

As might be expected, contractor officials demonstrated a clearer sense of the existence and impact of competition on the functioning of their hospitals. Hospital managers at all three of the hospitals noted that they faced some competition from surrounding public sector hospitals, in the sense that patients choose to attend hospitals based on perceptions of quality of care. Should patients choose to attend a neighbouring public hospital rather than the contractor hospital, occupancy rates and outpatient attendances would drop, with negative consequences for hospital revenues. One of the hospital managers recalled a period in the recent past during which the surrounding community developed negative perceptions of the quality of care at the contractor hospital and shifted their 'custom' to a nearby public hospital. Hospital managers and officials however noted that the extent of this form of competition was constrained by the impact of the PHC clinic system, which played an important role in directing the flow of patients.

For obvious reasons, competition from other private sector operators was perceived to be more of a threat than that posed by public sector hospitals, and this threat was taken seriously by all of the contractor officials interviewed. At the time of the study, the contractor was effectively a monopolist, with no other private for-profit companies operating in this particular market. Despite this, the company had a clear sense of the threat of competition, as borne out by the competition from other private hospital companies for the Hewu contract. They also took the view that competition from both local and international competitors was likely to increase substantially in the future.

The contractor officials were also clear on the link between their perceptions of the threat of competition and the efficiency of their hospitals. In light of these competitive threats, they were convinced that they would experience increased and growing pressure on prices, so that they would have to continually improve productive efficiency (and hence lower costs) in order to maintain (or grow) their profit margins. This had lead to efforts to improve cost control and productivity at all hospitals. In this context, their views on the mechanics of awarding future contracts were also interesting: whereas it would seem to be clearly in their interest to secure further contracts through direct negotiation rather than through competition, they were concerned that the lack of transparency in the direct negotiation approach would prejudice further contracts. Moreover, they were very confident of their ability to beat their competition on price, given their several decades of experience with this form of contracting.

6.4.7. Overview of the impact of contract design and process on efficiency

This analysis has demonstrated a contractual situation, in all three hospitals, which does not conform to the theoretical requirements for efficient contracts. A key requirement of efficient contracts is that risk in the contract is fairly distributed between the parties, such that the risk borne by each party is related to its degree of risk aversion. However, as demonstrated here, these contracts shift risk disproportionately towards the government, even though there is no explicit evidence that the government is less risk averse than the contractor. A second, related requirement is that the contractor has few opportunities for exploiting the contract, a situation that can be achieved through detailed contract specification and monitoring, which themselves have to be balanced against the problem of increased transactions costs. As this analysis has shown, however, the vague specification and poor monitoring of the contracts fail to protect the government against exploitation. It is also clear that the vaguely specified contracts were not designed with the explicit intention of reducing transactions costs, but were instead written by the contractor and passively accepted by the government. Ironically, any savings on transactions costs are almost certainly undermined by the increased

government efforts required to address the problems emerging from the fragmentation between hospital and district services noted above. While this study did not demonstrate any hard evidence of exploitation of the contract by the contractor, some of the results of the quality analysis, and some of the quality of care concerns expressed by government officials give an indication that the contractor was able to cut costs and hence quality in some areas without the government being aware of this. These issues are explored further in Chapter 8.

Perhaps most importantly, this analysis has demonstrated a substantial power imbalance between the government and the contractor in the contracting process. As argued above, the government essentially functioned as a passive recipient of relatively unfavourable terms and conditions in the contracts, a situation which is probably attributable to some combination of poor government capacity, and an overestimate of the extent of its dependency on this single contractor. This power imbalance is clearly illustrated in all aspects of the contract design and the contracting process, and perhaps most critically, in the ability of the contractor to secure highly favourable prices relative to its own costs.

The study also attempted to capture the views of both government and contractor officials on the overall efficiency of the existing contractual arrangements, and on the relationship between the contracts and efficiency. As might be expected, the contractor was of the view that the contractual arrangements were generating substantial efficiency gains for the government, both in terms of cost and quality of services provided. Contractor officials did however concede the problems emerging from the fragmentation of hospital and district PHC services, although they maintained the view that they would prefer not to have to manage such services, due to the complexity and uneven quality of such services. In terms of the specific relationship between contract design and process and efficiency, contractor officials argued that they face strong efficiency incentives due to the close scrutiny of prices exerted by government officials, which forces them to focus heavily on containing costs. They did note, however, some constraints in achieving their cost targets, namely the need to continually adjust salaries to stay ahead of increasing public sector salaries, and their lack of control over key clinical decisions, in the hospitals in which the doctors are not in their employ.

Officials of the Gazankulu government had a mixed view of the overall efficiency effects of the contracts. On the one hand, they argued strongly that the contractor hospitals were more efficient than their public sector counterparts in terms of hospital management, maintenance of buildings and equipment, and quality of services. While expressing some concerns over the nature of the reimbursement method and pricing, they did not take the view that these factors undermined the overall efficiency gains achieved by contract management. It is important to note, though, that while all of the officials believed that the contractor was able to manage hospitals more efficiently, none of them knew whether or not the contracts were actually generating savings relative to direct public provision. This was attributed to their lack of information on public sector hospital costs.

Against this background of a generally positive view of contractor efficiency, these officials expressed serious concerns about the problems emerging from the fragmentation of the hospital and district PHC services, and the general separation of the contracted hospital from the remainder of the health service system. They also identified the fragmented staffing models, particularly at Shiluvana, as a source of major efficiency and staff satisfaction problems. Overall, these officials argued that these problems were so severe that they undermined all of the efficiency gains within the hospital itself, resulting in a net efficiency loss. This was contrasted with the situation in the chronic care institutions contracted out to the same company, in which these officials perceived contract management to result in substantial net efficiency gains. In response to questions on how the acute care contracts might be improved, specific recommendations included elimination of automatic price adjustments, and a shift away from per diem payments to some form of global budgeting system. However, their overall view was that the government would be better off withdrawing from these contracts over time, since they did not believe that some of the critical problems could be effectively addressed.

Officials of the Ciskei government had a more uniformly favourable view of the effects of contracting. In their view, Hewu hospital was far more efficiently managed than most

of the public hospitals under their control, and while recognising some of the fragmentation and coordination problems, they did not perceive these to undermine the overall efficiency gains.

In the light of these views, the responses to questions on the future of contracting were predictable. Officials from the Gazankulu government were of the view that contracting out of chronic hospital services was a highly workable model which should be expanded, but that government should withdraw from contracts for acute care services when this was possible, and should certainly not consider expansion of this form of contracting. Officials of the Ciskei government took a different view, arguing that contracting would generate efficiency gains throughout the hospital system, and that it should be expanded wherever possible.

CHAPTER SEVEN: RESULTS - ANALYSIS OF MANAGEMENT STRUCTURES AND SYSTEMS, AND THE ROLE OF HOSPITAL OWNERSHIP

This chapter reports the results of the interviews which examined the management structures and systems in place in each of the groups, the impact of these on hospital efficiency, as well as the relationship between hospital ownership and efficiency. Interviews were conducted with officials at hospital and corporate[146] level in the three groups. The chapter begins with an analysis of management structures and functions at the hospital level, and then provides a similar analysis of these structures at corporate level, as well as of the interface between the hospital and corporate levels. It then examines some specific mechanisms and systems, including information systems, which the groups use to encourage hospital efficiency. The final section reports observations on the role of hospital ownership structures, and the consequent motivations of management staff, on hospital performance.

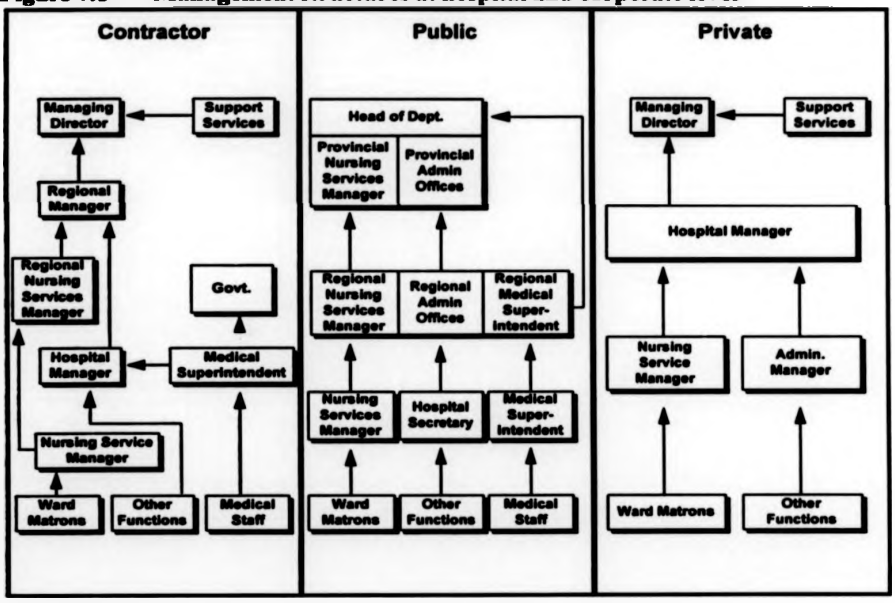
7.1. Management structures and functions at hospital level

Figure 7.1 provides a schematic illustration of the management structures at hospital and corporate level in the three groups. One of the essential differences between the three groups in management structures at hospital level concerns the presence or absence of a general management structure, and the corresponding degree of integration (or lack thereof) in the senior management team. In the case of the public hospitals, the figure shows the application of what may be termed an 'hierarchical silo' management model (Hospital Strategy Project Consortium 1996b), in which there is a complete separation between the management of nursing, administrative, and medical services, with no general management structure, and very limited integration and coordination between these three functional divisions. In this model, the wards are managed by senior nurses

146 The term 'corporate' is used here to refer to the supra-hospital structures in the three groups. In the public sector, this includes the province and regional level offices of the relevant Department of Health, which administer the hospitals. In the private hospital groups, hospitals are all administered by a single corporate head-office, while in the contractor group, hospitals are administered by a regional manager who reports to the corporate head office.

who report to a nursing service manager, who in turn reports to her superior at corporate level, rather than to a general manager at hospital level. Similarly, all administrative and domestic staff report to the hospital secretary, while all medical and paramedical staff report to the medical superintendent, with both of these officials again reporting to separate superiors. While the medical superintendent is nominally regarded as the most senior manager in the hospital, in effect he/she has very limited jurisdiction over the areas of responsibility of the nursing service manager or the hospital secretary.

Figure 7.1 Management structures at hospital and corporate level



This model is in sharp contrast with that used in all three private hospitals, in which a small, tightly integrated general management structure is in place. Here, the wards are managed by matrons, who report to a nursing service manager, who in turn reports to a hospital manager. Similarly, all administrative and domestic functions are managed by an administrative manager who also reports directly to the hospital manager. All reporting to the corporate level thus occurs via the hospital manager. As noted earlier, the medical staff in these hospitals are not hospital employees, and therefore do not form part of the formal management structure.

The management structures at the contractor hospitals lie somewhere between these two extremes. These hospitals also use a general management structure, with ward matrons reporting to the nursing service manager who reports to a hospital manager, and with all other functions also ultimately reporting to the hospital manager. There are however two constraints on the degree of integration in the top management team: the first is the arrangement whereby the nursing service manager in the hospital reports to a regional nursing service manager, as well as to the hospital manager, thus undermining the authority of the hospital manager to some extent. The second constraint emerges from the integration of these hospitals into public sector management arrangements. At Matikwana and Shiluvana, the medical staff report to their superiors in the government, rather than to the hospital manager, while at Shiluvana, this affects both medical and nursing staff.

In addition to the presence or absence of a general management structure, hospital level management structures also differ significantly in terms of scale and complexity. The management cadre at the public hospitals comprises far more categories of staff within each functional area than do both other groups, as well as much greater numbers of staff within each category, even after adjustment for the size of the institution. This is in sharp contrast with the contractor and the private hospitals, which all have very few categories of management staff, and the absolute minimum numbers of staff per category.[147]

These differences in management structures are closely reflected in the functioning of the management teams. Public officials at both hospital and corporate levels perceive the management teams at all three public hospitals to function extremely poorly, and to be characterised by minimal coordination between different functions, slow, ineffective decision-making, an inappropriate degree of formality, poor implementation, and a pervasive lack of morale and initiative. In this situation, even highly motivated individual managers face severe constraints to effective action. This was clearly the case

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147 Shiluvana is an exception to this observation, since the nursing management structures at this hospital are those of the public sector.

at two of these hospitals (Tintswalo and Bisho), where the medical superintendents were both recognised by their superiors as highly efficient, motivated and competent, but as unable to achieve their full potential within the prevailing managerial structures and systems.

By contrast, the management teams at all three private hospitals appeared to function in small, tight knit teams, which operate on a relatively informal and flexible basis, emphasise a participative approach to management, and are able to take decisions rapidly, and to implement quickly and effectively. These teams also seemed to be uniformly characterised by a high degree of motivation and job satisfaction.

The picture at the contractor hospitals was more variable, and appeared to be significantly determined by the differing management arrangements at the three hospitals. At Hewu, for example, where all staff are employed by the contractor, the management team appeared to function similarly to those described in the private hospitals. In the case of Matikwana, the situation was similar, with a motivated, efficient and flexible top management team, which again emphasised participation, and a relatively informal style in decision making and management. At both of these hospitals, however, the managers and other officials noted that the nursing management teams functioned in a bureaucratic and rigid way, and were actively attempting to address this problem. They attributed this problem mainly to the fact that the senior nurses in these hospitals had been recruited after long careers in the public sector, and had simply imported public sector nursing management systems into the contractor hospitals. These managers also acknowledged that the company had not worked sufficiently hard to overcome the 'public sector' culture among the nursing staff, and that this problem was aggravated by the requirement that these nurses report to a regional nursing service manager as well as to the hospital manager.

As discussed in Chapter 6, the 'dual employment' situation at Shiluvana hospital creates substantial fragmentation, tension and conflict within the senior management team. Both the contractor and government officials reported a serious split between the two management teams at the hospital, with the hospital manager (employed by the

contractor) functioning in a close-knit and apparently effective team with the other contractor-employed management staff, but with an entirely separate management structure, under the control of the medical superintendent and nursing service manager, governing the publicly employed nursing and medical staff. In the eyes of the contractor officials, the 'public side' of the hospital's management team functioned in a typical 'public sector' style. The hospital manager attributed his failed attempts to convene daily management meetings with both 'teams' to a lack of interest on the part of the public sector employees, and also perceived there to be active animosity on the part of the public sector management team towards those employed by the contractor. The medical superintendent at the hospital made similarly critical observations of the management team employed by the contractor, in this case pointing to their apparent disinterest in district activities and in patient needs as the main causes of conflict.

7.2. Interface between medical and management staff at hospital level

The interaction between medical and general management staff is a well recognised area of complexity in hospital management, and the interviews sought to identify any specific differences between the study hospitals on this issue. This was not identified to be a particular problem at the public hospitals, which was not surprising, given that the medical superintendent is always designated as the most senior official at these hospitals. Thus, while the degree of integration between the medical and other management staff is sub-optimal (as discussed above), their seniority clearly left the medical staff feeling comfortable in relation to other levels of hospital management.

The medical staff at private hospitals are not employed by the hospital, so that the relationship between them and the hospital management is a more distant one. It is also one in which the balance of power is shifted towards the doctors, on whom the hospital relies for its flow of patients.

As might be expected, the situation at the contractor hospitals is more complex. At Hewu, where medical staff are employed by the contractor, the interaction between

medical and general management staff appeared to work very effectively, with daily formal meetings between the manager and the medical staff, and with generally close, constructive working relations prevailing. Interviews with both the medical and management staff provided no evidence of any conflict between the clinical responsibilities of the medical staff and the management prerogative to contain costs within the hospital, and both sides appeared to perceive the need for a careful balance between these priorities. The interviews also indicated that these successful working relationships were in part attributable to the direct links between the medical staff at the hospital and the medical consultants at corporate level. These links provided direct and rapid support to the hospital doctors, increasing their motivation and loyalty, as well as their understanding of the wider needs of the hospital.

At Matikwana, where the medical staff are employed by the government, the relationship between the doctors and the management team appeared surprisingly good, with no manifestations of the potential divided loyalties nor of the potential conflict between clinical and management prerogatives that might be expected. This appeared to be attributable to the personalities involved, but also to the systematic efforts made by the hospital manager and by the contractor company to engender good relations with the medical staff. The situation at Shiluvana was much more complex than at the other two hospitals, with significant tensions between medical and management staff. These tensions appeared to be generalised, affecting all areas of the hospitals functions, and were not specifically focussed on the conflict between clinical and management perceptions and requirements.

7.3. Management structures and functions at the corporate level, and the corporate - hospital interface

As would be expected, this analysis identified a high degree of correlation between patterns of management structure and functions at hospital level, and those at corporate level, with the latter appearing to significantly influence the former. In the case of the public sector, Figure 7.1 shows an highly complex corporate management structure.

This is characterised, firstly, by two management levels, with hospital management having to report to a regional office which in turn reports to the head office. At both of these levels, the management structures have large numbers of staff, and are highly complex and un-integrated, with multiple divisions dealing with different management functions. As noted above, hospital management personnel report separately to these specific divisions, further entrenching the lack of integration at corporate level. This lack of integration is compounded by the fact that several of the critical corporate management functions are located entirely outside of the Department of Health, and are instead located in other government departments. These functions include the supply and maintenance of ambulances and other hospital vehicles (which is the responsibility of the Department of Transport); both large and small scale construction and maintenance of hospital buildings and equipment (Department of Public Works); and the procurement of hospital supplies (State Tender Board).

This complex, tiered and fragmented bureaucracy creates profound inefficiencies in the communication between the corporate and hospital levels. Hospital management officials often have to communicate with multiple officials to resolve even simple issues, and uniformly complained of often extreme delays by the head office in responding to requests for assistance. Interviews suggested that this severe inefficiency is attributable to a number of factors, including the complex organisational structure described here, and specifically, the location of key functions outside of the Department of Health. Other explanations included the lack of skills and capacity among many officials, and the fact that many administrative posts in often critical functions remain unfilled for long periods (due to inability to find suitable candidates).

These problems are profoundly aggravated by the lack of autonomy granted to hospital management officials within the existing public sector regulatory framework (Hospital Strategy Consortium 1996b). This framework places authority for almost all critical management functions in the hands of very senior officials at head office level, severely disempowering hospital level management. For example, hospital level officials have no authority over any key personnel management functions, including hiring and firing of staff, determination of salary or bonus levels, or staff disciplinary issues. They also have

no authority to procure any goods or services on their own, except for items of extremely small value, and have to make all such requests via the head office. The situation is perhaps even more serious in regard to financial management. In this case, hospital officials have no power whatever to shift resources across budget lines, and must simply accept the budgets handed to them. They are also not held accountable for overexpenditures, and cannot make use of any surpluses achieved through efficient management. Although hospital officials do make submissions regarding the hospital budget, these are not taken into account, as a result of which the budget often bears no resemblance to the real expenditure patterns of the hospital. If, in consequence, hospitals run overbudget, deficits are always funded from elsewhere in the Departmental budget. This combination of unrealistic budgeting, soft budget constraints and lack of accountability effectively means that hospital level officials play no effective role in the financial management of their hospitals.

Public hospital managers thus rely very heavily on head office officials and systems for decisions on almost every element of the daily management of the hospital, but for the reasons outlined above, they receive extremely slow, and often ineffective responses to their requests for assistance. Interviews with hospital managers and head office officials also highlight a culture which fails to reward initiative, and instead encourages risk aversion and rule bound behaviour. This managerial culture and system effectively prevents hospital managers from 'managing' their institutions in any real sense of the word, and instead they are forced to function as 'administrators' of a set of rules which are not of their making, and which they have no power to influence. Not surprisingly, this system is perceived to lead to severe 'undermanagement' of public hospitals, and to profoundly undermine the morale of hospital managers.

Interestingly, all of the public sector head office officials interviewed recognised the set of problems described here, and conceded that much greater autonomy for hospital managers, as well as a streamlining of their own administrations, would significantly improve the efficiency of hospital management. However, they uniformly argued that existing public sector regulations prevented them from undertaking any such reform within their own organisations. Most of the hospital managers interviewed expressed

extreme frustration at their inability to manage their institutions effectively, and felt that they received both minimal support and substantial obstacles from the head offices in their efforts to manage. These sentiments were strongly echoed by the manager of one of the private hospitals who had previously served as the senior medical superintendent of a large public hospital.

The corporate structure and functions in both of the private hospital companies differs substantially from those of the public sector. In both cases, there is a single corporate head office structure, which is lean and simple, with relatively few divisions dedicated to specific functions, and with an apparently high degree of integration between the divisions. Both groups are also characterised by simple, effective lines of communication between the hospital manager and corporate officials. Hospital managers in both groups perceived themselves to be extremely well supported by their head offices, which they consistently described as responding rapidly and effectively to all requests for assistance. In both groups, there appeared to have careful thought as to the most effective division of labour between the corporate and the hospital levels, and specifically, as to where scale economies could be achieved by centralising particular management functions. Both groups had, for example, developed strong capacity in procurement, industrial relations and personnel management, MIS, and the provision of medico-legal advice.

Hospital managers and corporate officials also described efforts to create a culture of informal, but strong support from the corporate level to the hospital. In both groups, for example, hospital managers felt comfortable to communicate directly with the Managing Director, or other senior executives at corporate level, in order to address any problems, and often did so with positive effect. One hospital manager went so far as to argue that he sometimes perceives support from the head office to be 'too good', in that they tend to take over and resolve any problems that he reports, rather than supporting his efforts to resolve them locally.

This efficient support system for hospital managers occurs against a background of a very high degree of autonomy for managers at the hospital level. In sharp contrast to the

public service approach described above, officials at both private companies articulated an explicit and systematically pursued philosophy of granting hospital managers maximum possible autonomy to manage their own institutions, within a context of efficient and intensive corporate support and supervision, as well as strong requirements for accountability of hospital managers to the corporate level. In all three of these hospitals, managers have a high degree of autonomy over critical personnel and financial functions, and as a result, managers are highly focussed on issues of personnel productivity, and on sound financial management. In the latter case, managers monitor expenditures, cash flow and other financial parameters on a daily basis. As regards capital expenditures, managers in all three hospitals require permission from the head office to make expenditures above R3000, but uniformly described the process of securing such permission as rapid and simple. Similarly, while there is strong central procurement capacity in both groups, hospital managers have full autonomy to purchase outside of central contracts if they can do so more cost effectively.

In the contractor company, the corporate-hospital interface occupies a position somewhere between the two extremes defined by the public and private hospitals, but is somewhat closer to the private than to the public end of the spectrum. As Figure 7.1 shows, hospital managers report to a regional manager, and via that line, to the corporate head office. Despite this indirect relationship, managers at all three hospitals perceived themselves to enjoy substantial and effective support from the corporate level. In all cases, the regional managers were perceived to provide very valuable support to hospital managers, through frequent visits to the hospitals, through extensive knowledge of local conditions, and through their ability to intercede with corporate level officials. Two of the managers also felt that this system did not inhibit them from contacting head office officials directly, if this was required. This view was not shared by the third manager, who felt bound to adhere to the normal reporting channels, and felt somewhat restricted by this.

The corporate structure, like that of the private hospital groups, is small in scale, simple and integrated in structure, and set up to provide maximal support to hospitals in areas in which scale economies can be attained. The company thus has extensive expertise in

procurement, industrial relations and personnel management, and clinical/medical support, and is perceived by hospital managers to provide effective and rapid assistance in each of these areas. Unlike the private groups, however, the managers at these hospitals perceived the corporate level to have limited capacity in sophisticated MIS, and to have systematically underinvested in this area. Two of the managers also noted that that the corporate decision making process can be slow in relation to decisions over capital expenditures. This was confirmed by corporate officials, and was attributed to the need for decisions by the Board of Directors, which only meets four times per year.

In regard to autonomy at hospital management level, there appears to be some explicit commitment on the part of corporate officials to allowing hospital managers substantial autonomy, but this is clearly more constrained than was observed in the private hospitals. One constraint emerges from the role of the regional manager, who is perceived by some of the hospital level managers to play a more operational role than would be ideal. Other constraints are seen in the extent of decision making power granted to hospital managers over specific management functions. In the case of personnel management for example, the corporate level exerts somewhat tighter control over the size and composition of staff establishments, salary scales and appointments than was observed in the private hospital groups. Nevertheless, within these fairly tight parameters, hospital level managers do have the authority to make recommendations on hiring and firing of staff, as well as on promotions and bonuses.

Similarly, hospital managers enjoy constrained autonomy over financial management. Until the year prior to the study, these managers had not participated actively in the development of the hospital budget, but under the current system, these managers do make a substantial contribution to the budgeting process. Once the budget is determined, they also enjoy some freedom to manage funds across line items, and are held accountable for ensuring that expenditure and revenues match budget projections. This encourages the managers to monitor financial performance quite closely, but they are limited in their ability to do this by the lack of information provided to them by the corporate head office, as well as by the lack of information system infrastructure in the hospital (see below). In the former case, much of the expenditure incurred by the

hospital occurs at head office level (e.g. staff salaries are paid by the head office, as are expenses for many of the supplies and other purchases on behalf of the hospital), but this information does not appear to be adequately or timeously shared with hospital managers.

In the case of procurement, managers reported that in recent years, they had begun to enjoy more freedom to purchase off head office contracts, provided they could prove that this was cost effective. In terms of capital expenditure, as well, there appears to be a relatively flexible approach, with no firm guidelines in place. Nevertheless, hospital managers usually seek approval from the regional manager and the head office for most expenditures above R2000-R3000.

The general picture which emerges in the contractor hospitals is thus one of a theoretical commitment to substantial autonomy, but which in practice leads to a higher degree of centralised control and less autonomy than hospital managers would prefer. This situation did however appear to be a dynamic one, with a general tendency for the corporate level to grant increasing levels of autonomy to hospital managers over time. One possible explanation for this pattern, elicited from some head office officials, is that several of the key managers in the corporate team responsible for the contractor hospitals came out of public sector management positions, and that they were more comfortable to run an operation that resembled the public sector environment, at least to some extent. This was noted to be in contrast with the corporate team responsible for the portfolio of private hospitals run by the company. In this case, the team had been drawn from various private sector positions, and tended to grant their hospital managers far greater autonomy.

7.4. Mechanisms and systems for encouraging hospital efficiency

Over and above the impact of the structures, systems and management philosophies described above, a number of other mechanisms used within the three hospital groups impact on hospital efficiency. These include mechanisms for monitoring of hospital

performance, MIS, incentives for managerial and staff efficiency, and specific efficiency initiatives or areas of expertise. Each of these are reviewed in the following sections.

7.4.1. Monitoring of hospital performance

Monitoring of public hospital performance by regional and head office officials appeared to be unsystematic and irregular in all three public hospitals. While officials of both governments clearly recognised the need for systematic monitoring, no systems appeared to be in place to allow for this. In general, head office officials from all relevant divisions visit the hospitals regularly, and are therefore in touch with developments at the hospital level, but have no formalised approaches to assessing hospital performance. This is reflected in the inadequate reporting requirements for hospital management officials. In all hospitals, the medical superintendent is required to submit monthly statistical returns, which reflect patient utilisation patterns, but contain no other management or clinical data, and aside from these, no other reports are required. All hospital level officials expressed the strong view that the reports they submitted were simply filed at head office, and are never used for management purposes. Head office officials also appear to monitor budgetary performance, although this tends to occur retrospectively, and often two or three months in arrears, thus undermining its efficacy.

In all three private hospitals, by contrast, corporate level officials make frequent and regular visits to review specific aspects of hospital performance. These visits complement the ongoing, highly systematic monitoring which is built into the management system. In all three hospitals, for example, there are live computer links with the head office, allowing daily monitoring of key parameters, such as patient utilisation data, and financial performance. Regular patient surveys are also conducted in all three hospitals, and information from these is collated and submitted to head office on a regular basis. Head office staff respond to this information in a similarly systematic way. All exceptions to normal parameters are identified, managers are requested for explanations, and where required, interventions or solutions are implemented. In

addition, relative performance of all hospitals in the group is analysed, and this information is passed on to hospital managers on a regular basis.

The contractor company monitors the performance of its hospitals much more closely and effectively than is the case with the public hospitals, but somewhat less so than in the private groups. Regional managers and head office officials also visit these hospitals frequently, complementing the detailed and specific monthly management reports submitted by the hospital managers. These reports cover patient statistics, staff and other input to output ratios, and budgetary performance, although they do not cover quality of care issues, nor do they incorporate information on patient satisfaction. There are also no live computer links between the hospitals and the head office, so that monitoring is confined to the monthly manual reports. Head office officials clearly utilise the information submitted on an ongoing basis, and all variances from expected performance are identified and communicated back to hospital level officials for explanation and correction. Similarly, the relative performance of all hospitals in the group are analysed and fed back to hospital management staff.

7.4.2. Management information systems

The public hospitals use extremely limited MIS. In all three hospitals, the official MIS is entirely manual, and consists of patient records in paper form, and collated statistics covering numbers of admissions, patient days, theatre cases and OPD visits only. These systems do not collate any clinical or management information at all, and hospital staff receive no training in the use of management information, and are unmotivated to collect and maintain patient records. As a result, data quality is often poor and inaccurate, and patient records are frequently lost, creating severe problems when patients make return visits. As might be expected, none of these data are used in any managerial or clinical decision making processes, and are collected simply to satisfy official requirements. At Tintswalo hospital, the superintendent has, through his own efforts, secured a small number of personal computers, which are linked together in a network, and which form the basis of an emerging MIS.

By contrast, all three private hospitals have sophisticated, computerised MIS, which collect detailed management, as well as patient demographic and clinical data.[148] Staff using the system receive detailed training in its use. The hospital managers make extensive use of the management information provided by the MIS to guide management decisions within the hospital, and to provide regular reports to the head office. However, the clinical information is collected only for billing purposes, and is not used to guide management decisions. The MIS is generally perceived to be an essential tool by all of these managers.[149]

The contractor hospitals appear more like public than like private hospitals in terms of the availability and use of MIS. All hospital managers reported that the corporate head office uses an outdated, inefficient MIS, which is not standardised with or linked to the hospital system, and which continually needs updating and maintenance. At hospital level, all systems remain manual, and collect very limited utilisation data, with no relevant management or clinical information collected. As at the public hospitals, staff are not trained in the use of the MIS, and are not motivated to ensure good data collection. As a result, the managers are anxious about the quality of the data, and in one case, the manager has instituted a nightly headcount of patients to corroborate information emerging from the system. As a result of the poor data, managers cannot incorporate important clinical data into decision making, are unable to provide these data to head office, and are unable to contact patients should follow up communications be required. At two of the hospitals, managers had purchased personal computers on their own initiative, and were in the process of establishing a very basic MIS which would assist them in their management tasks.[150]

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148 The degree of detail in the clinical data collected in these hospitals is driven by billing requirements, since these hospitals bill on a fee-for-service basis.

149 One weakness in the MIS identified by all three private hospital managers was the inability of their systems to allocate costs to particular cost centres within the hospital, thus limiting their ability to identify and manage specific cost problems.

150 At one of these hospitals, the manager reported finding a two year old computer lying unopened in its box.

7.4.3. Incentives for managerial and staff efficiency

For several of the reasons outlined above, managers and staff at public hospitals are provided with no systemic incentives to improve efficiency. Neither managers nor staff have their performance monitored or reviewed on a systematic basis, and there are no systems for linking remuneration to performance for any categories of staff. While the public service does in theory have a merit based promotion system, in practice all promotions are based only on seniority and tenure. In addition to the absence of positive incentives for efficiency, many categories of staff in the public hospitals appear to face specific disincentives to efficient behaviour. In the case of management staff, these include the extremely bureaucratic restrictions under which they operate, the effective lack of any management authority, and their recognition that even extreme 'management failures', such as budget overspends or quality of care problems, are likely to go unmarked, and certainly to go unpunished. In the case of other hospital staff, disincentives to productivity include the rigid, hierarchical management style within the hospital (particularly for nurses), and the lack of flexibility in the system regarding inter-hospital transfers or other employment conditions.

In terms of remuneration levels and benefit packages, interviews elicited a mixed picture. In the case of nursing staff, in particular, take home pay was widely regarded as too low, although their non-cash benefits, including housing and education allowances, were regarded as acceptable. Similar sentiments were expressed by administrative and management staff. Under these conditions, it is not surprising that all interviewees regarded morale amongst hospital staff as extremely low, and recognised the intimate linkage between these problems of morale and poor hospital efficiency.

Managerial and staff incentives at the private hospitals differed somewhat between the two groups. In the case of St. Dominics, a detailed systematic performance evaluation system is used, in which the performance of each staff member, including the hospital manager, is measured against customised performance targets on a two monthly basis. Successful performance against these targets is directly linked to pay increases. Interviewees at the hospital viewed this system as highly effective in influencing staff

morale and productivity amongst all categories of hospital staff.[151] While the systems in use at the other two hospitals appear somewhat less formalised, there is nevertheless a clear linkage in the minds of hospital staff between performance and remuneration, and a strong sense that staff performance is evaluated by management on a regular basis. As with St. Dominics, morale amongst nursing and other categories of staff was generally perceived to be high. In all three groups, nursing and management staff appeared generally satisfied with remuneration and benefit levels, which were clearly perceived to be superior to those in the public hospital system, which seemed to be the benchmark used for comparison, particularly by nurses.

In the contractor hospitals, the managers appeared somewhat confused by the specific incentives provided to them. While all were aware that their performance was monitored, and that their remuneration was somehow linked to performance, they were unclear on the precise linkages between performance and pay, and one manager articulated the specific concern that head office officials would not necessarily know whether he had performed well or not. The linkage between performance and pay was much clearer for all other hospital staff, for whom an annual performance review mechanism is used. Most officials perceived this system to assist with morale and to improve staff productivity. Interviews with nursing staff elicited interesting concerns in relation to conditions of employment. While their cash salaries were higher than those in the public sector, non-cash benefits were regarded as inferior to those available in the public sector, which was cause for some dissatisfaction. This was in spite of recognition that transfer and promotion policies were much more flexible than in the public sector. Another problem, identified by the manager at one of the hospitals, is that the company fails to communicate adequately with staff concerning their package of benefits and how this is adjusted from time to time. On the basis of the interviews, staff morale and motivation at the contractor hospitals appeared to be superior to that observed in the public hospitals, but somewhat inferior to that seen in the private hospitals. Shiluvana hospital was an exception to this pattern, with nursing and other staff employed by the government expressing fairly high degrees of dissatisfaction, both with their conditions

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151 This performance evaluation system is also linked to a wider total quality management programme which is applied in all hospitals in the group.

of employment, and with the role of the contractor company in the hospital. This was in contrast to the views of the contractor staff, who were generally happy with their conditions of employment, but expressed some frustration at the difficulties of working with public sector colleagues, for the reasons outlined earlier.

7.4.4. Other efficiency mechanisms

In addition to the various systems and mechanisms discussed here, the interviews identified other approaches used by the three groups to improve hospital efficiency. Key mechanisms here include human resource management techniques, staff training, and leveraging of key skills or capacities at central level. As noted above, both the private hospital groups and the contractor company pay detailed attention to staffing allocations, and monitor staff to output ratios on a regular basis, making adjustments as required. The private and contractor hospitals also maintain relatively low levels of permanent staffing, preferring to respond to increases in demand through hiring of temporary staff through agencies when this is required. As staff costs account for the majority of total hospital costs, these strategies represent rational efforts to manage staff costs on a scientific basis. These techniques are not applied in any of the public hospitals. Here, hospital staffing establishments are determined on the basis of standard norms, and are reviewed and adjusted very infrequently. There is thus no capacity to adjust staffing ratios for fluctuations in demand, and more permanent increases or decreases in staffing levels are extremely difficult to achieve.

The private hospitals groups and the contractor company also place substantial emphasis on staff training, and include all staff in their training programmes. These programmes include both in-service and more long term training (with the latter reserved for nursing staff). Managers and officials in these groups articulated a clear recognition of the value of investments in training, and of the impact of this investment on the long term productivity of their staff. By contrast, training policy in the public sector was much less explicit. In these cases, training was focussed almost exclusively on nurses, with no training provided for administrative and domestic staff, and with all decisions on

training in the hands of the nursing service managers at hospital level. While no systematic pattern could be ascertained, some interviews created the impression that training opportunities for nurses were used as rewards for friends, or for loyalty, and not as part of a systematic approach to staff development.

The leveraging of key skills and economies of scale at central level to improve hospital efficiency was noted above. In the case of the private hospital groups, the main areas of central expertise are in procurement (particularly of drugs and expensive equipment), negotiation with health insurers and doctors, information systems, and human resource management. The contractor company demonstrates a similar mix of central skills, with some different emphases. In this case, procurement, human resource and industrial relations management are also key skills, and in addition, the company has strong central capacity in hospital construction and maintenance, which assists with cost effective upkeep of its physical assets. As noted above, central support to the public hospitals is fairly limited. The purchase of drugs and equipment is however one area in which economies of scale are clearly achieved, and the public sector is able to secure drug prices substantially below those available on the private market. Head office officials in both governments however noted that logistical inefficiencies in drug supply and distribution often undermined the benefits obtained from centralising this function.

7.5. The role of hospital ownership structure

Interviews on the impact of hospital ownership structure on management performance and hospital efficiency yielded somewhat predictable insights. In the contractor group, and in both of the private hospital groups, corporate level managers had a clear sense that they were accountable primarily to the owners of the company, represented by the Board of Directors, and secondarily to the employees of the company. In the case of the contractor company, senior managers also perceived some degree of accountability to the government as the purchaser of services, and to the communities served by the hospitals. As might be expected from these notions of accountability, the senior managers in both of these groups prioritised, among their various responsibilities, the

need to ensure adequate returns to shareholders, the importance of ensuring the delivery of cost effective, high quality of care in the hospitals, and the need to ensure that employees were satisfied and well motivated. There was, however, no consistent pattern in the ranking of these various priorities. These managers also all believed that they communicated these priorities effectively to hospital level managers, and that this latter group had similar motivations to their own.

While the contractor and private hospital groups were therefore similar as regards the perceived accountability and motivations of corporate level managers, this was less so the case in regard to hospital managers. Hospital managers at all of the private hospitals were well aware of the ownership structure of the company, and of the need to ensure good returns to shareholders. For them, this imperative translated into specific operational requirements, including the need to maximise revenues through increased throughput and occupancy rates, as well as the need to minimise costs wherever possible. These managers were also acutely aware of the essential role played by the medical staff at the hospital in determining hospital revenues, and devoted substantial energies to ensuring good relationships with the medical staff, as well as to attracting new medical staff to the hospital. In all of the hospitals, the managers were aware of the financial and other indicators applied by the corporate head office in assessing hospital performance, and had full access to all information necessary to manage against these parameters. It thus seemed clear that in all three of these hospitals, the private ownership structure, and the need to ensure returns to shareholders, were among the primary motivators of management behaviour.

The situation was somewhat different in the case of the contractor hospitals. Here, hospital managers had minimal information regarding the actual shareholding of the company, and perceived themselves as accountable to their immediate superiors, and ultimately to the senior company executives, rather than to the shareholders of the company. This was reflected in the fact that none of these managers cited the need to increase returns to shareholders as one of their objectives or priorities, focussing instead on the need to control costs, to ensure good quality of care, and to manage and motivate the hospital staff. These managers did articulate a clear understanding of the

determinants of effective hospital performance, stressing the specific roles of occupancy rates and of tight cost controls, and were also aware that the corporate head office applied specific performance measures to assess hospital performance. However, they felt somewhat constrained in their ability to influence these important parameters. As noted above, occupancy rates are influenced primarily by the medical staff, and were thus perceived to be outside of management control. They did however recognise a much greater role for themselves in relation to management of hospital costs, although they argued that even this function was constrained by the very limited hospital performance data which they collect or receive. The only data regularly used by these managers to assess performance are patient days (and hence occupancy rates), and the performance of the hospital against its expenditure budget. In none of these hospitals were the managers aware of more detailed financial information, such as hospital profitability, although all of them argued that they would have been able to manage better had more information of this type been made available.

In summary, the private ownership structure of the contractor company ensures that its senior management is primarily motivated by the need to ensure good returns to its shareholders, although this motivation appears to be less effectively and directly communicated to the hospital management level than in the private hospitals. As a result, hospital managers do appear to be motivated to ensure hospital efficiency, primarily through cost containment, although they are provided with less specific performance parameters, and less information with which to manage than are their private hospital counterparts.

In the case of the public hospitals, there was some variation among head office officials in their perceptions of their lines of accountability. Some officials perceived themselves to be accountable to higher levels in the public sector bureaucracy, and thereafter to elected political representatives, while others understood themselves to be accountable more directly to the communities which they served. None of the officials regarded themselves as directly accountable to hospital staff. These officials also showed some degree of variability in their perceptions of their specific responsibilities. In some cases, responsibilities were only vaguely defined in terms of the orderly running of the

hospitals, with some mention made of quality of patient care. Other officials, however, had more detailed notions of their responsibilities, and listed among them, the smooth running of the hospitals, ensuring adequate quality of patient care, ensuring that staff were motivated and satisfied, and that budgets were adhered to. None of the officials however applied any specific parameters or indicators to assess hospital performance in terms of these responsibilities.

As might be expected, most of the hospital level managers had similarly variable and vague notions of their own lines of accountability and responsibilities. In most cases, these managers regarded themselves as accountable directly to the head office, and not to either hospital staff or the community. One manager provided an exception to this pattern, observing that while official structures and systems required that he be accountable solely to his superiors at head office, he in fact regarded himself as directly accountable to the patients using the hospital, through them to the community, and thereafter to his staff. In relation to their specific responsibilities, most of these managers cited a similar list to those of the head office officials, including ensuring the orderly running of the hospital, maintaining acceptable standards of patient care, ensuring that staff were motivated and satisfied, and ensuring that hospital expenditures remained within budget. As with head office officials, however, none of the hospital managers used any particular indicators or parameters to measure their own performance in terms of these responsibilities.

The public hospitals are thus almost at the opposite extreme from the private and contractor hospitals in relation to the impact of ownership structures on hospital efficiency. In this case, public ownership results in very diffuse and vague notions of accountability and responsibility, reflected in the absolute lack of any defined performance parameters for hospital managers. These factors aggravate the lack of management information, and the extreme centralisation of management authority discussed above, creating a situation in which public hospital managers have very little sense of what is expected of them, and in which they face major obstacles in achieving even their own definitions of effective performance.

CHAPTER EIGHT: DISCUSSION

This chapter integrates the findings of the various components of this study in order to address the specific research objectives outlined in Chapter 1. It begins with an integrated analysis of the relative efficiency of the contractor and directly managed public hospitals, both in terms of production efficiency[152] and total contract costs. This is followed by an analysis of the individual and combined impact of the various determinants of efficiency, including the nature of the contract and the contracting process, competition, hospital ownership structures, the 'trading relationship' between public purchasers and contracted hospitals, and management structures and systems.

Prior to discussion of the results, some comments on the legitimacy of the comparisons between the three hospital groups, and the role of confounding factors in these comparisons, should be noted. As outlined in Chapter 3, the contractor and public study hospitals were selected so as to limit the effect of possible confounding factors, such as patterns of service delivery, scale, or location. As indicated in Chapter 4, statistical analysis of variance established the legitimacy of ownership, rather than location, as the basis for grouping the hospitals. Chapter 4 also indicated relative similarity between the contractor and public hospitals in regard to patterns of service delivery and scale, although some specific differences in these dimensions were noted. Specifically, the public hospitals were noted to be larger than the contractor hospitals, and in some cases, to provide specialised services not available in the contractor hospitals. These differences were, however, adjusted for in several of the analyses, and these factors are thus not regarded as important confounders in the comparison of the contractor and public hospitals. This is less so the case for the private hospitals, which were shown to have markedly different patterns of service delivery and utilisation to the other two groups.

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152 The term 'production efficiency' is used here to denote underlying efficiency of production, as measured by utilisation statistics, production costs, DEA, and quality of care, but excluding considerations of contract price.

8.1. Production efficiency and total contract costs in contractor and directly managed public hospitals

8.1.1. Hospital utilisation statistics

As reported in Chapter 4, one of the key dimensions of production efficiency studied here was hospital utilisation, including LOS, average bed occupancy and turnover rates. Chapter 4 indicated that, on average, the contractor hospitals had slightly higher occupancy rates than the public hospitals, which was attributed to longer LOS in the contractor hospitals, overriding the effect of the lower turnover rates in this group. In the acute hospital setting studied here, an efficient utilisation pattern would typically be characterised by relatively high occupancy rates, attributable to a combination of high patient turnover and short LOS (Pabon Lasso 1986). Measured against this hypothetically efficient profile, and relative to the public hospitals, the contractor hospitals therefore demonstrated a somewhat inefficient utilisation pattern.

A number of factors influence these utilisation parameters in the acute hospital setting, and some combination of these might explain the observed differences between the two groups. Some of these factors are external to the hospital, including patterns and levels of demand for hospitalisation (which would impact on turnover rates), the service-mix and case-mix of patients presenting to the hospital (which would impact on both turnover rates and LOS), and the availability of post-hospital facilities to which patients can be discharged once they are clinically well (which would affect LOS).[153] As discussed in Chapter 3, these hospitals were selected so as to minimise the extent of these particular differences between them, and adjustments for service-mix were also carried out. Direct observation and interviews with hospital officials also failed to identify any differences in the general demographic or clinical profiles of the populations using these hospitals which might explain the differences in utilisation

153 Public hospitals in South Africa often face difficulties in discharging clinically well patients due to lack of post discharge facilities (for example, for long term or frail care), or because of the lack of facilities in the patient's home to ensure adequate post-hospital care. In this situation, patients often spend much longer in hospitals than is required from a clinical point of view.

patterns. Similarly, there were no clear differences in the availability of post-discharge facilities available to the patients using these hospitals.

The analysis did however elicit the important fact that all three of the public hospitals serve larger and more densely concentrated populations than do the contractor hospitals. This difference might well account for the higher throughput observed in the public hospitals, although the lack of accurate data on the catchment populations served by each hospital prevented calculation of actual population to bed ratios. To the extent that the public hospitals did have higher population to bed ratios than the contractors, this would go some way to explaining their higher turnover rates and lower LOS, since the pressure of a high admissions rate would likely result in shorter LOS over time. In addition, it is possible that differences in case-mix, beyond those compensated for by the simple service-mix adjustments carried out, could explain some of the variation in the observed utilisation patterns.

In addition to these external factors, a number of factors internal to the hospitals might explain the variations in turnover rate and LOS. One example is the problem of logistical delays, due to lack of operating theatre capacity or access to specific investigations, which may prolong LOS. Interviews with hospital officials identified this to be something of a problem in all six hospitals, but did not identify any systematic differences between the groups. The skill and experience of the medical staff can also impact on LOS, since less skilled and experienced staff are more likely to hold patients in hospital longer until they are certain of their recovery.[154] As noted in Chapter 5, the skill levels and experience of the medical staff in the public hospitals were, on average, superior to those in the contractor hospitals, and this might provide some explanation for the shorter LOS observed in the public hospitals.

A final factor, of particular importance in this context, is the impact of reimbursement related incentives on clinical decision making, and hence LOS. As noted in Chapter 6,

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154 This point was argued by officials of the contractor company as an important explanation for the longer LOS at the contractor hospitals. While this does not reflect badly on the contractor company itself in the case of Matikwana and Shiluvana hospitals (since the medical staff were appointed by the government), it does reflect poorly on the company at Hewu hospital, where medical staff are employed by the contractor itself.

all three of the contracts rely on a per diem reimbursement method. In theory, this would be expected to generate an incentive for the contractor to prolong LOS in order to maximise revenues and profits. There are two dimensions to the economic incentive to prolong LOS in this situation. As illustrated in the analysis of production costs (Chapter 4), fixed costs[155] account for a very high proportion of total cost in these hospitals, so that once the break-even occupancy levels are reached, additional patient days generate significant profit margins. In addition, it is well recognised that individual patient costs are higher in the earlier than in the later part of an hospital stay, so that when a fixed per diem is paid, the contractor is likely to prefer a total occupancy rate made up of fewer patients each with a longer LOS, than one composed of more patients with shorter stays. As discussed in Chapter 7, both corporate and hospital level officials in the contractor company demonstrated a clear understanding of these production economics, highlighting the potential impact of this incentive effect.

A number of factors do however mitigate the impact of this incentive effect on LOS in the contractor hospitals. As discussed in Chapter 6, two of the contracts (at Matikwana and Shiluvana hospitals) contain minimum occupancy clauses, which guarantee the contractor revenues at an occupancy rate of 90%, which is likely to be well above those required to break-even. In this situation, it is unlikely that the contractor would act to artificially prolong LOS, and the specific production economics in these hospitals might even make it rational to ensure that average occupancy rates are at or below the minimum specified in the contract. In addition, the medical staff at these two hospitals, who have ultimate decision making power on admissions and discharges, are employed by the government, limiting the ability of the management staff employed by the contractor company to influence LOS.

Interestingly, neither of these mitigating factors apply at Hewu hospital, at which the LOS was in between that observed at the other two hospitals. In this case, as discussed in Chapter 6, the medical staff argued that they experienced no pressure whatever from the contractor company to prolong LOS, although some views to the contrary did

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155 As defined in Chapter 3, fixed costs include all costs which do not vary with the quantity of outputs of the hospital, and include all capital costs, as well as staff costs and other overhead costs.

emerge from some of the interviews with other officials. While the longer LOS at the contractor hospitals may therefore be attributable, in part, to the incentive effect of the reimbursement mechanism used, this study did not elicit strong evidence to confirm that this is the case.

In summary, the somewhat less efficient utilisation pattern demonstrated by the contractors relative to the public hospitals may be attributable to less efficient practice patterns applied by the clinical staff working within the hospitals, but could also be explained by some combination of external factors, including differences in the catchment populations using the hospitals, and the case-mix of patients arriving at the hospitals. Aside from these factors, this study was not able to identify any specific explanations for these differences, and it seems unlikely that the per diem reimbursement method, given the mininum occupancy clause, is a critical determinant of the longer LOS and lower turnover rates in the contractor hospitals.

8.1.2. Production costs and data envelopment analysis

8.1.2.1. Cost analysis

The general cost analysis, reported in Chapter 4, demonstrated a consistent pattern of lower average production costs in the contractor hospitals when compared to the public hospitals, but with some important exceptions to this pattern. The differences between the two groups were most marked when in-patient days were used as the measure of output. When admissions were used as the measure of output, the contractor costs remained well below those at the public hospitals, although the margin between the two groups was somewhat reduced, due to the effect of the longer LOS in the contractor hospitals. It is worth noting here that the relationships between costs per day, costs per admission and LOS can be somewhat more complex than the direct influence of LOS on costs per admission. For example, since the costs of treating acute care patients are almost always higher in the early days of a stay than in the later days, longer LOS may itself reduce average costs per day for the hospital as a whole, and this might in fact

provide a part explanation for the lower production costs per day observed in the contractor hospitals.

The cost analysis therefore demonstrated that the contractor hospitals are able to produce many of the key hospital outputs measured here at lower cost than the public hospitals, although the poor performance of Bisho hospital distorted the picture in the case of OPD visits and operations. The analysis also demonstrated that all of these differences were robust to variations in several of the critical assumptions used in assessing capital costs and other elements of the cost analysis, as well as to adjustments for service-mix.

Although the general cost analysis incorporated some basic service-mix categories, variations in case-mix could still have accounted for some of the unit cost variations between the two groups, and the tracer cost analysis was designed to address this problem. The data obtained in this analysis showed a less consistent picture than that obtained in the general cost analysis. In both the caesarean section and NVD cases, costs per case were lower in the contractor than in the public hospitals, although these results were again biased by the high costs per case at Bisho hospital. In the appendectomy and hernia repair cases, on the other hand, costs per case at the contractor hospitals exceeded those at the public hospitals.

Further analysis of these results shows some consistencies with the general patterns observed in the general cost analysis. In the analysis of the caesarean section cases, for example, the contractor hospitals show lower production costs per day, but have longer LOS than the public hospitals. In the NVD cases, lower production costs per day in the contractor hospitals account for the most of the observed differences between the groups, since LOS is similar across the two groups. In the appendectomy and hernia repair cases, the higher costs per case at the contractor hospitals are attributable mainly to longer LOS and higher theatre costs per case, which together override the lower production costs per day at the contractor hospitals. Together these data therefore confirm the lower production costs per day, the longer LOS, and the higher unit theatre costs at the contractors compared to the public hospitals, all of which were also observed

in the general cost analysis. These factors also explain the fact that costs per case were generally higher at the contractor than at the public hospitals, with the exception of Bisho hospital, whose high unit costs led to higher mean costs per case at the public hospitals in two of the tracers conditions analysed.

Notwithstanding these similarities between the results of the tracer and the general cost analysis, comparison of the tracer results with the service-mix specific unit cost data in the general cost analysis highlights some noteworthy differences. For example, whereas the tracer analysis showed that the mean costs per caesarean section and per NVD case were lower at the contractor than at the public hospitals, the general cost analysis showed that contractor costs per maternity admission were in fact 3% higher than those at the public hospitals. This difference is probably attributable to differences between the two groups in the proportions of caesarean section, NVD, and other cases in the maternity wards.[156] Similarly, the higher costs per appendectomy and hernia repair case at the contractor hospitals is in contrast with their generally lower cost per surgical admission observed in the general cost analysis. In this instance, the discrepancy is almost certainly attributable to differences between the groups in the case-mix of patients in the general surgical wards.

Together, the general cost analysis and the tracer cost analysis thus demonstrate some consistent trends in the comparison of production costs at the contractor and public hospitals. Production costs per day were generally lower at the contractor than at the public hospitals, often by significant margins. LOS was however noted to be higher at the contractor hospitals, and this either reduced and, in some instances, even reversed the observed margin between the two groups when costs per admission were analysed. In addition, where surgical cases were examined, the higher unit theatre costs at the contractor hospitals, themselves attributable to low throughput, also increased the overall costs per admission in these hospitals.

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156 Other cases in maternity wards might include those admitted prior to delivery for medical or gynaecological reasons, and those with suspected labour but discharged when found not to be in labour.

The analysis of the composition of production costs in Chapter 4 provides some explanations for these observed differences in production costs. This analysis indicated, firstly, that unit production costs were lower at the contractor than at the public hospitals across all but one of the individual cost categories and sub-categories analysed. Secondly, within these various cost categories, clinical staff and domestic services (which included domestic staff costs) were clearly the most important determinants of cost, jointly contributing almost 70% to the total margin between the two groups.

While these analyses therefore demonstrated that almost all components of production costs are lower at the contractor than at the public hospitals, it is clear that lower unit staff costs account for most of the observed differences between the groups. Analysis of these staff costs in turn showed that the lower costs at the contractor hospitals are achieved primarily through the use of significantly lower numbers of staff than are used in the public hospitals, and that the control over staffing numbers is sufficiently tight to ensure lower overall costs, in spite of the fact that the contractors rely on a more expensive staff mix, and also provide higher average remuneration for most staff categories.

The cost analysis also demonstrated that all categories of variable costs per day, including drugs, consumables, and laboratory tests, were again lower at the contractor than at the public hospitals, suggesting more careful management of these resources in the contractor hospitals, although the medical staff also influence the use of these resources to some extent.[157]

These data therefore provide strong evidence that the contractor hospitals are in general able to manage resources more efficiently than their public hospital counterparts across the full spectrum of hospital production activities, including both the fixed and variable cost components. Most importantly, however, the contractor hospitals appear to achieve

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157 As noted in Chapter 7, the medical staff at Hewu and Matikwana hospitals appear to play a significant role in cost containment (in the former since they are employed by the contractor, and in the latter, due to a close working relationship between the government employed medical staff), while at Shiluvana, decision-making by the medical staff appears to be unrelated to efficiency considerations on the part of the management staff employed by the contractor.

lower fixed production costs per day through more efficient allocation and management of staff resources, and more specifically, by obtaining higher levels of productivity from smaller numbers of more highly skilled and better paid nurses, than is the case in the public hospitals.

It is important to note, however, that the variations in unit production costs observed in this analysis are not solely attributable to the observed differences in fixed and variable production costs, but also to the variations in the quantity of outputs produced by each hospital, itself a function of internal productivity as well of the levels of external demand which the hospital faces. The relationship between these various factors can be illustrated with reference to fixed costs per bed, which captures the allocation and management of fixed costs, independent of hospital output, and which were on average found to be 31% lower in the contractor than in the public hospitals. Thus, while the throughput of in-patients (measured by turnover rate) in the contractor hospitals was 21% lower than in the public hospitals, this was insufficient to overcome the substantial difference in the average fixed cost per bed, explaining the consistently lower *fixed* unit costs per admission in the contractor hospitals. The margin between the two groups in costs per admission was increased by the differences in variable cost per day, where contractor costs were on average 172% lower than those observed in the public hospitals, more than compensating for the longer LOS at the contractor hospitals, and thus explaining the generally lower *total* costs per admission at the contractor hospitals.[158]

These results should of course be interpreted in the light of the various methodological problems encountered in the cost analysis, and discussed in full in Chapter 3. As noted there, one of the key problems was the estimation of the capital element of total hospital costs, although sensitivity analysis indicated that all of the results were robust to the variations in the assumptions used in these estimations. The second important methodological problem was encountered in the step down allocation of costs; here the

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158 Similar analyses could be conducted using in-patient days rather than admissions, although this would be biased in favour of the contractor hospitals due to their longer LOS, and would also confuse the effects of external demand and internal productivity.

major concern related to the allocation of head office administrative costs to the public hospitals, since this required a formula based allocation, while more accurate data were available for the contractor hospitals. The difference in approach between the two groups is, however, unlikely to have resulted in a systematic bias in the comparison, since the allocation formula used in the public hospitals is believed to fairly accurately capture the use of head office resources by those hospitals.

The third major problem encountered in the cost analysis emerged from the poor quality of data on, and inconsistent definitions of, hospital outputs. While this set of problems is clearly relevant to the overall interpretation of the results of the cost analysis, it is again unlikely to have resulted in any systematic bias in the comparison of the public and contractor hospitals, since most of the specific problems encountered were common to both of these groups. The final, and perhaps most important problem emerges from the small sample sizes used in this study. As noted in Chapters 3 and 4, this prevented use of parametric statistical tests in most of the analyses (the exception being the tracer cost analysis). This is conceded as a major problem in comparing the public and contractor hospitals, particularly in light of the fact that, in many of the analyses, the hospitals show results falling within overlapping ranges and/or individual hospitals substantially bias the mean results for their group. While efforts were made to address these particular problems, for example through inclusion of both mean and median data, it is recognised that these do not adequately address the impact of small sample size on the generalisability of these results. Although this problem could have been addressed through inclusion of a larger sample of public hospitals (since the full population of contractor hospitals was included in the study), logistical constraints prevented this.

8.1.2.2. Data envelopment analysis

The comparison of the relative efficiency of the contractor and public hospitals using the base DEA model showed a very close correlation with the results of the cost analysis, confirming the more efficient allocation and management of production resources at the contractor hospitals. As discussed in Chapters 3 and 4, higher mean scores in the DEA

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indicate a greater degree of technical efficiency in the use of inputs to produce outputs, with the distance from a score of 1 indicating the extent of inefficiency. Since costs were available for all of the input variables, these results can also be interpreted in terms of economic, rather than purely technical efficiency. In the analysis of the whole hospital, for example, the mean scores obtained by the contractor and public hospitals were 0.8981 and 0.7860 respectively, indicating that production costs at the contractor hospitals could be reduced by a maximum of 10.2% if the hospitals were functioning at maximum efficiency, whereas the equivalent figure for the public hospitals is 21.4%.

The close correlation between the results of the cost analysis and the DEA was also maintained in the application of DEA to the four tracer conditions, again using the base model. The base model DEA thus provides further evidence for the superior production efficiency of the contractor compared to the public hospitals. It also highlights some of the advantages of DEA relative to other methods of assessing efficiency outlined in Chapter 3. In particular, this analysis illustrates the ability of DEA to quantify the extent of inefficiency measured (and hence the potential efficiency gains from a shift to maximally efficient production), at least relative to the total study sample, and in this case, to express the quantum of inefficiency in terms of production costs. Another advantage of DEA, the ability to use multiple input and output variables, was also applied in this case, but with limited success, due to the restrictions imposed by the small sample size (see below).[159]

This analysis also however demonstrates some of the methodological weaknesses of the DEA approach. Firstly, all efficiency measures are relative to the sample only, so that no absolute measures of efficiency are available. While this limitation is not crucial in the context of this study, which aimed to compare the two groups, some of the findings of the analysis do highlight the shortcomings of the relative efficiency approach. For example, the findings of the tracer analysis, which demonstrated perfect efficiency scores in several of the hospitals, are somewhat counterintuitive in the light of other

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159 Another potential advantage of this approach is its ability to assess the relative contribution of different components of production, such as staff or other cost elements, to the observed levels of inefficiency. However, this specific advantage of DEA was not applicable here due to the high level of aggregation of input variables used in the base model.

observations in the study, and it is highly probable that a larger sample, or other methods of analysis, would identify inefficiencies in the production of those specific outputs in the same hospitals.

A second limitation concerns the quantification of inefficiency, or more specifically, the assumed efficiency gains to be obtained from a shift to maximal productive efficiency. These interpretations of the DEA are based on the assumption of a continuous production possibilities frontier, implying that all hospitals are capable of improving their production 'technology' to reach the point of maximum efficiency. This assumption is probably plausible in the context of the six contractor and public hospitals, which do use similar production technologies to produce a similar range of outputs. It is however less plausible when all nine of the study hospitals are included, since the private hospitals use a very different set of production technologies to the other six hospitals.

Thirdly, and perhaps most importantly, since DEA assumes causal relations between the input and output variables, and does not assess the nature or extent of causality, it is impossible to make judgements as to the relative strength of different model specifications. This weakness is well illustrated by the results of the various alternative DEA models used in this analysis. One key variation from the base model was the specification of in-patient days, rather than admissions, as the output variable. As might be expected, this modification benefited the contractor hospitals due to the longer LOS, and hence greater number of total days per hospital in this group. As a result, the contractor hospitals appear more efficient than the public hospitals, by a somewhat greater margin than was the case with the base model.

This analysis also demonstrated that, when the sample size is small as was the case here, the sensitivity of the DEA (and hence its ability to detect relative inefficiency) is substantially reduced when the number of variables is increased. Similarly, the results were shown to be sensitive to assumptions regarding returns to scale. Unfortunately, the DEA approach provides no basis for assessing which of the two input models used here is objectively preferable.

A further, closely related problem of the DEA approach is its inability to differentiate between genuine determinants of internal efficiency, and external 'market shocks' such as case-mix, or the quality of care delivered. While the literature provides mixed evidence on the impact of these factors on the results of DEA, the other analyses conducted in this study do suggest the important effects of these factors. As discussed in some detail in Chapter 3, this analysis therefore made some attempts to adjust for these external factors, through inclusion of adjustments for service-mix, the tracer analysis, and through the inclusion of some adjustments for quality of care.

In summary, the results of the base model DEA, which uses a small number of variables, and eliminates the effects of scale, are closely correlated with those of both the general and the tracer cost analysis, suggesting greater production efficiency in the contractor group compared to the public hospitals. However, modifications to the base model assumptions, including an increase in the number of variables, and an allowance for variable returns to scale, produce important differences in the results, in some cases reversing the observations of the base model analysis. Given the overall sensitivity of the DEA results to model specifications[160], and the absence of objective judgements as to the relative validity of alternative specifications, all of these results should thus be interpreted with caution.

8.1.2.3. Comparison of total contract costs with public sector production costs

While the cost analysis and DEA both indicated generally lower production costs for most outputs at the contractor hospitals compared to the public hospitals, the more important comparison from the government's perspective is that between production costs at directly managed public hospitals and the total contract cost at contractor hospitals. The incorporation of total contract cost into the various analyses results in a more ambiguous picture of the relative efficiency of the contractor and public hospitals

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160 The finding that DEA results are sensitive to model specifications is in contrast with the views of some of the authors cited in Appendix 4, who argue that DEA results are generally insensitive to model specifications.

than was observed when production costs alone were compared. The cost analysis data show that the government effectively faces higher total contract cost than its own production costs in respect of several of the critical hospital outputs studied here, including cost per OPD visit and per admission. Similarly, the DEA results suggest that contracted hospital production appears less efficient than direct public sector production, at least in two of the four key analyses conducted. These data lead to the important conclusion that the government currently fails to derive meaningful efficiency benefits, at least as measured in terms of lower production costs, from the clearly superior production efficiency of the contractor hospitals. Instead, the government appears to face higher costs through contracted production than it would in its own hospitals, suggesting that, under current arrangements, contracting out may result in net efficiency losses.

Further analysis of these results highlights some important factors contributing to these observations. As noted above, costs per in-patient day were lower at the contractor than at the public hospitals, even when total contract cost were incorporated into the analysis, albeit with much reduced margins. This suggests that the higher effective costs faced by the government per admission and per composite output (defined to include admissions) are attributable to some combination of relatively long LOS, and high effective total contract cost per day. One conclusion from this analysis is therefore that a reduction in the LOS at the contractor hospitals to the same levels as those observed in the public hospitals would ensure that the effective cost to the government of contracted production would be consistently lower than the equivalent public sector production costs, at least in respect of in-patient services. The same argument does not however apply to OPD visits, in which case the high effective total contract cost overrides the previously observed margins in production costs.

The effect of potential changes in LOS notwithstanding, it is also essential to examine the various other factors contributing to the high total contract cost observed in these contracts. As discussed in Chapter 4, the total contract cost is determined by the government's share of production costs at each hospital, as well as by the total price of the contract. The analysis identified fairly substantial variations between the three

hospitals in the government's share of production costs, which were attributed mainly to variations in contractual arrangements, including differences in the capital cost burden, and in the burden of staff costs borne by the government. In light of the results of the cost analysis, it is highly likely that there are some inefficiencies in the staffing component of these costs, particularly at Shiluvana, where the government bears the cost of virtually the entire staff establishment, and to a lesser extent at the other two hospitals, where the government is responsible for much smaller staffing components. Similarly, the capital cost borne by the government at Hewu hospital is somewhat higher than might have been the case had the contractor built the hospital, which is illustrated by the fact that the replacement cost per bed at Hewu hospital was approximately 15% higher than the equivalent costs at the two hospitals built by the contractor. It should be noted, however, that there is no reason to expect that these inefficiencies should be any greater than those observed in the public hospitals themselves.

Variations in the government's own costs in the different contracts might also be due to variations in the transactions costs incurred, including the costs of negotiating and monitoring the contract, as well as of administering any government staff at the contractor hospital. As discussed in Chapter 6, none of the government departments allocated any dedicated staff to the negotiation and monitoring of contracts, nor were they able to provide any reasonable estimates of the proportion of time spent by government officials on various tasks related to the administration of the contracts. The only quantifiable element of transactions costs was thus the allocation of an overhead cost from the government head office, which was based on the numbers of government staff employed at each hospital. As would be expected, these transactions costs were extremely low at Matikwana and Hewu hospital, and slightly higher at Shiluvana, but in all three cases, these costs were substantially below those incurred at all of the public hospitals, due to the much higher numbers of government staff employed at the public hospitals. While it is recognised that this limited approach to quantifying transactions costs is likely to underestimate the true impact of these costs, the absence of data provided no alternatives. It is also the case, however, as noted in Chapter 6, that government officials devote very limited time and resources to negotiating and

monitoring the contracts, suggesting that transactions costs make only a small contribution to the government's share of total contract cost.

These observations suggest that while the government's share of total contract cost is a relevant consideration, the total price of the contract is a more important determinant of total contract cost, justifying closer scrutiny of the determinants of contract price. Since all three of the contracts are based on a fixed price per in-patient day (and per OPD visit at two of the hospitals), the effective annual contract price is determined by the product of the per diem rate and the total number of in-patient days and OPD visits provided during the year.

As noted in Chapter 4, the per diem rate (and hence the price per OPD visit) varies substantially between the three contracts. One obvious explanation for these variations is the different contractual obligations faced by the contractor in the three contracts. While these variations in the contractor's obligations explain some of the difference in the per diem rate, Chapter 4 showed that some of the price variations are not in proportion to the reduced obligations faced by the contractor. This was clearly illustrated by a comparison of the contractual arrangements at Shiluvana and Matikwana hospitals, where differences in contract price were not in proportion to differences in staff costs. The difference in the per diem rates at the two hospitals is also not attributable to any differences in capital costs incurred by the contractor in constructing the hospitals, as shown by the virtually identical estimates of replacement cost per bed (R67,644 at Matikwana and R67,696 at Shiluvana). These observations provide some suggestive evidence that the contractor was generally able to secure favourable per diem rates in all three contracts, which is confirmed by the fact that these rates exceeded underlying production costs per day by fairly substantial margins in all three cases.

In addition to relatively high per diem rates, the total number of in-patient days (and OPD visits) plays a major role in contributing to the high total contract price paid by the government. Two separate factors were in turn shown to influence the total number of days charged for by the contractor. The first of these is the relatively long LOS, while

the second is the minimum occupancy clause in the contracts for Matikwana and Shiluvana.

These observations therefore suggest that the high per diem rates, the minimum occupancy clauses in two of the contracts, and the relatively long LOS together resulted in the relatively high total contract price, and hence the high total contract cost in these three contracts. It is also clear that it is primarily these factors which account for the failure of the government to secure the potentially substantial cost savings which this study has demonstrated might be obtained from selective contracting out of hospital services. This suggests, in turn, that the government's failure to secure cost savings was due to its having entered into contracts containing several unfavourable contract terms, suggesting either a lack of understanding of the impact of these issues, and/or a lack of negotiating capacity on the part of the government. By contrast, these observations indicate that the ability of the contractor to negotiate contracts favourable to itself resulted in its being able to capture a substantial proportion of its superior production efficiency in the form of profit. This is clearly illustrated by the substantial profit margins obtained by the contractor during the study year (which were shown to range from 32% to 70%).

These observations also highlight some of the critical skills and processes which government would need to focus on in order to secure the potential cost savings from contracting out. These include improvements to the contract negotiation process, as well as to the monitoring of contractor performance, and are discussed in more detail in Chapter 9. In the former case, stronger capacity to negotiate over price would allow the government to secure lower unit prices (whether per diem or otherwise), while still ensuring that the contractor was able to secure sufficient profits to ensure sustained participation in the contract. The high profit margins outlined here demonstrate that both parties have substantial room for manoeuvre in price negotiations, and that the government could in fact expect to secure significant price reductions. Secondly, a shift away from a per diem reimbursement mechanism would reduce the incentive for the contractor to prolong LOS; and thirdly, efforts could be made to reduce or eliminate completely the minimum occupancy clause, while still compensating the contractor for

the capital risk assumed. As regards monitoring of contractor performance, these observations suggest that closer scrutiny of LOS by the government has the potential to reduce the contribution of this parameter to the high total contract cost observed.

In summary, this analysis has demonstrated that while the contractor hospitals are able to produce most hospital outputs at lower cost than their public sector counterparts, the government fails to capture these cost savings, due mainly to contracts which strongly favour the contractor, and to a lesser extent, to relatively high government costs at the contractor hospitals. As a result, government currently faces higher total costs in contracted than in directly managed public hospital production for several of the key outputs measured here. This analysis has however demonstrated that this situation could almost certainly be reversed through improvements in contract terms, which would in turn require that the government develop stronger capacity to negotiate and monitor contracts of this kind.

8.1.3. Quality of care in contractor and directly managed public hospitals

While the analyses discussed in the previous section suggest that contracting out currently fails to generate cost savings, this discussion has so far omitted any consideration of differentials in quality of care between the contractor and public hospitals, which might themselves be sufficient to compensate for the observed cost differences. This section reviews the results obtained from the various analyses of quality of care.

8.1.3.1. Structural aspects of quality of care

While both the contractor and public groups on average performed relatively well in the evaluation of SQOC, some consistent trends and differences between the groups did emerge. In general, the contractor group performed more poorly than the public group, obtaining a lower total score, as well as lower scores in all but two of the functional

clusters analysed, suggesting that from a structural perspective, quality of care at the contractor hospitals could be considered inferior to that observed in the public hospitals. However, several factors suggest the need for some caution in the interpretation of this general result; firstly, the absolute differences between the two groups were relatively small in both the total score, as well as in all but two of the functional clusters. In addition, the mean values disguise fairly wide variation between individual hospitals in some cases, as well as overlapping ranges of results between the two groups.

Further analysis of the performance of the two groups does however indicate some consistent and important differences which bear on judgements about SQOC. The functional cluster which contributed most to the observed difference between the groups was that of clinical staff, which assessed the numbers, training and qualifications of medical, nursing and paramedical or ancillary staff available at the hospitals. In this case, the observed difference between the two groups was substantial (an absolute difference of 27 percentage points in the mean scores), and was attributable to substantial gaps in all three staffing categories, although the largest was in the paramedical staff category, followed by nursing and medical staff. Examination of the individual criteria scores reveals several factors behind these patterns: in the case of medical staff, the contractors were inferior to the public hospitals in terms of the supply of specific specialist skills, and in the general experience of the medical staff. In the case of nursing staff, the major contributor to the observed difference was the much smaller total supply of nurses in the contractor hospitals, which was sufficient to overcome the impact of the more highly qualified mix of nurses in these hospitals relative to the public hospitals; in the paramedical staff category, the observed difference was due to inferiority of the contractors in terms of the supply of the full range of skills required in this category. The contractors were therefore assessed as generally inferior to the public hospitals in terms of the provision of staffing, which was in turn attributed to a combination of low staff numbers in some categories, and to inadequate skills and experience in others.

Similar patterns were also observed in the aggregated analysis of the categories within each of the functional clusters. In the aggregated analysis of non-clinical staff, for

example, the contractors demonstrated substantially and consistently poorer performance, again due to a combination of lower numbers and skills of staff. In the aggregated services/functions and equipment/supplies categories, the contractors again performed somewhat more poorly than the public hospitals, although the differences in these two cases were smaller than in the case of the staffing category. In these latter two categories, the differences were attributable to general inferiority on the part of the contractors in the performance of specific functions or services, and to poorer performance in terms of the availability, quantity, and quality of various supplies and equipment regarded as essential for adequate quality of care. The opposite pattern was observed in the case of the aggregated buildings category, however. Here, the contractor hospitals were consistently and substantially superior to the public hospitals, a pattern attributable to a combination of better provision of space, ablution and other facilities, and more importantly, to superior physical condition and cleanliness of all of the hospital buildings which were evaluated.

In summary, while the overall differences in scores between the two groups on this evaluation were relatively small, and should be interpreted cautiously, this evaluation did demonstrate important and consistent differences between the two groups in some key structural elements of quality of care. More specifically, the contractor hospitals appear to limit the quantity and quality of key inputs to the hospital production process, including critical staffing and equipment and supplies, to the point of failing to meet what this evaluation defined as realistic public sector standards. On the other hand, the contractors demonstrated clearly superior provision and maintenance of hospitals buildings and amenities, suggesting closer attention to these aspects of SQOC than was observed in the public hospitals, where these aspects were generally found to be very poor.

As discussed in Chapter 3, these results should also be interpreted cautiously in the light of the important methodological limitations of this evaluation, in particular, the role of subjectivity in the design of the evaluation instrument, in the rating of the hospitals, and in the implicit judgements as to the relative importance of the different components of SQOC evaluated here. Equally importantly, the power of these results is limited by the

uncertain relationship between structural aspects of quality of care and overall quality of patient care, as well between patients' subjective assessments and more objective assessments of quality of care.

8.1.3.2. Quality of nursing care

The instrument based evaluation of the quality of nursing care showed a somewhat different picture from that observed in the evaluation of SQOC, with the contractor hospitals demonstrating superior performance in most of the analyses.

This evaluation also highlighted some important and consistent differences in the quality of nursing care between the two groups. The superiority of the contractors in the nursing care cluster was evidenced in all four of the categories which comprised this cluster. As discussed in Chapter 3, this assessment was based on a particular model of nursing care, which recognises critical aspects of nursing care as distinctive from the medical care of the patient, and which requires of nurses to play an active role in assessment, diagnosis, monitoring and control of the patient. The performance of the nurses in the contractor hospitals according to these criteria was uniformly and consistently superior to those in the public hospitals, indicating that this model of care was followed relatively well in the contractor hospitals, while nurses in the public hospitals tended to be much less active, following medical orders more passively, and keeping patient records in a generally poor condition.

In the case of the nursing management cluster, the evaluation showed a more mixed picture, with the contractors demonstrating superior performance in such areas as benefits and service conditions, but with the public hospitals showing superiority in the case of staff-patient ratios (which is consistent with the observations made in the evaluation of SQOC), in-service training and career development. Overall, these results therefore indicate a fairly consistent picture of superior quality of nursing care at the contractor hospitals, with a more even picture in the case of the management of nursing staff.

The findings of the subjective evaluation of nursing care were generally consistent with those of the instrument based evaluation, and with many of the observations of the evaluation of SQOC. In the evaluation of nursing care at the ward level, for example, the evaluators judged the public hospitals to be inferior to the contractors in most of the parameters assessed. A less consistent picture emerged in the evaluation of nursing care process, where the evaluators did not identify any systematic differences between the two groups.

The evaluation of nursing management again highlighted important consistencies with previous observations. While staffing numbers and skill levels were generally judged to be adequate in both groups, the evaluators argued that contractor staffing levels were just adequate to cope with current patient demand and acuity levels. These findings are again consistent with the previous observation of the tendency of the contractors to supply inputs at or even below minimum acceptable levels.

In summary, both the instrument based and the subjective evaluations produced a fairly consistent set of conclusions concerning the quality of nursing care in the two hospital groups. These are, firstly, that, with some exceptions, the quality of nursing care at ward level was generally superior in the contractor hospitals, despite the fact that numbers and skill-mix of nursing staff in these hospitals were judged as just adequate to cope with current activity levels; secondly, the two groups present a more even picture in the case of nursing management at hospital level, with each group having particular strengths and weaknesses, noticeable differences in nursing management style, and with generally low staff morale at all hospitals beside one of the contractor hospitals. A third, implicit conclusion is that nursing management appears to be less relevant than ward level nursing care in influencing overall quality of nursing care, as shown by the strong subjective judgement that overall quality of patient care in the contractor hospitals was superior to that observed in the public hospitals. These conclusions should of course be interpreted in the light of the various methodological cautions noted in the previous section, which also apply to these evaluations.

8.1.3.3. Evaluation of clinical record keeping

The evaluation of clinical record keeping focussed on the medical aspects of patient records, and complemented the assessments of records carried out as part of the evaluations of SQOC and of the quality of nursing care. This evaluation demonstrated a fairly similar pattern of problems in the two groups across most of the indicators assessed, and did not identify any statistically significant differences between them in most cases. For two of the most important indicators, however, the contractors were shown to perform worse than the public hospitals, in both cases by statistically significant margins. The first of these was the proportion of cases in which the evaluator could not interpret the diagnosis and/or treatment from the patient record. This indicates extremely poor record keeping by the medical staff, and would be particularly important from the perspective of continuity of care between different medical staff working in the hospital. The second parameter was the proportion of cases in which there was no evidence of a visit by the doctor in the past 48 hours. These latter data almost certainly indicate compromises in quality of care in both groups, and a more severe problem in the contractor group, although it should be recognised that the poor performance noted here might have been artificially exaggerated by poor record keeping *per se* (i.e. doctor visits taking place but not being recorded). A similar pattern emerged in the evaluation of record keeping for NVD cases, as indicated by the absence or incompleteness of the partograph.

These data are only partially consistent with those obtained from the record reviews undertaken in the analyses of SQOC and of the quality of nursing care. In those analyses, both groups showed relatively similar performance, with the performance of the contractor group noted to be marginally superior. These discrepancies are however consistent with the observed trends in overall quality of nursing and medical care in the two groups. The generally superior nursing care in the contractor hospitals would account for the somewhat better performance in those aspects of record keeping for which nurses are responsible, which were measured in the analysis of SQOC, although the completion of the partograph, which is the responsibility of the nurse-midwives in

the labour ward, is an exception to this pattern. In the case of medical care, however, the contractors were shown to have fewer, less skilled clinical staff than the public hospitals, which may well account for their worse performance in terms of clinical record keeping, for which the medical rather than the nursing staff are generally responsible. It is important to recall, however, that the medical staff posts at Matikwana and Shiluvana are established and filled by the government authorities, so that inadequate provision of medical staff cannot be attributed to the contractor.

8.1.3.4. Evaluation of outcomes of care

The analysis of the sample cases of all four of the tracer conditions did not identify any statistically significant differences between the groups, in either the prevalence of indicators of poor outcomes, or in the expert analysis of the avoidability of poor outcomes. This general conclusion notwithstanding, the analysis did identify some variability within and between groups, as well as some particularly disturbing evidence of poor quality of care at individual hospitals within both groups.

The evidence of poor quality of care at individual hospitals, while limited to very small numbers of cases, is disturbing, and suggests some general problems in the quality of medical treatment in both of the groups studied, particularly in comparison with the private hospitals. In the hernia repair cases, for example, there was evidence of lengthy delays between admission to hospital and operation at one each of the contractor and the public hospitals, with some indication that these were attributable to logistical problems, such as lack of staff and/or theatre time. While delays of this kind are not particularly serious in most cases of chronic hernia repair, some cases can require urgent intervention, as was the situation with one of the cases at one of the contractor hospitals (Matikwana), where the delay of 7 days noted from the record is unacceptable. Similarly, a very high proportion of cases at both hospitals showed no recorded evidence of adequate pre-operative assessment, which is disturbing since most patients presenting with this condition are likely to be in higher age groups, and therefore at higher risk from anaesthetic complications.

The analysis of appendectomy cases also revealed 8 instances, all at the contractor hospitals, in which long delays between initial presentation and admission to the hospital, or between admission and operation, strongly suggest poor quality of care, since delays of this kind can have serious medical complications. In the former instance, the main problem appears to have been poor initial diagnoses, while the delays between admission and operations were again due to a combination of logistical problems at the hospitals involved. Both groups also demonstrated fairly high rates of wound infection relative to that observed in the private hospitals, providing further evidence of avoidable quality of care problems.

The analysis of peri-natal and maternal mortality rates showed a generally similar pattern to that observed in the tracer case analysis, with disturbing evidence of poor quality of care in both contractor and public hospitals, but with only limited statistically significant differences between the two groups. In the case of peri-natal mortality, for example, both groups showed very high rates (with the public group showing a higher rate than the contractors), relative to the rate observed in the private hospitals. No data on national peri-natal mortality rates are available in South Africa, preventing comparison of these hospitals with the broader public sector. It is worth noting, however, that recent data for the African continent suggest an average rate of 75 per 1000 (WHO 1996), which is substantially higher than the rates observed here, although rates in South Africa would be expected to be lower than those for other regional countries, due to its higher per capita income and better developed health care system.

While many factors aside from the quality of hospital care, including socio-economic and other characteristics of user populations, strongly influence peri-natal mortality rates, there is no explicit evidence to suggest that the populations using these 6 hospitals are particularly more predisposed to peri-natal mortality rate than the majority of the South African population. This suggests that the high rates identified here can, at least partially, be attributed to the quality of health care delivered by the local health services, including the study hospitals. This is borne out by the expert analysis of the peri-natal cases, which showed a very high prevalence of avoidable factors in the peri-natal deaths

analysed in both of the groups, with a statistically significant difference between the prevalence of 74% in the contractors and 50% in the public hospitals. Further analysis of these factors indicated that over 75% of these avoidable factors in both of the groups were of such a nature that the death could *probably* have been avoided, had different actions been taken. As disturbing is the conclusion that over 80% of the total avoidable factors identified in both groups were attributable to hospital related factors, including problems in medical management and administrative problems, as distinct from factors related to the patient or to other administrative factors beyond the hospitals.

In the analysis of maternal mortality rates, both the contractor and public groups showed similar, high mean rates relative to those observed in the private hospitals, although here again there was no statistically significant difference between the two groups (with this result almost certainly attributable to the very small total number of cases evaluated). While national data on maternal mortality is poor, indirect estimates suggest a very high national rate of 250 per 100,000, which substantially exceeds the rates observed here (Fawcus *et al.* 1996).

These various evaluations of the outcomes of care therefore lead to two main conclusions: the first is the lack of any sustained or systematic differences between the performances of the contractor and public hospitals, except in the single instance of the proportions of avoidable factors in the analysis of peri-natal deaths, where quality of care in the contractor hospitals appeared to be worse than in the public hospitals. This provides further evidence of the inferiority of medical care in these hospitals relative to that in the public hospitals. Secondly, this analysis provided a range of evidence suggesting serious problems with the quality of care delivered at some of the hospitals in both the contractor and the public groups.

Both of these conclusions should be interpreted in the context of a number of important methodological concerns. Many of the analyses, particularly those concerning the surgical tracer conditions and the maternal mortality cases, relied on small sample sizes, the reasons for which were discussed in Chapter 3. A second problem emerges from the fact that many of the sampled records contained inadequate information, as a result of

very poor record keeping in many of the hospitals. This hampered both stages of the outcome analyses, contributed to the small total sample sizes, and almost certainly led to an underestimate of the true prevalence of poor outcomes, as well as to an inadequate assessment of their causes. As discussed in Chapter 3, there may also have been a perverse negative correlation between the quality of record keeping and the quality of care evaluated in this way, since it would have been easier to identify instances of poor outcomes in those hospitals which keep better records. Finally, this analysis assumes a causal relationship between poor outcomes and poor quality of care within the hospital, thus ignoring the impact of non-hospital factors on the outcomes measured. Such factors would include, among others, patient socio-economic and demographic factors, access to health services, and the quality of local primary health care services. As discussed above, there is no obvious evidence that any of these factors differ systematically between the hospitals in the contractor and public groups, although it is conceded that these were not studied in any depth, so that some material differences may well have not been identified. The use of expert analysis, which aimed to identify instances of poor quality of care directly attributable to the hospitals, was also included to address this problem.

8.1.3.5. Overview of quality of care in the contractor and directly managed public hospitals

One major conclusion of the various evaluations discussed here is the lack of any consistent or sustained difference in measured quality of care between the contractor and public hospital groups. This is seen in the fact that the contractors showed a worse average performance in the evaluation of SQOC, but a better average performance in the evaluations of quality of nursing care and in the subjective evaluations of overall patient care conducted by the nursing experts. Similarly, the evaluations of clinical record keeping and of clinical outcomes identified few sustained and significant differences between the groups, although the contractors did demonstrate worse performance than the public group in some limited aspects of both of these evaluations, including some evidence of poor record keeping by medical staff, and a significant difference in the number of avoidable factors contributing to peri-natal mortality.

These observations highlight one of the limitations of using multiple evaluations of quality of care, namely the lack of any way of integrating these various findings into an overall assessment of quality of care, which might have been possible, for example, through the attachment of relative weights to the different evaluations. While this would have been less important had there been a consistent pattern of differences between the two groups, the mixed picture observed here emphasises this problem. As discussed further below, this limitation is attributable to the more fundamental problem of uncertainty as to the nature and strength of the causal links between these various aspects of quality of care and the overall quality of patient care.

Despite the generally mixed picture observed here, these evaluations did identify some consistent themes and trends which are material to the evaluation of the relative efficiency of the two groups. One of these is the observation that the contractor hospitals constrain the quantity, and sometimes the quality, of inputs to the production process to a greater extent than the public hospitals. At the same time, however, the contractors appear to manage several of these resources more efficiently than the public hospitals. In some instances, the superior management of resources appears to be sufficient to ensure adequate and even superior quality of care in the contractor hospitals, despite the lower intensity and/or quality of inputs applied. This was demonstrated in the case of the buildings, equipment and facilities aspects of the SQOC evaluation, as well as in the evaluation of the quality of nursing care. Here the numbers of nurses in the contractors were observed to be generally lower than those in the public hospitals, and in spite of this, the quality of nursing care at the contractor hospitals was consistently judged to be superior to that in the public hospitals. This suggests that key aspects of management, such as staff allocations, the application of nursing processes and systems, and motivation of staff, may play a crucial role in ensuring high quality of nursing care.

This analysis also suggests that there are some instances in which superior management is insufficient to overcome the negative impact of lower intensity and/or quality of inputs on quality of care. This seems to be particularly the case in respect of medical and paramedical staff, in which the relatively fewer resources in the contractor hospitals

does appear to have resulted in inferior performance in some aspects of the evaluations. This was seen, for example, in the poor relative performance of the contractor hospitals in some key aspects of record keeping by the medical staff, in the evidence that medical staff visit patients less frequently in the contractor than in the public hospitals, and perhaps most importantly, in the higher rate of avoidable factors contributing to peri-natal mortality in the contractor hospitals.

These differences in the impacts of resource constraints and management on the quality of nursing and medical care make sense in the context of the quite different patterns of work organisation between nursing and medical staff in the hospital setting. In the case of nurses, the large numbers of staff involved, and the large number of different functions which they perform, suggest that factors such as efficient allocations, ward and hospital wide nursing systems, and staff motivation, will impact significantly on the performance of nurses, and hence on quality of nursing care. The picture is somewhat different for medical staff, primarily due to their fewer numbers and relative functional flexibility. In this situation, while management functions such as such as allocations and motivation are clearly important, factors such as the available number and skills of the individual medical staff, especially the doctors, are likely to have a much greater impact on quality of care.

These observations raise obvious questions as to the relative importance of the quality of nursing and medical care on overall quality of patient care and specifically, the outcomes of care. It is arguable that, at the margin, the quality of medical care is more important than that of nursing care, since interventions by medical staff will often be more important than those of nursing staff in changing the outcome where patients are extremely ill and negative outcomes are likely. It is recognised, though, that the opposite argument could well apply in several situations. As also noted several times above, the linkages between these specific dimensions of quality of care and overall quality of care are not clear, and it is thus not possible to make firm judgements as to the relative importance of these two elements of care. In the context of this study, such judgements might have been possible had there been sustained and significant differences between

the contractor and public hospitals in the various evaluations of the outcomes of care, but the absence of these prevents firm judgements of this kind.

A second general observation emerging from these analyses concerns the disturbing evidence of poor quality of care in individual hospitals in both groups. While much of this evidence should be considered anecdotal, in view of the small numbers of cases identified, the evidence of very poor medical management is nonetheless extremely disturbing. In addition, some of the evidence is more systematic, particularly that relating to the observed mortality rates, and to the contribution of potentially avoidable factors to the peri-natal mortality rates.

These general conclusions should be interpreted in the context of the important methodological limitations discussed above, many of which are common to most or all of the individual evaluations. While efforts were made to address many of these limitations in the context of each of the evaluations, it was not possible to entirely mitigate their individual or combined effects. The study design adopted here had two inherent structural limitations, which also suggests the need for caution in the interpretation of these results. The first of these is the small total sample of hospitals, which prevented statistical analyses of differences between the groups except in some limited instances, while the second is the lack of certainty as to the absolute and relative causal associations between these various dimensions of quality of care and the overall quality of patient care.

8.2. The relative efficiency of contractor and directly managed public hospitals: an integrated overview

Integration of these various analyses allows some overall conclusions as to the relative efficiency of contracted and directly managed public production. Given that the observed margins between the costs of contracted and public hospital production were relatively small when total contract costs were incorporated, it remained theoretically possible that differences in quality of care could have compensated for the observed cost

differences, thus still allowing the possibility of net efficiency gains from contracted production. However, as discussed above, the evaluations of quality of care produced a somewhat mixed picture of the performance of the two groups, and failed to demonstrate any sustained or systematic differences between them.

These results therefore suggest, firstly, that under current arrangements, contracted production of hospital services does not generate consistent efficiency gains relative to directly managed public provision. Instead, the data suggest that contracting out may in fact be inefficient relative to directly managed public provision, although this conclusion depends to some extent on which outputs are considered most relevant from the government's perspective. Where OPD visits and in-patient admissions are considered the relevant outputs, as was assumed in this study, contracted production clearly results in net efficiency losses relative to directly managed public provision. On the other hand, the use of in-patient days as the measure of output would suggest that contracted production is more efficient than directly managed public provision.

Secondly, this study has provided convincing evidence that contracted production has the potential to generate substantial efficiency gains relative to direct public provision, provided that suitable contractual conditions are in place. This conclusion is based on the view, for which this study has provided strong evidence, that contractors are currently able to produce hospital services more efficiently (i.e. at lower cost, and at the same or at higher quality) than public hospitals, but that they are able to capture the majority of these efficiencies in profit, due to highly favourable contracts, and to poor monitoring of contractor performance by the government. These issues are discussed further in the following section.

A third conclusion, closely related to the first two, concerns the relationships and trade-offs between cost and quality of care observed in the various components of this study. As discussed above, the contractor hospitals are able to produce hospital outputs at lower cost than the public hospitals as a result of much stricter control over the use of both fixed and variable cost resources, and primarily through reductions in the numbers of staff, but also of other resources, used per unit of output. In some instances, these

reductions in the input intensity translated directly into poor quality of care as measured in this study; this was seen for example, in the case of the evaluation of SQOC, where the contractors were judged to be providing sub-optimal levels of key inputs required in the hospital production process. Similarly, the lower intensity and skill levels of medical staff in the contractor hospitals were judged to contribute to some extent to the some of the poor quality of record keeping, and of patient outcomes identified in the contractor hospitals. This inverse relationship between input intensity (and/or quality) and quality of care was however noted to be less of a problem where the management of the resources involved was so efficient as to more than compensate for the reduced levels of inputs, as was well illustrated in the case of nursing services.

It is important to reiterate here that the relationship between quality of care and actual quality of patient care remains uncertain, and is also likely to vary substantially across the different quality of care evaluations conducted here. Reductions in different inputs are likely to impact differentially on the actual quality of patient care, although both the direction and extent of these differences remain uncertain. While it thus probable that reduced quantity or quality of structural inputs such as buildings and facilities will impact to a lesser extent on quality of care than fewer nurses or medical staff, these relationships remain conjectural, and it is difficult to make firm judgements as to the relative impact of differential input reductions on overall quality of patient care.

These complex relationships notwithstanding, these observations reiterate the importance of both contract design and monitoring in ensuring efficiency gains from contracted production. Where contractors operate on a for-profit basis, as is the case here, there will often be a tendency to reduce inputs so as to maximise profit margins. However, different reimbursement mechanisms will encourage this tendency to a greater or lesser extent, as will the absolute level of the contract price. Similarly, the freedom the contractor faces to manipulate input and output levels can also be restricted through both detailed specifications of the contract, and close monitoring of contractor performance. These issues are discussed in more detail in the following section, as well as in Chapter 9.

8.3. The determinants of efficiency in contractor and directly managed public hospitals

In addition to comparing the relative efficiency of contracted and directly managed public hospital production, this study aimed to assess the impact of various determinants of efficiency in the two hospital groups. This section integrates the findings on efficiency with the analyses of the various postulated determinants of efficiency, examining both their individual and collective impact.

8.3.1. Contracts and the contracting process

As illustrated in Chapter 6, a number of specific features of the three contracts contribute to the failure of government to secure the potentially substantial efficiency gains that this study has suggested might be achieved by contracting out of hospital services. This was noted, firstly, in the serious inefficiencies in service delivery and organisation which emerged from some of the contract specifications relating to the contractor's service and staffing obligations. While it is not possible to quantify the extent of these inefficiencies, and thus to assess their impact on the overall efficiency of the contractor hospitals, it is worth noting the view, expressed by some of the government officials, that these inefficiencies were so great as to undermine any other efficiency gains from contracted production.

Over and above the general problems of coordination and integration, these contractual arrangements also led to other more specific inefficiencies. The split between hospital services and the rest of the health service, for example, was noted to create incentives for inefficient contractor behaviour, such as increasing the number of OPD visits at the hospital (as opposed to in district PHC clinics), and for unnecessary referrals to higher level hospitals. Similarly, the dual employer situation at Shiluvana hospital prevented the contractor from managing the majority of fixed cost resources at the hospital, thus undermining its capacity to achieve maximum efficiency gains.

The analysis of the historical context of these contracts in Chapter 6 indicated that none of these specific contractual arrangements were either essential or unavoidable, but rather that they had been introduced by either the government (e.g. the retention of medical staff in government employ), the contractor (limitation of service obligations to the hospital itself), or were the product of historical circumstance (the 'dual employer' situation at Shiluvana). This suggests that some or all of these contractual conditions could be altered in order to enhance contractual efficiency. Recommendations in this regard are discussed in Chapter 9.

A second set of efficiency problems were noted to be attributable to the fact that the current contracts are heavily biased in favour of the contractors in a number of dimensions. This was demonstrated, firstly, in the ability of the contractor to obtain high unit prices relative to underlying production costs, to secure its margins against cost increases through the inclusion of automatic price escalation clauses, and to translate the high unit prices into high total contract prices. When considered in combination, it is these specific factors, perhaps more than any others, which account for the ability of the contractor to capture its superior production efficiency in profit, thus undermining potential efficiency gains for the government.

The bias in the contracts towards the contractor was also demonstrated in the extent to which risk in the contracts was shifted away from the contractor and towards the government. From an efficiency perspective, this maldistribution of risk is critical since it results in the contractor facing weak incentives for efficiency. If, for example, the contractor obtained a lower unit margin, and had no automatic price escalation clauses, it would be forced to pay more attention than it does to management of costs. Similarly, if it faced shorter contract terms, the threat of competition would also encourage greater vigilance and cost efficiency, as would more detailed specifications of input and output requirements.

The limited specifications of the quality and quantity of both inputs and outputs required from the contractor also created the space, at least in theory, for the contractor to exploit

the contract, and to increase its profit margins by reducing input costs, even if this resulted in compromises on quality of care. As noted above, this study did not produce hard evidence of such exploitation by the contractor, but there is little doubt that some of the problems of quality of care identified in this study are due to the tendency of the contractor to cut production costs by reducing the numbers and quality of key inputs, such as nursing and medical staff, and hospital equipment. Poor specification of the contract also aggravates the potential for exploitation by making it very difficult for the government to monitor contractor performance with any precision, since there are no measurable parameters or performance criteria to against which performance can be measured.

The negative efficiency effects of these contractual problems were aggravated by two critical implementation issues: the generally poor monitoring of contractor performance by government officials, as well as the absence of competitive bidding in the contracting process. As noted in Chapter 6, informal monitoring of contractor performance by government officials was generally regarded as satisfactory by both parties, but, despite this, it seems clear that several elements of contractual efficiency could have been improved by more formal and rigorous monitoring.

The absence of competitive bidding in all three contracts (with the exception of the initial award of the Hewu contract) almost certainly allowed the contractor to obtain higher per diem rates than would have been the case in the face of competition. Similarly, the use of direct negotiation allowed the contractor to influence the contents of the contracts to a much greater extent than would have been the case with a formal, competitive tendering process. This is illustrated by the fact that all three of the contracts were originally drafted by the contractor prior to the direct negotiations. In a formal competitive tender, the detailed tender specifications would have been drawn up by the government, and these would have formed the basis of the subsequent contract.

In summary, this analysis indicates that several problems in the design of the contracts and in the contracting process contributed to the failure of the government to secure the potential efficiency gains from contracting out of hospital services. More specifically,

several features of the contract design have contributed to contracts which shift risk away from the contractor and towards the government, and which provide the contractor with opportunities to exploit the contract. These problems are attributable to, and are also aggravated by, serious flaws in the contracting process, including the absence of competition, and the very poor monitoring of contractor performance by the government.

Problems of this magnitude in the contractual environment raise important questions as to how they came about, and why the government was unable to negotiate more efficient contracts. As discussed in Chapter 6, the fundamental explanation for this situation appears to be a deep imbalance in the power relations between the contractor and the government, which resulted in the government functioning as a passive 'taker' of unfavourable contract terms and conditions, rather than as the party empowered to dictate such terms and conditions. This power imbalance is in turn attributable to substantial imbalances in the relative capacities of the two parties. On the government side, this study highlighted very poor understanding of the intricacies of contract design and the contracting process, as well as of the relationship between these factors and contractual efficiency. Similarly, the government's understanding of the role of competition in ensuring efficient contracts appeared to be very limited, and the government demonstrated very limited capacity to negotiate favourable contracts, as well as to monitor contractor compliance. Conversely, this study suggests that the contractor has a very clear understanding of its own risk profile, of the relationships between contract design and risk, as well as strong contract negotiation capacity. In this situation, it is not surprising that the contracts which emerged from a direct negotiation process so strongly favoured the contractor, with all the consequences outlined here.

8.3.2. The impact of hospital ownership and management structures and systems on efficiency

The analysis of hospital ownership and motivations, and of management structures and systems, reported in Chapter 7, provided several explanations for the superior

production efficiency of the contractor hospitals. In the contractor company and within the hospitals themselves, the emphasis on efficiency was pervasive, and can be traced back to the impact of the for-profit ownership structure on the perceptions and motivations of corporate officials and hospital managers. Corporate officials perceived themselves as motivated primarily by the need to ensure profitability and delivery of high quality and cost effective care. While these motivations were not consistently communicated to the hospital managers, this group nevertheless perceived themselves as directly accountable to their superiors, and as responsible for ensuring control of costs and good quality of care. These hospital managers also demonstrated a clear understanding of the key determinants of hospital cost, and of the extent and limits of their capacities to influence such costs.

These clearly articulated motivations of ensuring profitability and hence low costs, were reflected in (and in part attributable to) the corporate structure and capabilities of the contractor company, and in the corporate-hospital interface at all three hospitals. The corporate structure, for example, was shown to be small, to function very efficiently, to have highly developed capabilities in critical support functions, and to focus heavily on efficient management of staff resources. This intense level of corporate support to the hospitals was accompanied by close and systematic scrutiny of hospital performance. Despite the strong central support and monitoring of hospital performance, hospital managers were also noted to be given fairly substantial autonomy over several key areas of managerial decision making, although within fairly tight constraints.

In summary, officials of the contractor company appeared to be highly motivated to maximise production efficiency, due to the combination of the well articulated corporate goal of maximising profit, and the corporate management structures and systems which have been designed to give effect to this goal. The study also identified some instances, however, when the emphasis on cost containment in these hospitals appeared to be taken too far, with detrimental effects on efficiency. This was seen, for example, in the poor management information infrastructure available at both corporate and hospital levels, and in the tendency to compromise quality of care through provision of sub-optimal quantities and/or quality of key hospital inputs. The potential interaction between these

pressures and those of the contractual environment should also be noted here. Had the contracts placed more pressure on the contractor, for example through a lower contract price, it is arguable that they would have faced further pressures to increase production efficiency, and that this might have further aggravated the tendency to compromise quality of care.

By contrast with the situation in the contractor company, the motivations, management structures and systems in the public sector head offices and hospitals were shown to mitigate strongly against efficient production at every level. Public ownership was shown to result in diffuse and vague notions of accountability, responsibility and objectives at all levels. Reflecting this, the corporate structure and head office-hospital relationships were shown to reflect a range of bureaucratic imperatives, rather than those of efficient production of hospital services. Perhaps most importantly, the public sector management structures and systems were characterised by a high degree of centralisation, with hospital managers enjoying virtually no autonomy over most key management functions, thus ensuring that even motivated and competent hospital managers were unable to compensate for the extremely weak central support provided to them.

This analysis thus suggests two relevant conclusions. The first concerns the close linkage between ownership structure and motivations on the one hand, and management structures and systems on the other, with the former appearing to strongly influence the latter in the case of the contractor company, while in the public sector, the absence of any clearly defined goals and motivations appears to have resulted in management structures and systems which respond to bureaucratic imperatives, rather to any defined hospital performance requirements. The second conclusion concerns the sharp contrast, in terms of motivations, systems and structures, between the contractor company and the public sector. As has been shown here, these factors drive in almost opposite directions within the two organisations, strongly promoting efficiency in the contractor hospitals, while actively hindering it in the public hospitals.

8.3.3. The impact of the 'trading relationship' and competition on efficiency

Whereas the differential impact of ownership and the associated management structures and systems on hospital efficiency was clear-cut, the analysis of the impact of the 'trading relationship' between public purchasers and contracted providers suggests somewhat more subtle linkages with hospital efficiency.

On the one hand, the interview data did provide some evidence that, in combination with the profit motive, the existence of a contractual or 'trading relationship' did encourage efficient contractor behaviour. This was seen, for example, in the fact that the contractor faces a defined contract price, as well as government scrutiny of price increases, and in order to meet profit objectives, must ensure that its costs fall below these prices by some defined margin. In response to this environment, the production process within the contractor hospitals is transparent to the company's own managers, who were clearly aware of the determinants of costs, and of input/output relationships, and who apply this information to manage costs wherever possible.

On the other hand, there are several reasons to believe that the impact of the 'trading relationship' on hospital efficiency under the current contracts is far weaker than it might otherwise be, and that this contributes to the failure of the government to realise the potential efficiency gains from contracting out. This study has indicated that the government functions as a relatively crude and unsophisticated purchaser of services, with purchasing decisions based on crude measures of need, rather than on any measures of cost effectiveness, and with evidence of poor negotiation, specification and monitoring of contracts. As a result, production in the contractor hospitals remains completely opaque to the purchaser, and the contractor faces relatively weak pressure from the purchaser's side to behave efficiently.

Several of the contractor's behaviour patterns make sense as responses to this contractual environment. As indicated above, the contractor is motivated to reduce costs and hence to maximise margins within the ruling contract price. The tendency to reduce costs through reduction in the quantity and/or quality of inputs is encouraged by the lack

of specification in the contract, as well as by the lack of systematic monitoring of contractor performance, and is subject only to the contractor's own quality constraints.

This analysis therefore suggests that the simple existence of an arms-length 'trading relationship' certainly has some positive effects on production efficiency in the contractor hospitals, at least in contrast with the directly managed public hospitals studied here. However, it is also clear that the potential efficiency gains to the government from this form of relationship are not being realised, primarily due to the lack of transparency within the contractual relationship, and that this is in turn due to the current inability of the government to act as a sophisticated and informed purchaser.

As with the 'trading relationship', this study has demonstrated that competition has far less of a positive impact on hospital efficiency than it might potentially have. At the time of the study, public sector hospitals faced no actual or potential competition, and this was arguably an important contributor to the inefficiency of these hospitals. Perhaps more importantly, the absence of effective competition from the contracting process contributed to the unfavourable contract terms discussed in Chapter 6.

The impact of competition on the contractor's perceptions and consequent behaviours appears to be more mixed. On the one hand, its position as an effective monopoly supplier over several decades is likely to have created some degree of complacency, and to have undermined its incentives for efficient production. Where government is an unsophisticated purchaser, as was the case here, actual or potential competition would be expected to constrain the ability of the contractor to reduce costs at the expense of quality, since perceptions of low quality in its hospitals would undermine its competitive position. Conversely, the absence of competition removed this additional constraint on the contractor, making it easier to exploit the contract. The study also however elicited evidence that contractor officials are increasingly taking the threat of competition seriously, particularly in the light of the threat of increased international competition, and of the growing competitiveness and rivalry within the private hospital market in South Africa.

This study has therefore provided suggestive evidence that competition, whether actual or potential, is important in encouraging production efficiency, as well as in ensuring that government is able to secure overall efficiency gains from contracting out. However, the study design used here does not allow firm conclusions as to the relative importance of actual versus potential competition, nor as to the relative importance of competition and the other determinants of efficiency. For example, it is not possible to judge definitively whether or not competition is a necessary condition for securing efficiency gains from contracting out, or whether it would simply bolster the effects of a well designed contract and contracting process. It is probable that the extent to which competition itself is a necessary condition for the achievement of efficiency gains is contingent on other factors in the contractual environment, such as the capacity of the government to act as a sophisticated purchaser. Where government has this capacity, competition is probably not a strictly necessary condition for achieving efficiency gains. Where government does not have this capacity, as was the case here, competition has the capacity to enhance the effects of a well designed contract, specifically by ensuring a reasonable price, and by constraining the ability of the contractor to exploit the contract. In these conditions, competition is thus more likely to be a necessary condition for achieving efficiency gains from contracting out.

8.3.4. The determinants of efficiency: an integrated overview

This study has demonstrated clear linkages between the various determinants of efficiency studied here and production efficiency in the study hospitals. Firstly, there is strongly suggestive evidence that the relatively inefficient production patterns observed in the public hospitals can be explained by the lack of clearly articulated organisational goals and motivations, which may itself be attributable to public ownership, and to the inefficient management structures and systems in place at all levels. By contrast, the for-profit ownership of the contractor company led to clearly articulated efficiency goals throughout the organisation, as well as to management structures and systems geared towards efficient production. The existence of a 'trading relationship' was also argued to encourage efficiency in the contractor hospitals to some extent, mainly through the

linkage of hospital outputs to a defined contract price, although the extent of this was argued to be limited by the governments lack of capacity to function as a sophisticated purchaser. This situation was again in contrast to that in the public hospitals, in which the absence of any linkage between costs and outputs further constrained efficient production.

The study also demonstrated that some of these factors acted to constrain production efficiency, despite their potential to enhance it. The most important manifestation of this was the tendency of the contractor to reduce costs to the point where aspects of quality of care were compromised, by reducing the quantity and/or quality of inputs. While a tendency towards this behaviour would be expected from a profit-maximising contractor, this behaviour should in theory be constrained by the combined effects of a well designed contract and contracting process, transparency in the 'trading relationship', and competition. However, most of these circumstances did not apply in the contracts studied here, resulting in the contractor facing weaker incentives for efficiency than it ought to have, as well as in it having opportunities for exploitation of the contract. This study also demonstrated that the specification of contract obligations in all three contracts undermined production efficiency by separating the provision of hospital services from those of the district PHC services, thus imposing substantial coordination costs, and creating perverse referral and treatment incentives.

In addition to considerations of production efficiency, this study also examined the links between these various factors and the failure of government to secure the demonstrated potential efficiency gains from contracting out of hospital services. Perhaps the key issue in this context was the high total contract price paid by the government in all three contracts; again this was shown to be attributable to key failings in the contracting process.

The impact of total contract price on overall contractual efficiency is partly contingent on the cost/quality trade-off discussed here, since high total contract prices could still be compatible with overall efficiency gains from contracting out, provided that quality of care was sufficiently good to justify the margin between total contract cost and public

sector production costs. As was shown, however, quality of care in the contractor hospitals was not sufficiently superior to that in the public hospitals to account for the margin between total contract cost and public sector production costs.

These observations therefore indicate that contracting out, the consequent 'transparency of trading' and competition have the potential to enhance production efficiency within hospitals, and also to ensure that the government captures a sufficient proportion of these increased production efficiencies, thus ensuring overall efficiency gains from contracting out. This study has shown, however, that the combination of the current contracting process, the design of the contracts, and the lack of actual and/or potential competition for the contracts, prevented the government authorities from achieving these potential efficiency gains. This suggests that significant changes to these various elements of the contracting process are required to ensure efficiency gains from contracting out. These are discussed in Chapter 9.

8.4. Efficiency in the private hospital group

This section briefly reviews the efficiency of the private hospitals studied here, focussing specifically on differences between the private hospitals and the other two groups, and on the determinants of these differences. A fuller discussion of the performance of the private hospital group is provided in Appendix 24. As discussed in Chapters 1 and 7, the private hospitals differ substantially from the other two groups in terms of the characteristics of their user populations, the level of financial resources available, the economic incentives faced by managers and medical staff, and the patterns of care provided. As a result, direct comparisons of relative efficiency between the private and the other groups are unlikely to provide meaningful results. Instead, it would seem more useful to analyse the efficiency of the private hospitals in their own terms, and to draw conclusions from those observations which might be applied to the other two groups.

In this perspective, the study provided substantial evidence of a highly efficient production pattern in the private hospitals. This was seen, firstly, in the very high throughput and capacity utilisation, in the hospitals as a whole, as well as in specific functional areas such as the operating theatres; secondly, in the consistently high standards of quality of care observed in these hospitals across almost all of the evaluations conducted; and thirdly, in the fact that the private hospitals emerged as more efficient in production cost terms in most elements of the tracer cost analysis and the DEA, as well in some components of the general cost analysis, despite the use of much more expensive inputs. The maintenance of relatively low costs and high standards of quality in the face of expensive resource usage, very high capacity utilisation and rapid turnover implies highly efficient allocation, coordination and management of all production resources. Direct observations in these hospitals provided confirmatory evidence of the overall efficiency of resource allocation and management.

It is crucial to distinguish here between hospital level production efficiency as discussed in this chapter, and a broader concept of social efficiency, which takes into account the societal implications of resource allocation decisions by health sector institutions. On this view, the private hospitals could be argued to be highly inefficient, since there is evidence from this and other studies that patients are admitted unnecessarily to these hospitals, that they frequently provide unnecessary services, and that they use excessive quantities of often very expensive inputs in the production process (Broomberg *et al.* 1992, Price and Broomberg 1990). From a social perspective, these hospitals can thus be seen as contributing to a misallocation of resources, which is problematic in a context of constrained resources, as occurs in South Africa at present.

The analysis of ownership structures, as well as management structures and systems in these hospitals, provides convincing explanations for these various observations. As noted in Chapter 7, managers at both corporate and hospital level were strongly motivated by the objective of profit maximisation, and were also clearly aware of the operational implications of this primary objective. This was illustrated by the fact that hospital managers were explicitly motivated to maximise revenues, by minimising costs where this would increase margins, and by encouraging the use of expensive resources

where their costs could be passed on with a mark-up, thus increasing revenues. Importantly, corporate and hospital managers in the private hospitals were given both the autonomy and the support required to act effectively on these motivations. Managerial efficiency was also enhanced by the use of small and flexible management teams at the hospital and corporate levels, and by short and responsive lines of communication between the two levels. Overall, therefore, these hospitals demonstrated explicit and close connections between private for-profit ownership, the motivations of managers, and management structures and systems.

A comparison between these patterns and those observed in the contractor and public hospitals raises a number of interesting questions. As described above, corporate managers in the contractor company seem similarly motivated to maximise profits and returns to shareholders, and management structures and systems are similarly set up to ensure maximum production efficiency. However, as noted in Chapter 7, these motivations are less well communicated to hospital level managers than in the private hospitals, and hospital managers in the contractor hospitals appeared somewhat less aware of the detailed connections between operational efficiency and company performance, and are also somewhat less empowered than their private sector counterparts. Similarly, the information systems and monitoring of hospital performance by the corporate level was less sophisticated in the contractor than in the private hospitals, presumably because the contractor company did not regard investment in a sophisticated MIS as economically justifiable.

While these differences between the contractor and private hospitals are almost irrelevant when these two groups are compared with the public sector hospitals, it is nevertheless interesting to explore the reasons for these differences, which must, by definition, go beyond the for-profit motivation which both groups have in common. One important explanation for these differences is that the two groups differ significantly in terms of the complexity of production and revenue generation. As described above, the private hospitals have to provide a broad range of services within a complex, fee-for-service billing environment, and to engage in complicated relationships with their associated medical staff. By contrast, the contractor hospitals deliver a smaller, simpler

range of services, are paid on a fixed per diem rate, and have limited influence on throughput. These differences may also, however, be attributable to some elements of a 'public sector culture' within the contractor hospitals, despite the fact that the company is privately owned and operates for-profit. This would be explained by the fact that the contractor hospitals operate within a public sector context, respond to public sector requirements, and that several of the key senior corporate managers had been drawn from the public sector.

Perhaps more importantly in the context of this study, these observations of managerial motivations and efficiency in the private hospitals raise questions about their applicability within the public sector. More specifically, they raise the question of the extent to which the profit motive is itself a necessary condition for achieving superior managerial and hence hospital efficiency, or whether efficiency gains might be achieved through the use of substantial managerial autonomy and the other managerial structures and systems seen in the private hospitals, in the absence of the profit-motive.

The study design used here, which compared two for-profit companies with the public sector, does not allow firm conclusions on this question, which would have been more easily answered by comparing private for-profit, private not-for-profit and public hospitals. Some of the data from this study do however give some indications of possible answers to this question. In both for-profit companies, there appears to have been a clear link between profit maximisation objectives, the management structures and systems in place, and managerial behaviour, suggesting that for-profit ownership is an important, if not a necessary, condition for production efficiency. This conclusion is strengthened by the almost extreme opposite situation which prevails in the public sector, where the absence of a profit-motive was correlated with highly inefficient structures and systems, and by correspondingly inefficient managerial behaviour.

On the other hand, there was also suggestive evidence that much of the improved managerial efficiency observed in the private and contractor hospitals was attributable to the management structures and systems themselves, including such measures as managerial autonomy, strong and responsive support from the corporate level, and

effective methods of human resource utilisation. This raises the question of whether such structures and systems could emerge or be implemented in the absence of for-profit ownership, and what incentive structures would be required to ensure that this did occur. While this study cannot provide clear answers to these important questions, it is arguable that at least some of these structures and systems could be implemented within hospital systems, regardless of ownership, and that they could improve efficiency to some extent. This would constitute an argument for internal public sector managerial reform, for example through decentralisation of hospital management, and/or the creation of fully autonomous hospital organisations which remain under public ownership, but which operate under 'performance contracts' as discussed in Chapter 2. In these situations, incentives unrelated to profitability would be required to ensure the emergence of appropriate structures, systems and efficient managerial behaviour.

CHAPTER NINE: CONCLUSIONS, POLICY IMPLICATIONS AND RESEARCH PRIORITIES

9.1 Conclusions

This study has assessed the relative efficiency of contracted out versus directly managed public hospital services under three specific contracts, and has provided some empirical evidence on which to base policy decisions regarding the use of private providers in the provision of publicly funded hospital services. A further objective was to assess the impact of a series of determinants on the efficiency of contracted out hospital services, thus allowing conclusions as to the necessary conditions for ensuring efficiency gains from contracting out, or other forms of selective contracting, if indeed such efficiency gains are possible. This section examines the key conclusions of the study in relation to these objectives, while the policy implications of these conclusions, and suggestions for further research, are examined in some detail in the subsequent sections. As discussed further in Section 9.3 below, the generalisability of the conclusions of this study are somewhat constrained by the small samples of public and private hospitals studied here, since, unlike the contractor hospitals, they cannot be taken to be fully representative of the populations from which they were drawn. As discussed in Chapter 3, the public hospitals are in fact broadly representative of rural district hospitals in South Africa, although it is conceded that they may differ, in important respects, from the total population of public hospitals.

One of the fundamental conclusions of this study is that the contractor hospitals were able to produce most hospital services more efficiently than their public sector counterparts. This was illustrated by the substantially lower unit production costs for most outputs in the contractor hospitals, and by the lack of any systematic or consistent differences in quality of care between the two groups. Importantly, the lower contractor production costs were shown to occur in spite of lower capacity utilisation in these hospitals, suggesting that with higher throughput and capacity utilisation, the efficiency differential between the contractors and the public hospitals could have been even

greater than that observed here. This conclusion is important since it demonstrates the potential for efficiency gains from contracting out of hospital services under optimal circumstances.

The superior production efficiency in the contractor hospitals was shown to be attributable to more effective management structures and systems in these hospitals. These were shown to motivate, support and empower local managers to achieve much greater efficiency in the allocation and utilisation of human resources and other inputs than was found in the public hospitals. The study also provided suggestive evidence of a close linkage between the for-profit ownership structure of the contractor hospitals, and these more effective management structures and systems. This was in sharp contrast with the public sector, in which the absence of any clearly defined goals and motivations appears to have resulted in inefficient and disorganised management structures and systems which created severe inefficiencies at hospital level. It should be noted, however, that the study was not able to draw strong conclusions on the extent to which a for-profit ownership structure is itself a strictly causal and/or necessary condition for efficiency of hospital management.

The existence of a 'trading relationship' between the contractor and the government was also shown to contribute, to a limited extent, to the greater production efficiency in the contractor hospitals. This was suggested by the clear awareness, on the part of the contractor managers, of the influences of external factors (such as the contract price), and factors under their own influence (such as outputs and costs), on hospital and company revenues and profit margins. By contrast, public hospital managers had access to extremely limited and crude information on costs, outputs or revenues, and their behaviour was not influenced in any way by these data. The impact of the 'trading relationship' on the efficiency of the contractor hospitals was however also shown to be substantially constrained by the inability of the government authorities to act as informed and sophisticated purchasers of hospital services.

The second, and most important conclusion of this study is that, despite the superior production efficiency of the contractor hospitals, government purchasers failed to realise

consistent efficiency gains from contracting out. Instead, the data suggest that under current arrangements, contracting out may in fact be less efficient than directly managed public provision, when costs, quality of care and other dimensions of service efficiency are considered together. Looked at another way, this study suggests that the contractors are currently able to capture the majority of their superior production efficiencies in the form of profit, thus undermining the potential efficiency gains available to government.

This pattern is illustrated by the study's conclusions regarding both costs and quality of care. In terms of relative costs, this study showed that contracting out is more costly than public provision where in-patient admissions and OPD visits are considered the relevant outputs from the government's perspective. In terms of quality of care, the study failed to demonstrate any consistent differences between the two groups, eliminating superior quality as an explanation for the higher total contract costs per unit output in the contractor relative to the public hospitals. Perhaps more importantly, the study also showed a tendency on the part of the contractor to reduce the quality and or the quantity of key inputs, at times to the point of compromising quality of care. The existing contractual arrangements were also shown to result in a number of service related inefficiencies, including the separation of hospital and district PHC services, and the problems emerging from two employers within the contracted out hospitals. These problems were shown to lead to often serious coordination and morale problems, which further undermined the overall efficiency of the contracting arrangements.

The study demonstrated a number of interlinked factors which explain the disturbing conclusion that contracting out led to overall efficiency losses in spite of superior production efficiency in the contractor hospitals. The most important of these is the poor structure and design of the current contracts, which were shown to contribute directly to the high total contract cost faced by the government, to the problems of service delivery discussed above, as well as to undermine efficiency incentives for the contractor by shifting the risk in the contract substantially towards the government. These problems were aggravated by poor monitoring of contractor performance, and by the inefficient allocation and management of government staff and other resources used in the contractor hospitals.

Together, these observations suggest that perhaps the most critical explanation for the lack of efficiency gains in these contracts was the imbalance between the government and the contractor in relation to contracting skills. More specifically, the government authorities demonstrated severe lack of capacity to design, negotiate, maintain and monitor efficient contracts, while the contractor demonstrated substantial skill in designing and negotiating contracts favourable to itself. While this imbalance might alone be sufficient to undermine efficiency gains from contracting out, this study also showed that problems in the contracting process, and specifically lack of competition, further aggravated the inefficiency of the contracts, in this case by allowing the contractor to obtain a higher contract price than might otherwise have been possible, and by allowing it substantial influence over the structure and terms of the contract. It is also worth noting that poor government capacity itself influenced the extent of competition for the contracts, since the government's poor understanding of the dynamics of the private health care market led it to underestimate the extent of actual or potential competition, and hence to overestimate the extent of its dependence on the incumbent contractor.

This study has also provided substantial detail on the specific contractual problems which emerged from this imbalance of capacity and power between the government authorities and the contractor. One of the key problems in the contracts was shown to be the high total contract costs, due to a combination of the high per diem rate secured by the contractor, and the high total patient days billed under the contracts, this latter parameter itself due to the long LOS, as well as to the minimum occupancy clause in two of the contracts. Total contract cost was also shown to be inflated by the inappropriately high costs of government resources used at the contractor hospitals.

Another critical problem in contract design was the lack of incentives for contractor efficiency, due to an inappropriate shift of contractual risk towards the government. Contract terms contributing to this were the minimal specification of inputs and outputs in the contract, the long contract terms, the high per diem rates (guaranteeing a substantial margin for the contractor), automatic price adjustment clauses (reducing

incentives to hold costs down over time), and the per diem reimbursement method (which eliminated incentives to reduce LOS). It should be noted, though, that contracts which shifted a greater share to the risk to the contractor might also have required the government to pay a higher price. More efficient contracts would thus need to address all of these individual problems of contract design, and approaches to this are discussed further below.

These observations lead to the third conclusion of this study, namely that contracting out of hospital services has the potential to generate substantial efficiency gains relative to direct public provision, provided that suitable contractual conditions are in place. While this study has provided fairly strong suggestive evidence to support this conclusion, it relies on two further assumptions which this study did not explicitly test. The first of these is that the 'surplus' or savings generated by contracting out of hospital services will be sufficiently large to allow the government to achieve lower total costs (for similar quality) than those of direct public production, while still allowing contractors to generate sufficient profits to attract adequate bidders for contracts. The large contractor profit margins demonstrated in this study do suggest that contract prices and total contract cost could be reduced to the point where genuine efficiency gains would result, without driving profit margins so low as to deter bidders from competing for contracts.

The second assumption is that government authorities, in South Africa or in similar countries, could create and maintain adequate capacity to design, let, negotiate and monitor contracts which maximise contractual efficiency. While this study showed current government capacity in these areas to be very poor, and did not explicitly examine the prospects of improving it, it is likely that strong government commitment on these issues would result in either the development and/or the outside procurement of such capacity in the foreseeable future. This specific issue is discussed further below.

9.2 Policy implications

The findings of this study have several implications for health policy makers in middle and low income countries, with regard to the specific issue of selective contracting of clinical services[161], as well as to the organisation of publicly managed health services. These two sets of implications are discussed in some detail below.

9.2.1. Implications for policy on selective contracting of clinical services

There are several reasons why government authorities in South Africa, or in other middle or low income countries might consider selective contracting of hospital services, or of other clinical services. These include the potential for efficiency gains, and the fact that contractors may possess skills, capacity or resources not available to the government, but which are regarded as essential to the fulfillment of health policy objectives. The government may also wish to free up its own administrative resources in order to focus them on its major priorities, and to use contractors to carry out non-priority functions. Under circumstances of severe resource constraints, as occur in the health sectors of South Africa and numerous other middle and low income countries, more than one of these reasons for selective contracting will often co-exist.

While the potential efficiency gains from selective contracting may therefore be fairly broadly defined, and need not necessarily require cost savings in cash terms, this study has nevertheless shown that a number of conditions must be in place in order to ensure that the desired efficiency gains are achieved, and to avoid efficiency losses through exploitation by contractors. In the following paragraphs, each of these broad sets of conditions is reviewed with specific reference to the problems in attaining such conditions in a middle or lower income country context, and to possible solutions to these problems. Thereafter, consideration is given to the broader question of which

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161 While several of the policy implications of this study apply equally well to contracting out of clinical and non-clinical services, this discussion confines itself to questions relating specifically to the contracting out of clinical services.

minimum set of these conditions is essential before selective contracting of clinical services can be recommended as an appropriate policy in the health sector.

9.2.1.1. Design and monitoring of efficient contracts

Governments face a number of choices in relation to specific form of selective contracting available to them. As discussed in Chapter 2, these choices relate to the range of bidders allowed to bid for contracts (e.g. internal contracting, competitive tendering and contracting out to either for-profit or not-for-profit providers), and to the ownership of assets (e.g. contracting out to private providers who own the hospitals, or management contracts for publicly owned facilities, or 'build, operate and transfer' contracts). Chapter 2 also highlighted the growing importance of long term, trust based contractual relations in the health sector as distinct from short term, competitive, 'spot contracts'. The appropriate choice of contractual form in any situation will thus depend on a number of factors, including the government's needs and policy objectives, the supply of potential contractors in the public and private sectors, and the broader social and political environment.

Whichever form of contracting is applied, it will be essential to design efficient contracts in order to avoid all of the shortcomings identified in the three contracts analysed in this study. Firstly, governments should seek to minimise total contract cost by obtaining the lowest feasible contract price (while not shifting all risk to the contractor, and thus risking exploitation of the contract), and by ensuring that the total number of outputs paid for under the contract corresponds to the government's needs, and cannot be artificially inflated by the contractor. Several mechanisms can be used to achieve these specific objectives: the output quantities can be specified within the contract, with some margin on either side to allow for variations in demand; alternatives to per diem reimbursement methods could be used in order to eliminate incentives for the contractor to increase outputs unnecessarily; and contractor performance can be carefully monitored to ensure compliance with these requirements. In addition, contracts should exclude minimum occupancy clauses or other similar provisions which force the

government to pay for services which are not actually provided, although once again, the impact of these modifications on the distribution of the risk in the contract must be taken into account.

In addition to controlling total contract costs, efficient contracts will need to ensure that the distribution of risk between the parties is such that contractors face sufficient risk to encourage efficient performance, while also ensuring that risk to the contractors is not so onerous as to deter them from bidding for the contract. In addition, the contract should be designed so as to limit opportunities for the contractor to exploit the contract for its own ends. To these ends, contracts should, if possible, exclude automatic price adjustment clauses, instead fixing prices for the duration of the contract, with some provision allowing interim adjustments only under specific circumstances. Contracts should also specify, in some detail, the required quantity and quality of both inputs and outputs, as well as performance indicators by which the government can monitor contractor performance. Contract terms should also be of more reasonable length than was the case here, and should definitely not be so long as to remove all threat of competition from the contract. The reimbursement method could also be shifted from a per diem to a budget or per case based system, in which the contractor bears more risk than under current arrangements.

The contract specifications should ensure the optimal allocation of roles between the government and the contractor. More specifically, contracts should probably cover both hospital and district PHC services, rather than only one of these, and the current dual employer situation should probably be avoided, allowing contractors to meet their obligations using an integrated team under their control. To the extent that the government does allocate staff or other resources to contracted out hospitals, this should also be done with careful attention to efficiency considerations.

In addition to the design and negotiation of efficient contracts, this study has also demonstrated that government capacity to monitor contractor performance is integral to the achievement of efficiency gains. Such monitoring would need to focus on basic utilisation parameters such as LOS and turnover rates to ensure compliance with output

requirements, as well as on contractor performance relative to specified performance indicators. The ability of government to act as a sophisticated purchaser of health services would also stimulate greater efficiency on the part of the contractor through a stronger impact of 'transparency of trading'. Given the complexity of hospital service production, detailed monitoring of contractor performance could potentially be very complex and costly. Contract design should therefore focus on the inclusion of easily measurable input, output and performance indicators. Similarly, the overall monitoring process should be designed so as to balance the costs and benefits of this component of the contracting process.

9.2.1.2. Government capacity to manage the contracting process

This study has clearly demonstrated that adequate government capacity to manage all aspects of the contracting process is a fundamental requirement for the achievement of efficiency gains from contracting out or other forms of selective contracting, and that at a minimum, government must be able to match the skills and experience of private sector contractors in contract design and negotiation. Such capacity would include having the necessary data and skills to make the appropriate decision to contract out, to design and negotiate efficient contracts, to design and execute often complex competitive tendering processes, and to monitor contractor performance. More specifically, the government would need to understand and specify its own needs in some detail, and be able to integrate contracted with directly managed services. It would also need to understand the structure of production costs in its own hospitals, as well as in those of potential contractors, and the potential quality and quantity problems involved in contracts of this kind, so as to specify contracts which reduce these risks. It would also need to have a detailed grasp of the competitive dynamics in the contracting market, as well as of the factors which affect risk and reward for potential contractors. In addition to these content based skills, the government will also require strong general negotiation and legal skills.

This study has also shown that the two South African government authorities studied here clearly lacked almost all of these capacities, and this problem is almost certainly generalisable to the most of the remaining government authorities in South Africa, as well as in many other middle and low income countries. In this situation, there is a serious risk that selective contracting will fail to realise efficiency gains, and may even result in inefficiencies, due to inappropriate decisions to contract out, or poor contract design and monitoring, resulting in poor contractor performance, or even frank exploitation of the contract by for-profit contractors.

While adequate government capacity is therefore an essential prerequisite for efficient contracting, governments or government departments lacking this capacity could utilise a number of different mechanisms for accessing and developing this capacity. One approach would be for government to develop sophisticated internal expertise in contracting and procurement at central level. This model is currently applied in South Africa, where provincial administrations and the central government each have centralised procurement authorities (Tender Boards), which serve line function departments. However, as currently organised, this model fails to provide line function departments with the required skills or support, and instead functions as an extremely rigid and inefficient bureaucracy, hindering rather than assisting the contracting process. The South African experience highlights an important risk of this model, namely that the very problems of government inefficiency which a government may be attempting to address through contracting, may interfere with the efficiency of the contracting process itself. This is obviously not a necessary consequence of such a model, and could be avoided through careful allocation of the roles and skills between the central authority and other departments.

In addition to bureaucratic and other problems with this model, some governments may even lack the capacity to develop the required expertise at central level. In these circumstances, governments may look to outside sources for procurement expertise. Such sources could include international agencies, or private sector organisations, from within or without the country. The role of such organisations may be limited to specific elements of the contracting process, for example, design of the contract and

management of the tendering process, or may be more extensive, including long term monitoring of contractor performance. This model is commonly applied in large scale infrastructure development projects in middle and lower income developing countries (Ferreira and Khatami 1996).

Each of these models could be regarded as permanent, or as an interim measure while permanent capacity is developed, with this decision being strongly influenced by local circumstances, such as the likely success of capacity development efforts. However, factors such as economies of scale and the need to eliminate corruption lend support to the development of permanent capacity at the central level.

9.2.1.3. Competition

This study has shown that some element of competition between contractors, whether actual or potential, is an important factor in ensuring efficiency gains from selective contracting. Actual competition for contracts substantially strengthens the bargaining power of government in the contracting process, particularly by contrast with direct negotiation with a monopoly supplier, as was the case in the contracts studied here. This increased bargaining power allows the government much greater influence over the terms and conditions of the contract, including contract price, which will also be driven lower by the competitive process itself than would be the case in a direct negotiation.

Where no actual competitor exists at the time of awarding the contract, the threat of potential competition for the next contract round is also likely to stimulate greater efficiency and compliance with the contract on the part of the contractor, who will need to demonstrate value to the government in order to ward off the threat of losing the contract at the next round. The duration of the contract also plays an important role in the effects of competition on contractual efficiency. Where the contract term is long, as was the case in this study, the threat of future competition is weak, and will have minimal impact on contractor performance, until close to the expiry date of the contract.

Where the contract term is short, however, competition will have a much greater impact on contractor performance.

It is important to note, as discussed above, that this study did not draw firm conclusions as to the relative importance of actual versus potential competition, nor was it able to judge definitively whether or not competition is a necessary condition for securing efficiency gains from contracting out, or whether it would simply bolster the effects of a well designed contract and contracting process. The study has suggested, though, that where government functions as a sophisticated buyer, competition is probably not a strictly necessary condition for achieving efficiency gains, but that where government lacks this capacity, competition is a more important factor in achieving such efficiency gains.

In South Africa, the historical pattern of contracting out of hospital services has led to a situation in which a single contractor currently dominates the contracting market in respect of hospital services. However, there is substantial potential competition for this contractor from several other local organisations which currently own and/or manage private hospitals, as well as from some international hospital management companies which have expressed interest in bidding for South African hospital management contracts. This suggests that it would not be difficult to ensure a competitive situation in the awarding of future hospital management contracts in the South African context. The situation is likely to be similar in other middle income developing countries, which have relatively well developed private health sectors, and which are also attractive to international contract management companies.

However, it may be more difficult to ensure competition in low income countries, which have small private health sectors, which are usually dominated by not-for-profit providers. In these situations, governments consider letting management contracts for publicly owned facilities, to either not-for-profit or for-profit providers. However, not-for-profit providers, often mission hospitals, may not be interested in competing for hospital management contracts, and even if they were so, might face capital and other constraints to entering this market. One possible solution for such countries might be the

use of international contract management companies to manage public hospitals, a practice that has been attempted in Kenya in recent years, and is currently being explored in other Southern African countries, including Swaziland, Lesotho and Botswana (Haddon 1995). There are however some constraints to this alternative. Governments may not wish to hand over management of their hospitals to foreign companies, preferring to keep them in local hands; and international contract management companies may not find the opportunities in these countries particularly attractive. It is also possible that competitive and/or contestable conditions may pertain more in the PHC sector than in hospital services, making the PHC component of the health services more suited to selective contracting.

9.2.1.4. For-profit versus not-for-profit contractors

This study did not explicitly examine the role of not-for-profit providers as contractors, and thus no firm conclusions can be drawn on the potential for such contractors to play a role in the delivery of hospital services. The study did provide some indicative evidence that for-profit ownership was linked to efficient management structures and systems and hence to efficient production, suggesting that the for-profit ownership structure may be an important determinant of efficiency in a contractual situation.

However, the study was not designed to produce firm evidence on the causal associations between these factors, and thus cannot exclude the possibility that not-for-profit contractors could function equally efficiently under well designed contracts. This possibility is strengthened by the evidence in this study that contracting out can lead to more efficient hospital production, even in the absence of the for-profit motive, through the impact of an arms-length 'trading relationship' between the purchaser and the contractor. Similarly, competition itself is likely to encourage greater efficiency on the part of contractors, even if this competition is between not-for-profit providers competing for government funding. These observations suggest that availability of for-profit providers is not a necessary condition for successful implementation of contracting out, and that, provided there is adequate government capacity to manage the

contracting process, contracting out of services to not-for-profit providers may generate significant efficiency gains.

In addition to issues of government capacity, successful contracting out also requires that the contract is designed to reflect the for-profit or not-for-profit nature of the contractors involved. More specifically, contracts should take into account the different motivations and responses to contract incentives that might be expected from such providers. As discussed previously, contracts with for-profit providers need to prevent exploitation by profit maximising contractors who might reduce costs to the point of compromising quality of care, or fail to comply with contract requirements in other ways.

While contracts with not-for-profit providers may have to deal with exploitation of this kind, it is less likely to be a problem than with for-profit contractors. Contracts with not-for-profit contractors may however have to deal with other, more specific problems. In South Africa, for example, contracts with a not-for-profit provider of TB hospital services are uniformly characterised by inefficient service delivery, resulting in poor quality of care, and often substantial budget overruns. Since the organisation concerned is a charitable one, government's response has historically been to meet these budget deficits and to accept the relatively poor quality of services, resulting in higher effective contract prices than implied in the original implicit contract, and in net efficiency losses. This illustrates the importance of ensuring that contracts with not-for-profit providers are as strict as those with for-profit providers in respect of issues such as input and output specifications, quality of care and contract price. Failure to adopt this approach may well result in net efficiency losses from such contracts.

9.2.1.5. Political and economic conditions

While this study did not explicitly examine the impact of political conditions on the prospects for selective contracting, the political environment is likely to be an important determinant of whether a government succeeds in its efforts to secure efficiency gains

through contracting. Conducive political conditions include those in which the social, judicial and political environment encourage and support trust-based cooperative contractual relations, or at a minimum, ensure compliance with contracts and remedies for lack of compliance.

A more specific political problem may occur in resistance to current and new contracts from trade unions and/or individual workers at institutional level. In many cases, contracting out may be perceived as a threat to jobs, or as a mechanism by which the government is seeking to reduce employment levels and/or wages over time. This has been the experience with South African government efforts to contract out clinical and non-clinical services within the health sector, and is also experienced by private health sector organisations attempting to contract out 'non-core' services, such as catering.

In order to forestall or to minimise these problems, it will be essential for senior government officials to consult with worker representatives prior to the decision to contract out a service. This dialogue would provide an opportunity for the government to convince workers that that the decision to contract out has been taken in the best interests of efficient service delivery, and may also alert management to the specific views and needs of workers, which could then be built into the contract, if feasible.

In some instances in South Africa, government has responded to worker objections to contracting out by using approaches which compromise the efficiency of the contract. For example, some contracts for catering or laundry services specify that the contractor must take over and manage existing public sector staff working in the laundry or kitchen. Similarly, the contract at Shiluvana hospital, which was studied here, required that the contractor manage a full complement of public sector staff. While these compromises do address worker concerns regarding job security, they also create a situation in which these workers have dual loyalties, and seriously constrain the ability of the contract manager to achieve efficiency gains. It is therefore important to ensure that compromises developed to address political obstacles to contracting do not ultimately undermine the efficiency gains obtained from the contracts.

An appropriate economic environment is also essential to the achievement of efficiency gains from selective contracting. Where resources are constrained, contract prices may be too low, encouraging exploitation, or even failing to attract bidders for the contract. In addition, selective contracts can lock public resources in for long periods, preventing necessary reallocations during the contract term. Selective contracting is thus unlikely to succeed in highly resource constrained environments.

9.2.1.6. Negative effects of selective contracting

Decisions as to the advisability of selective contracting should also take into account some of the potentially negative effects of this approach to service delivery. As this study has demonstrated clearly, poor implementation of contracting, for whatever reason, may result in overall efficiency losses for the health system. Even if the contracts themselves produce efficiency gains, however, there may be other important negative effects on the health care system as a whole. One example of these, also demonstrated in this study, is the potential for contracting to create a lack of coordination between different components of the health services. Similarly, contracting may generate the complex problem of differential levels of remuneration between staff employed by contractors and the public sector, as was again demonstrated here. Lack of coherence may also occur at the policy level, where the values and incentive structures inherent in formal contracts with providers may not fit easily with those that prevail in the public sector as a whole.

There is also a risk that contracting may undermine the broader social objectives of the health care system, particularly when it is widespread, and where for-profit contractors are introduced into the system. This might occur, for example, through public providers starting to function like for-profit providers, eliminating essential but unprofitable services. Chapter 2 highlighted the risk that widespread introduction of contracting may lead to reduced levels of employment and wages, leading to an increase in the costs of unemployment insurance and other social costs, and potentially undermining any efficiency gains achieved by the contracts themselves.

As importantly, contracting out may lead to a situation in which government becomes substantially dependent on one or more contractors for the delivery of essential services. Where government becomes dependent on a monopolistic contractor, as has occurred in South Africa, this can severely limit the government's bargaining power in negotiating future contracts, thus limiting the extent of efficiency gains from contracting. Such dependency can and should be avoided by ensuring competition for contracts, either from local and/or from international organisations. Contracting may also however create a more general dependency on contractors, with the government becoming unable to deliver certain services itself. This form of dependency limits the government from conducting ongoing reassessment of the costs and benefits of contracting out, and may well lead to situation in which contracting persists, even when the government would choose to provide services itself. One possible solution to this problem is for governments to maintain at least some capacity to deliver services should this be required, for example, through the use of management contracts at publicly owned hospitals. This would, in theory, allow governments to take over service delivery themselves should this be necessary, although government's lack of functional capacity could prove as powerful a constraint as its lack of physical assets in preventing it from undertaking service delivery.

Finally, the experience of other countries demonstrates that selective contracting or other similar reforms lead to substantial transactions costs, which may themselves be sufficient to undermine any efficiency gains from contracting. This suggests that potential transactions costs, both one-off and recurring, should be estimated prior to decisions to contract for clinical or non-clinical services.

9.2.1.7. Overview: should governments contract out the delivery of hospital services and/or other clinical services?

While this study was limited in its scope, it has provided some evidence that governments can achieve efficiency gains from contracting out the delivery of hospital

services to private organisations (and by implication, from other forms of selective contracting), provided that a number of important conditions are in place. These include the presence of some degree of contestability, government capacity to act as a competent purchaser and regulator, the availability of management capacity on both the purchaser and provider sides, and a conducive social, economic and political environment. Perhaps most importantly, governments should carefully specify and quantify the need for such outside assistance, the net benefits expected from it, and the likely time period over which outside assistance is required. Governments will need to ensure that political obstacles to selective contracting are overcome, and that the potential negative effects of this approach to service delivery are anticipated and prevented. Assuming that these fairly rigorous conditions are met, selective contracting may well allow governments to improve the efficiency of service delivery, at least in the short term.

Where the need for contracting, and the overall gains to be expected are less clear, however, the complexity and problems associated with selective contracting suggest that alternative approaches, including internal public sector reforms, should be strongly considered. This would be more so the case where government capacity to manage the contracting process is weak, where there is limited or no actual or potential competition for the contract, where government faces strong political obstacles to contracting out, and where the risk of negative consequences, such as dependency or inequity, are high.

There is thus no unconditional answer to the question of whether or not governments in middle or low income developing countries should contract out hospital or other elements of service delivery. Instead, this study has made it clear that the success or failure of contracting out is fundamentally contingent on a number of environmental factors; it has also indicated that, given the complexity and risks of contracting out, this decision should always be taken carefully, and should, if possible, be implemented incrementally and subjected to continuous review. While this study was limited to the contracting out of hospital services, similar considerations would apply to other forms of selective contracting, and to other clinical services, such as PHC, as well as to many other non-clinical services.

9.2.2. Implications for organisation of publicly managed health services

Some of the findings of this study also have policy implications for the internal organisation of publicly managed services, irrespective of policy decisions on contracting. These implications are examined here in the context of South Africa's public hospital system, but could also apply, with suitable modification, to public hospital systems in other developing countries.

9.2.2.1 Development of 'performance contracts' between hospitals and government authorities

The study demonstrated that an arms-length contractual or 'trading relationship' between government purchasers and hospital providers may have some positive effect on efficiency in its own right. This suggests that more widespread introduction of this form of relationship within the public hospital system may improve efficiency, even in the absence of formal contracts with private providers. In this situation, hospitals would enter into some form of 'performance contract' under which they would agree to deliver a specified quantity and quality of outputs, and the hospital budget would be linked to performance against the 'contract'. This would, in theory, improve efficiency by creating greater awareness by hospital management and staff of the expectations of them, as well as of critical input-output relationships in the production process. This approach, with or without provider competition, is a key element in the 'internal market' reforms in several developed countries, and is being attempted in some developing countries, as discussed in Chapter 2. However, its feasibility in a developing country context remains unclear. Such arrangements require sophisticated administrative systems and staff capacity, and have high administration costs. In many developing countries, such reforms might thus be unfeasible. In South Africa, however, where administrative capacity is sufficient or could be developed to an adequate level, the creation of some form of contractual relationships based on 'performance contracts' between publicly owned hospitals and government authorities may present an attractive

alternative to full-scale contracting out to private providers, and may well lead to efficiency gains.

9.2.2.2. Competition between public hospitals

Where such contractual relationships are feasible, it is also possible that some element of internal competition between publicly owned hospitals might further enhance efficiency. In this context, competition might take the form of public hospitals competing for publicly funded patients, with budgets being determined in part by the numbers of patients attracted by the hospital. There are of course several limitations to this approach in developing countries, including the fact that hospitals are monopoly suppliers in most geographic areas aside from the main urban centres, as well as the significant administrative requirements of this approach. These problems clearly apply to many parts of the South African public hospital system, with competition between public hospitals being feasible only in a few metropolitan areas of the country. In these areas however, it may be possible to utilise an element of competition between public hospitals, most of which are large, well funded teaching hospitals which are generally regarded as inefficient, and which could benefit from the need to compete for patients and hence for budgets.

9.2.2.3. Decentralisation of management authority to hospital level

The management structures and systems applied in the private and contractor companies and hospitals studied here also suggest some mechanisms to improve the efficiency of public hospitals, even in the absence of the more substantial reforms discussed above. One such mechanism is the decentralisation of substantive management authority to the hospital level. Such authority could extend to most of the key management functions, including financial and personnel management and procurement. This would overcome the numerous problems attributable to overcentralisation of authority in the South African public hospital system (Hospital Strategy Project Consortium 1996b), and

would almost certainly lead to much greater initiative on the part of local managers, as well as to speedier and more appropriate resolution of the numerous problems which are currently handled at the head office level. In the South African context, such a policy shift would require significant legislative reform, as well as substantial investment in developing adequate managerial capacity. Notwithstanding these obstacles, decentralisation of hospital management authority is currently identified as a critical policy issue in the South African context, and is receiving significant attention (Hospital Strategy Project Consortium 1996b). As discussed in Chapter 2, however, decentralisation without substantial changes in the balance of power between the hospital and the centre, is unlikely to impact significantly on efficiency. Decentralisation reforms of this kind should thus be implemented within a broader framework of a shift in the traditional power relations in public sector bureaucracies.

9.2.2.4. Improving hospital management structures and systems

Since formal decentralisation of managerial authority involves fairly substantial policy reform which may take some time to be successfully implemented, some of the other mechanisms identified in this study, including changes to the structure and functioning of management teams at both hospital and head office level, could be more rapidly and effectively applied in South Africa as well as in other developing countries. As demonstrated by the contractor and private hospital companies studied here, management teams at both levels should be small, simple in structure, and should function in an integrated manner, with a single locus of executive authority, and with multi-skilled individuals carrying out many different functions. In addition, the role of the head office team should be explicitly defined as providing support and leadership, on an explicitly defined set of issues, to hospital level management. These changes will require careful selection of appropriate officials to lead and operate within these management teams, substantial improvements in the skills of officials at all levels, and the development of adequate information systems. These latter requirements need not necessarily be fully in place prior to implementation of these management reforms,

since the reforms themselves should be expected to contribute substantially to development of managerial capacity and systems.

In addition to the development of new organisational structures, attention should be paid to the incentives facing hospital and head office managers. As discussed above, the current South African public service strongly discourages any risk taking initiatives, and encourages rule bound, inefficient behaviour (Hospital Strategy Project Consortium 1996b). This situation could be changed by the introduction of performance based contracts for senior management, in which reimbursement is linked to performance, as well as by the development of systematic performance review mechanisms, as was seen in the private hospital companies, and to a lesser extent in the contractor company.

Together, these various reforms to management structures and systems would go a long way towards addressing the severe fragmentation, duplication of functions, and general inefficiency which currently characterise the public hospital systems of South Africa and numerous other middle and low income developing countries. As such, they may be an important forerunner to the introduction of more comprehensive and complex reforms, such as decentralisation of management authority, competition between public hospitals and hospital 'performance contracts'.

9.2.3. Overview of policy implications

This study has identified a number of approaches to improving the efficiency of public hospital systems in a developing country context. These can be viewed as occupying a spectrum of political and administrative complexity, with formal contracting out to private providers being the most complex, reorganisation of management structures and systems the least complex, and with internal 'performance contracts' and decentralisation of authority lying in between these two extremes. Governments wishing to address inefficiencies within public hospital systems thus have a range of alternative policy options to choose from, and the appropriate choice will be highly contingent on

local conditions, including such factors as government managerial capacity, and political attitudes to the use of private providers in the delivery of publicly funded services.

Where formal selective contracting is not feasible, for either administrative or political reasons, this study has identified a number of other 'internal reforms' to the public sector, most of which are less politically controversial, and some of which are less administratively demanding. While these reforms may go a long way towards addressing the inefficiency of current public hospital systems, it remains to be seen whether they are capable of overcoming all of the critical problems faced by publicly owned and managed hospitals, or whether the more radical approach of selective contracting, and specifically of contracting out to private providers, will come to be seen as an essential component in efforts to improve the efficiency of public hospital systems.

9.3. Priorities for further research

As noted in Chapter 2, there remains relatively limited empirical analysis of the impact of contracting out, or other forms of selective contracting of publicly funded clinical services in either developed or developing countries. While this study has provided some insights into these questions in the context of a middle income developing country, its limited scope and scale constrain the generalisability of its results to other countries as well as to contracting of non-hospital services. An obvious and urgent research priority is thus to extend the scope of research on these issues to include analysis of experiences with selective contracting in other developing countries, as well as for other non-hospital clinical services, such as PHC and clinical support services (e.g. laboratory/pathology services etc.).

Analysis of selective contracting in a range of other countries is critical since it will allow more systematic analysis of the impact on contractual efficiency of different contracts and contracting processes, as well as of the various environmental factors highlighted by this study. Similarly, extending the analysis to non-hospital services would assist in identifying those specific features of particular clinical services which

either support or undermine contractual efficiency. For example, the theory of contracts, as discussed in Chapter 2, would predict that contracts for more complex services would be more likely to lend themselves to exploitation by contractors than would be the case with less complex services. While this theoretical argument would suggest that exploitation, and hence inefficiency, would be more likely in contracts for hospital services than those for PHC services, it would be useful to test this prediction with sound empirical evidence.

In addition to extending the scope of empirical analysis of the impact of selective contracting, further research is also required on the impact of the particular determinants of contractual efficiency highlighted by this study. More specifically, it would be very useful to examine the impact on contractual efficiency of such factors as competition for contracts, the ownership structure (for-profit versus not-for-profit) of contractors, and government capacity to manage the contracting process. It might be possible to undertake such analyses through comparative, retrospective analysis of contracting in a range of different countries where different environmental conditions prevail. In this situation, however, it is often difficult to isolate the specific impact of particular environmental conditions, as was the case in this study. It might thus be more useful, if somewhat more logistically complex, to assess the impact of these factors in prospective studies which can be designed to isolate the impact of these various individual factors.

Over and above these relatively theoretical analyses, it might also be useful to undertake 'action research' to evaluate the effect of specific interventions designed to achieve greater efficiency within a contractual environment. For example, where a government is engaged in selective contracting of some form, or plans to let a new contract, an intervention to strengthen government capacity to manage the entire contracting process could be designed and evaluated on a prospective basis. Similarly, more limited interventions, for example to improve the monitoring of contractor performance, or to assist not-for-profit providers to bid for contracts, might also be implemented and evaluated where the environment is appropriate.

As discussed in Chapter 2, governments in both developed and developing countries are increasingly experimenting with various forms of selective contracting in efforts to improve the efficiency of publicly funded health services. In this context, the experiences of countries further along the road with these reforms will be very important for those at earlier stages of the policy debate, as will the availability of extensive and detailed information on the successes and failures of various approaches to contracting, and on the determinants of success or failure. In this context, the research approaches outlined here, as well as others, will become increasingly relevant and urgent.

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