AN ECONOMIC ANALYSIS OF DIRECT PAYMENT FOR HEALTH SERVICES IN URBAN ZAMBIA: IMPLICATIONS FOR EQUITY

by

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ABSTRACT

The thesis discusses health financing policy, introducing or enhancing direct payment for health services in low income countries from a viewpoint of equity through theoretical and empirical economic analysis using the case of urban Zambia. It analyses equity implications of alternative direct payment mechanisms to user fee - voluntary prepayment and pre-purchased discount card. These alternative payment mechanisms are compared with the theory of consumer's choice in an econometric framework. Two theoretical models: demand for alternative payment mechanisms and demand for health services under chosen direct payment mechanisms, are elaborated applying expected utility theory and the law of demand, respectively. These models illustrate the effects of fee schedule, income, perceived health status and perceived quality of care on consumer's demand for health services. These demand models also predict the theoretical equity implications of alternative payment mechanisms. These theoretical explorations are empirically tested with data from the study field. Three data sources: household survey focusing on health seeking behaviour, records at health facilities, and outpatient questionnaire survey, are used for statistical analysis. Consumer's demand model for payment mechanisms is estimated with qualitative response logit model. Consumer's demand for health services is analysed not only with parametric method but also with non-parametric method for categorical data. The results of the statistical analyses support the theoretical demand model for health services and the effects of perceived health status in consumer's choice of payment mechanisms. Perceived quality of care is not found significant in the choice of payment mechanisms. These empirical findings suggest positive equity implications of employing voluntary prepayment or pre-purchase discount card in environment dominated by user fees even under conditions where the improvement of quality of care is difficult. These findings contribute to the economic theory of demand for health care, and feed evidence into the discussion on health financing policy in low income countries.

Dedicated to

Zoe

without whose support, encouragement, and love
this thesis could have never been completed

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CHAPTER 1

INTRODUCTION

CONTEXT AND BACKGROUND OF THE STUDY

1.1 CONTEXT

1.1.1 INTERNATIONAL HEALTH FINANCING POLICY

Health sector reforms have been pursued in many countries in the world since the 1980's (OECD, 1994; Berman, 1995) including Sub-Saharan African countries (Gilson and Mills, 1995). Financing reforms are key components of health sector reforms. One financing reform, the introduction or increase of direct payment by health care users, known as "cost-recovery" or "cost-sharing" or "the Bamako Initiative", had been adopted in most sub-Saharan African countries by 1994 (Shaw and Griffin, 1995; Stierle, 1999), reflecting influential international policy initiatives (World Bank, 1987; UNICEF, 1990; Cassels, 1995). Levying fees on users of public health care services at the point of utilisation according to a certain fee schedule, the policy of user fees, has been a common form of this policy (McPake, 1993; Creese and Kutzin, 1995).

However, the introduction or enhancement of direct payment employing user fees has been criticised (e.g. Gilson, 1988; Mills, 1997) because it creates a financial barrier to health care, which would deter access to health care by the people, especially by the poor section of the population.

Payment mechanisms involving risk sharing have also emerged in health financing policy in Sub-Saharan African countries during the 1990's (Shaw and Griffin, 1995). Risk sharing is considered to have potential to reduce the deterioration of access to health care created by user fees. Alongside user fees, voluntary prepayment and social insurance models have been proposed as alternative models of risk sharing after the introduction of user fees (which give users an incentive to pay the premium of prepayment). Voluntary prepayment is sometimes considered to have more potential than the social insurance model since it is applicable to a large number of people working in informal sector (McPake, 1995). However, use of this mechanism has been limited. A recent review shows that there are only eleven well documented cases of voluntary prepayment in the Sub-Saharan African region (Creese and Bennett, 1997).

Voluntary prepayment is offered to users as an alternative direct payment option to paying user fees at the time of use. The payment of a relatively small premium in advance allows users to access health care at a reduced price or free of charge, compared to the user fee at the point of utilisation. Voluntary prepayment is considered to mitigate the deterioration of access to health care by reducing the financial barrier created by user fees. However, the feasibility of such mechanism has been questioned by detractors (Creese and Bennett, 1997), since its design can be more complicated and its operation can be more difficult compared to those of user fees. This problem becomes greater as the membership widens and the benefit package becomes more generous.

1.1.2 ZAMBIAN HEALTH FINANCING POLICY

This international context forms the background to the health sector reform programme in Zambia, which is the field of this study. The new government in 1991 replaced a command economy oriented one party rule with a market economy oriented democracy. It laid the cornerstone of Zambian health sector reform (although some efforts for reforms had been made in the 1980's). The new government published a health policy framework paper stating that "Zambians must commit themselves to building a health care system that guarantees equity of access to cost-effective, quality health care as close to the family as possible". The subsequent reforms have followed this paper (Kalumba, 1991).

In a reversal of the policy of providing free health care to all citizens since independence, user fees at governmental health facilities were introduced in 1993. Since equity in access is clearly stated as one of the key objectives of Zambian health reforms, and given the concerns about the financial barriers to health care created by user fees, the potential of voluntary prepayment alongside coexisting user fees has been widely discussed in the health policy arena. Voluntary prepayment has been introduced on several occasions both in urban and rural areas since 1993. Although most schemes introduced have been dysfunctional or abandoned for several reasons, voluntary prepayment alongside user fees has continuously been in operation in two urban districts, Lusaka and Kitwe, which are the fields of this study.

However, in both districts, malfunctions of voluntary prepayment such as

mismanagement and abuse are pointed out by one recent review. For example, patients present a borrowed prepayment card as their direct payment or pay the premium only for the first month and wait for a night to validate their prepayment card before consultation every time they fall ill, since the premium is cheaper than the user fee for one consultation and 24 hours is required to validate the prepayment card. Another subterfuge is to attend several health centres in a row for one episode to collect multiple courses of drugs and sell them in a private market, since the prepayment card is good for all health centres within a district (Daura et al., 1998). In order to cope with these problems, the "discount card", a third payment mechanism was introduced in 1998 as an alternative to voluntary prepayment.

In this payment mechanism, health care users are asked to purchase a discount card consisting of several coupons to receive health care services. The users give up one coupon in exchange for the diagnosis and treatment of one episode of their illness. The price of a discount card is set to be lower per episode than the equivalent user fee. This is a new payment mechanism in the context of health financing policy in low income countries. Small scale trials of discount card have been in operation in these districts since then, and the expansion of this payment mechanism is under consideration if these trials are proven to be successful.

1.1.3 SUMMARY

In summary, direct payment at government health facilities has become a common practice in most Sub-Saharan African countries. Although user fees have been the

most prevalent payment mechanism of direct payment, better alternative payment mechanisms are sought, due to concerns about the financial barrier and access to health care created, especially by the poor section of the population. Voluntary prepayment and discount card are regarded as potential alternatives to user fees.

1.2 OBJECTIVE OF THE STUDY AND OUTLINE OF THIS THESIS

1.2.1 OBJECTIVE OF THE STUDY

An appropriate institutionalization of direct payment, finding a mechanism that ensures access to health care, especially by the poor section of the population has been one of the health financing policy objectives in Sub-Saharan Africa including Zambia. Voluntary prepayment and discount card are alternative payment mechanisms to user fees. They are options for this institutionalization. In other words, the policy question is whether payment mechanisms such as voluntary prepayment or discount card should be promoted in designing direct payment in order to increase equity in the health care system. This study aims to provide theoretical and empirical evidence to answer that policy question by addressing the following research question: 'What are the equity implications of use of voluntary prepayment or discount card together with user fees as direct payment mechanism?'.

1.2.2 OUTLINE OF THIS THESIS

There are a number of previous studies of the introduction or increase of direct

payment in developing countries both on theoretical and empirical grounds. Most of them focus on equity consequences of direct payment, especially of user fees. Since definitions of equity in the literature often lack clarity (Donaldson and Gerard, 1993), this study starts from the review of the definitions of equity in health care systems in Chapter 2. Then, experiences of direct payment for health care in Sub-Saharan African countries are reviewed to specify the research questions of this study. There are three research questions on individual behaviours related to health care under direct payment policy and equity consequences. An economic approach, theoretical modelling and empirical study of demand, is introduced in order to answer these research questions.

Methodological backgrounds of research techniques employed in this study are developed through literature reviews in Chapter 3 and Chapter 4, before establishing the method of this study. In Chapter 3, the development of demand models for health care and health insurance applying the utility maximisation model is reviewed in order to specify a prototype of the model to be elaborated in the theoretical investigation. In Chapter 4, statistical analysis techniques for models with limited dependent variables are reviewed in order to establish a base for the test of the hypotheses derived from the theoretical investigation.

The method of this study is described in Chapter 5. A framework of econometric study is introduced in order to draw theoretical and empirical findings. The use of modelling strategy in the theoretical investigation is discussed. Then, the protocols of data collection and analysis in the empirical investigation are described. Three data sources are specified: Living Conditions Monitoring Survey 1998,

records at health centres and outpatient questionnaire survey.

The results are presented from Chapter 6 to Chapter 9. Chapter 6 presents results of the theoretical investigation. Two demand models and their implications for equity consequences of the alternative payment mechanisms are developed. Then, hypotheses to be tested in the empirical investigation are introduced. Chapter 7 presents results of the analysis of the data from Living Conditions Monitoring Survey 1998. It describes health seeking behaviour of the population in each field and tests hypotheses derived from the demand models elaborated in Chapter 6. Chapter 8 presents results of the analysis of the data from records at health centres. It constructs a map of health care service users' choice of payment mechanisms at health centres along with tests of hypotheses derived from the demand models. Chapter 9 presents results of the analysis of the data from the outpatient questionnaire survey. It reports results of tests of hypotheses derived from the demand models after examining the scales for perceived quality of care.

Chapter 10 presents the discussion of these results. Results from the tests of hypotheses are reviewed. Then, equity consequences are discussed, which are followed by policy implications and conclusions.

Before proceeding to Chapter 2, the field sites of the study are introduced in the last section of this introduction chapter.

1.3 FIELD SITES OF THE STUDY

1.3.1 SELECTION OF FIELDS

Two urban districts, Lusaka and Kitwe in Zambia are taken as the field sites of this study.

Zambia is selected because its health financing policy, especially direct payment policy in 1990's, exemplifies the international health financing policy context in Sub-Saharan Africa as described in Section 1.1. After the launch of its health sector reforms in 1991 following the health policy framework paper (Kalumba, 1991), which is thought to be a reflection of international policy initiatives (World Bank, 1987; UNICEF, 1990), direct payment at public health facilities, predominantly in the form of user fees, prevailed nationwide by 1994.

Although voluntary prepayments are officially regarded as an alternative payment mechanism for direct payment in Zambian health financing policy (MOH, 1994), Zambia's experiences are as limited as those of the international context. A survey on direct payment policy in 1995 that sampled 10 out of 61 districts identified the operation of district wide voluntary prepayment schemes in 3 districts including Lusaka and Kitwe, and small-scale facility based voluntary prepayment in 5 districts (Kalyala et al., 1998). In 1997, a mailed survey to all districts on the practice of direct payment identified 5 out of 41 responding districts to have small-scale facility based voluntary prepayment (Daura et al., 1998). These 5 facilities were different from the ones identified in the previous survey. Although

Lusaka and Kitwe failed to respond to this mailed survey, the authors found the operation of district wide voluntary prepayment through their visits to these districts.

Lusaka and Kitwe are the unique known districts that have continuously operated voluntary prepayment in Zambia. In addition, these districts have experimented with the operation of the discount card. Therefore, they are chosen as field sites for this study.

1.3.2 THE HEALTH SYSTEM IN THE FIELD SITES

The background of each field site with respect to the social infrastructure, health system, and pattern of health care service utilisation is introduced in the following.

Zambia is a landlocked country in Southern Africa. Approximately 10 million people live in 753,000 square kilometres. 40% of the population live in urbanized areas. GDP per capita is 320 U.S. dollars, which ranks 21st out of 48 Sub-Saharan African countries in 1998. Life expectancy at birth is 38.5 years and infant mortality ratio is 114 (World Bank, 2000; Esterhuysen, 1998; WHO, 2000).

Zambia is administratively divided into 9 provinces, comprising 72 districts at the time of this study. Lusaka district is the capital and Kitwe district is the third largest urbanized district in the country.

1.3.2.1 LUSAKA DISTRICT

Lusaka district is predominantly urban. The estimated population of the district is 1,162,465 by the latest census in 1990. A large number of people are in informal employment.

Health care is provided through a three tier public provision system alongside a substantial number of private and industrial facilities. 23 health centres managed by the district health management team provide primary care to the general public. 8 among these also provide secondary care, although the differentiation between primary care provision and secondary care provision is in process and immature. The University Teaching Hospital (UTH) offers tertiary care as well. There is market segmentation at UTH: a high cost department, which implies high quality, operates separately from a low cost department. The exact number of private facilities is difficult to estimate due to the lack of data. The number of industrial facilities is limited compared to Kitwe.

Within this system, a small number of relatively affluent patients have access to the high cost department at UTH, private facilities, or industrial facilities owned by their employer. Subscription to high cost prepayment is required to attend the high cost department. At the time of this study, its premium was K 8,000 (K 4,500 = £ 1 in 1999) per month per person for diagnosis and treatment at the time of illness. Private facilities charge higher fees than either the University Teaching Hospital or health centres.

The majority of the population have access to health centres but not to the high cost department at UTH, private facilities, or industrial facilities. In principle, since 1996, the low cost department of UTH has provided care only for patients who have been referred by health centres.

At health centres, user fees were initiated in 1991, and low cost prepayments, which are the form of voluntary prepayment targeted in this study, were introduced in 1993. The trial of pre-purchase discount cards started at two pilot health centres in October 1998. Therefore, patients at health centres where the discount cards trial is not in operation must choose one from two payment mechanisms, user fees or low cost prepayment. Patients where the discount cards trial is in operation must choose one from three payment mechanisms, user fees; low cost prepayments, or discount cards. Table 1.1 shows the fee schedule at health centres in Lusaka at the time of this study.

At the low cost department of UTH, patients without referrals whether or not they had subscribed to low cost prepayment must pay relatively expensive "by-pass user fees", K 5,000 per attendance. In practice, even referred patients with low cost prepayments needed to pay the same expensive user fees, although they were supposed to receive care free of charge at the time of this study.

Table 1.1 Fee schedule at health centres in Lusaka

AGE	USER FEES	LOW COST PREPAYMENTS	DISCOUNT CARDS
0 – 5	Exempted	Exempted	Exempted
6 – 15	K 2,500	K 1,500 to enroll K 500 per month	K 5,000 for 4 episodes
16 – 64	K 5,000	K 2,500 to enroll K 1,000 per month	K 10,000 for 4 episodes
65 +	Exempted	Exempted	Exempted

Governmental facilities enforce exemption policies. Treatment of chronic illnesses such as TB, HIV/AIDS, treatment of STDs, treatment of epidemics such as cholera, and safe motherhood and family planning services are provided free of charge. In addition, children under the age of 5 years and people over the age of 65 years, vulnerable individuals who have evidence provided by the social welfare department, or people who can indicate that they cannot afford to pay are treated free of charge. In practice, evidence by the social welfare department are never presented by patients and exemptions are subject to duty sister's discretion.

1.3.2.2 KITWE DISTRICT

Kitwe district is also predominantly urban. The estimated population of the district is 450,495 according to the latest census in 1990. A large number of people are employed in the mining sector. There are also a large number of people who are unemployed or working in the informal sector.

Health care is provided through two tier public provision system alongside several industrial facilities and a few private facilities. 18 health centres managed by the district health management team provide primary care to the general public. Kitwe Central Hospital (KCH) offers secondary care. There is also market segmentation at KCH: a high cost department, offering higher quality services in principle, operates separately from a low cost department.

Within this system, relatively affluent patients have access to the high cost department at KCH, industrial facilities owned by their employer such as the mining company, or private facilities. Subscription of high cost prepayment is required to attend the high cost department. At the time of this study, the prepayment consisted of the premium, K 8,000 for a family membership for one year, and deposit, not less than K 250,000. The cost of care utilised is deducted from the deposit. Industrial facilities usually offer care free of charge or at a minimal cost for employees and their families. Private facilities charge higher fees than public facilities.

A large proportion of the population had access to health centres but not to the high cost department at KCH and industrial facilities as was the case in Lusaka. In principle, since 1995, the low cost department of KCH provided tertiary care only for patients with referrals from health centres.

At health centres, user fees were initiated in 1994, and low cost prepayments, the form of voluntary prepayment targeted in this study, were introduced in 1995. The trial of pre-purchase discount cards started at two pilot health centres in October

1998. Therefore, patients at health centres where the discount cards trial is not in operation must choose one of two payment mechanisms, user fees or low cost prepayments, and patients at health centres where the discount cards trial is in operation must choose one from three payment mechanisms; user fees, low cost prepayment, or discount cards. Table 1.2 shows the fee schedule at health centres in Kitwe at the time of this study.

At the low cost department of KCH, patients without referrals must pay relatively expensive "by-pass user fees", K 2,500 per attendance whether or not they have subscribed to low-cost pre-payment. Referred patients with low cost prepayments received care free of charge in practice, which was different from Lusaka.

Table 1.2 Fee schedule at health centres in Kitwe

AGE	USER FEES	LOW COST PREPAYMENTS	DISCOUNT CARDS
0 – 5	Exempted	Exempted	Exempted
6 – 15	K 150 to register K 250 to consult K 250 for 1 course of each drug Extra for Lab test	K 400 per month	K 3,000 for 6 episodes
16 – 64	K 150 to register K 500 to consult K 500 for 1 course of each drug Extra for Lab test	K 800 per month	K 5,000 for 6 episodes
65 -	Exempted	Exempted	Exempted

Governmental facilities in Kitwe enforce exemption policies, which are the same as in Lusaka.

CHAPTER 2

LITERATURE REVIEW I

CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS

2.1 INTRODUCTION

The purpose of this chapter is to develop a conceptual framework and to specify research questions for the study. Since the objective of the study is to consider equity consequences of user fees compared with alternative payment mechanisms for health care services as specified in Chapter 1, equity in the health care system is a research endpoint. There is an agreement among most people that equity is one of the important objectives of social policy, but there is much less agreement on the appropriate definition of equity (Le Grand et al., 1992). Therefore, arguments about the definition of equity in the health care system are reviewed in the next section in order to give an operational definition of equity for the study. Then, in section 2.3, experiences of direct payments for health care services in Sub-Saharan Africa are reviewed on both theoretical and empirical bases. Finally, in section 2.4, research questions are specified.

2.2 EQUITY IN THE HEALTH CARE SYSTEM

As a social policy objective, equity is defined as fairness (Rutherford, 1992). More specifically, it is defined as a goal relating the way in which resources should be distributed or shared among individuals (Barr, 1997). There is a consensus of opinion that health care systems as social institutions should be fair, or equitable

(Le Grand et al., 1992), in other words, health or health care should be distributed or shared among individuals fairly. However, there is variation in the definition of fairness in the health care system within the literature. In order to study the performance of health care systems in terms of equity, some reasonable definition of equity is needed (Donaldson and Gerard, 1993). In this section, arguments around the definition of equity, or fairness, in health care systems are reviewed in order to provide an operational definition of equity for the study, and its operational indicators are also considered.

Equity is defined as a principle of distribution of resources by Barr (1997). Therefore, before defining equity in the health care system, there are two points that need to be clarified: the principle of distribution, and the resources to be distributed. Before reviewing principles of distribution, the resources to be distributed in the health care system should be defined. There are two types of resources discussed regarding equity in the health care system in the literature, health and health care (Donaldson and Gerard, 1993). In this section, the distribution of health care is reviewed. This is because the health care system is primarily distributing health care, although it ultimately tries to achieve population health (Abel-Smith, 1994).

2.2.1 PRINCIPLES OF DISTRIBUTION

From the point of principle of distribution, there are some basic theories and simple criteria to be noted before further discussion on the definitions of equity in the health care system.

2.2.1.1 POLITICAL THEORIES OF SOCIAL JUSTICE

Firstly, philosophical arguments on the definition of fairness, known as political theories of social justice, underlie the discussion on the definition of equity. There are four basic political theories of social justice (Donaldson and Gerard, 1993; Barr, 1997): libertarianism, utilitarianism, Rawlsian arguments, and egalitarianism. These are shown in Table 2.1. The relevance of these to the definition of equity in the health care system has been discussed in the literature.

Table 2.1 Political theories of social justice

THEORY	FAIRNESS
Libertarianism	Market mechanism is considered fair.
Utilitarianism	Maximising greatest happiness for the greatest number.
Rawlsian arguments	A basic set of primary social goods are distributed so that the position of the least well off in society is maximised.
Egalitarianism	Equal shares of commodities.

In libertarianism, justice is entirely a matter of the enforcement of private property rights (Williams and Cookson, 2000). Libertarians consider that distribution through the market mechanism is fair. Some argue that state intervention in the market is morally wrong except in very limited circumstances; and others that state intervention is wrong because it will reduce total welfare (Barr, 1997). However, for the purpose of this study, libertarianism is considered an inadequate philosophical foundation, since the market mechanism allows a wide range of distribution of goods depending on initial conditions (Ng, 1983). This implies the

lack of a consistent principle of distribution. Furthermore, the imperfections of the health care market are widely admitted to require some form of state intervention (McGuire et al., 1988; Donaldson and Gerard, 1993), at least to a limited degree even in some libertarian fora (e.g. Bosanquet, 1999; Booth, 2002).

In utilitarianism, justice is ultimately a matter of maximising the sum total of human happiness (Williams and Cookson, 2000). Utilitarians consider that the maximisation of happiness for the greatest number is fair and ignore distributional aspects (Donaldson and Gerard, 1993). Consequently, utilitarianism lacks a principle of distribution (McGuire et al., 1988; Donaldson and Gerard, 1993) and is not considered an adequate philosophical foundation of equity in the health care system for the purpose of this study.

According to Rawls' theory of justice (1972), there are two principles of justice. Firstly, basic liberties are to be distributed equally and at the maximum level that is compatible with everyone else enjoying the same level. Secondly, social and economic inequalities are to be arranged so that they are to the greatest benefit of the least advantaged member of society. Rawlsians consider that a basic set of primary social goods should be distributed so that the position of the least well off is maximised. This is considered as a potential theory for defining equity in health care systems for the purpose of this study (Culyer, 1976; Daniels, 1985), although whether health care should be treated as a primary social good is not clear (Donaldson and Gerard, 1993).

Egalitarianism is about the concern for social, political and economic equality

(Donaldson and Gerard, 1993). Egalitarians consider that equality in distribution is fair. This is regarded as a starting point of some theoretical discussion on equity in the health care system in the literature (McGuire et al., 1988; Barr, 1997). However, it may be judged fair to distribute health care unequally, such that groups more likely to be ill should perhaps be given greater access (Donaldson and Gerard, 1993).

Thus, Rawlsian arguments and egalitarianism are thought to be potential philosophical foundations of equity in the health care system for the purpose of this study.

Fair distribution of health care by Rawlsian and egalitarian arguments are likely to be achieved by governmental intervention in the health care market (Donaldson and Gerard, 1993; van Doorslaer et al., 1993). The fact that almost all health care systems across different types of society have some portion of public provision or funding, which implies non-market rationing of health care, suggests that principles other than libertarianism and utilitarianism dominate in collective decision making on health care, despite widely differing cultural contexts. For example, even the U.S. health system, which is regarded as the most market oriented (Folland et al., 2001), has public provision (Medicare for the low income population and Medicaid for the elderly) and wide ranging additional market intervention.

However, typical operational definitions in the literature do not use these principles straightforwardly (Donaldson and Gerard, 1993).

2.2.1.2 CRITERIA FOR DISTRIBUTION

Apart from arguments from the philosophical level, two types of equity criterion are also proposed as principles of distribution in the literature: 'full equality' and 'minimum standard' (Le Grand et al., 1992; Barr, 1997). Full equality is interpreted as straightforward operationalization of egalitarian fairness. Equal distribution of health care is considered fair. However, this fails to treat unequal cases unequally as mentioned before. Minimum standard first assumes a distinction between necessary and discretionary health care. Then, equal distribution of necessary health care is considered fair. It is argued that the principle of minimum standard is evident in many aspects of the health care system (Le Grand et al., 1992) such as free primary care for low income groups to ensure access to primary care. However, the definition of minimum standard is left undefined. Typical operational definitions of equity in the literature do not use these principles, either.

2.2.2 DEFINITIONS OF EQUITY

2.2.2.1 DEFINITIONS IN THE LITERTURE

The most commonly proposed definitions of equity in the health care system, horizontal equity and vertical equity (Donaldson and Gerard, 1993; Barr, 1997), are based on other criteria for fairness than those basic principles mentioned above. Horizontal equity implies equal treatment of equals and vertical equity, unequal treatment of unequals. For example, equal access to health care for the equally ill

is considered horizontally equitable; unequal financial contributions to health care according to unequal ability to pay are considered vertically equitable.

In addition, definitions tend to focus on specific aspects of the health care system such as provision or financing of health care depending on the policy question of interest. Health care financing policy, which is the subject of this study, also has effects on both horizontal and vertical equity. Table 2.2 shows typical definitions of equity in the health care system from the literature.

Table 2.2 Definitions of equity in the health care system

	PROVISION	FINANCING
HORIZONTAL EQUITY	· equal utilisation for equal need · equal access for equal need	· equal payment for equal utilisation · equal payment for equal ability to pay
VERTICAL EQUITY	· unequal utilisation for unequal need · unequal access for unequal need	· unequal payment according to unequal ability to pay · unequal payment for unequal utilisation

Horizontal equity in health care provision is typically defined as equal utilisation for equal need, or equal access for equal need; for example, equal waiting time for patients with similar conditions. Vertical equity in health care provision is defined as unequal utilisation for unequal need, or unequal access for unequal need; for example, unequal treatment of patients with treatable trivial conditions compared

to those with serious conditions. Horizontal equity in health care financing is defined as equal payment for equal utilisation, or equal payment for equal ability to pay; for example, equal premium of health insurance for equal income group. Vertical equity in health care financing is defined as unequal payment according to unequal ability to pay or unequal payment for unequal utilisation; for example, unequal premium of health insurance for unequal income group. Progressive pricing according to income is usually considered fair.

2.2.2.2 NEED, ACCESS, UTILISATION

However, there are problems around these definitions, especially with regard to equity in health care provision. The definition of need, and the distinction between utilisation and access should be clarified.

There are three types of need in health care according to the orientation: expressed need, normative need, and comparative need (Luck et al., 2000). Expressed need refers to need revealed in actual demand, which is based on libertarianism rather than any philosophy which can adequately provide a basis for the assessment of equity. Normative need refers to need defined by professionals such as physicians but is often criticised by economists in terms of equity, since it fails to consider the costs of meeting needs (Bowling, 2002). Economists view need as comparative, and are concerned with marginal met need. They define need as the capacity to benefit from health care (Culyer, 1995). This definition has an advantage in defining equity in health care provision when taking availability of interventions and resources into account, and is considered to be fit for use in this study which is

concerned with distribution under scarcity.

In empirical studies, equity in health care provision is more often defined in terms of access than utilisation (McGuire et al., 1987). This is because equal access implies equal opportunity to use needed health care. It is considered superior to equal utilisation, which does not allow consumer's choice whether to use health care or not based on their preference (Donaldson and Gerard, 1993). Equal utilisation requires equal compliance and the standardization of interventions, which is not likely, or necessarily appropriate, in practice (Mooney, 1987; Andersen and Mooney, 1990).

2.2.2.3 SUMMARY

In summary, equity in the health care system is usually defined according to the principles, equal treatment of equals, and unequal treatment of unequals. Four types of equity are usually defined separately depending on the principles of fairness and focus of argument. The definition varies within each category.

2.2.3 OPERATIONAL DEFINITION OF EQUITY FOR THIS STUDY

As specified in the objective of this study, the focus on equity is derived from concern on the financial barrier to access health care created or increased by direct payments, especially for the poor section of the population. This is about equal access for equal need, irrespective of income status. Therefore, horizontal equity defined as equal access for equal need is taken as the definition of equity in this

study.

However, this definition still has problems in enabling discussion of equity on an empirical basis. Access, which implies opportunity to benefit, and need, which implies capacity to benefit, are both difficult to observe (Culyer and Wagstaff, 1993). Therefore, most empirical studies take utilisation as a proxy for access (McPake and Kutzin, 1997). This study will also use utilisation as an endpoint indicator.

2.3 EXPERIENCE OF DIRECT PAYMENT FOR HEALTH CARE SERVICES IN SUB-SAHARAN AFRICA

2.3.1 UNDERLYING THEORY OF DIRECT PAYMENTS POLICY

The policy of the introduction or enhancement of direct payments for health care services by users is formed from a notion that one of the fundamental problems of the health sector in low income countries is its under provision of care for the majority of people. Health care provision systems in Sub-Saharan Africa are considered to be failing in providing health care services to the majority of people when they fall ill (e.g. Shaw and Elmendorf, 1994; Streefland et al., 1995). In an underlying theory of direct payments, this under provision is considered to be caused by inefficiencies in the way the health system performs, which is exacerbated by the shortage of resources. Two types of inefficiencies are considered to constitute the core of the problem to be solved by financing policy: allocative inefficiency and internal inefficiency (World Bank, 1987). Allocative inefficiency is caused by the misallocation of resources to less cost-effective

production processes. For example, the allocation of more resources to tertiary care and less to primary care may exacerbate allocative inefficiency in low income countries since most health problems may be solved by primary care at a lower cost. Internal inefficiency occurs when resources are not optimally utilised within a production process. For example, without factors of production such as drugs or health staff, health services cannot be produced efficiently, then complementary resources are wasted. Shortage of resources exacerbates internal inefficiency because it may cause the shortage of inputs such as capital or labour.

Introduction or increase of direct payments intends to solve the under utilisation problem through reducing these inefficiencies in three steps (World Bank., 1987; Shaw and Griffin, 1995). Firstly, increased resources are to be raised for the health sector. Secondly, allocative efficiency is to be increased because resources raised will be concentrated at or reallocated to primary level where there is relative under-investment; and internal efficiency is to be increased because resources will be used to correct imbalanced input mixes. These steps are intended to result in increased production of health services at better quality levels. Finally, the produced services are to be delivered to the underserved majority of people. This is expected to have positive impact on equity in health care provision.

A number of studies have focused on user fees. These have mainly focused on each of the three theoretical steps discussed above: revenue generation, efficiency of service provision, and utilisation of health care services. Critics of user fees discuss the third step most extensively, the utilisation of health care services. Their concerns focus on the accessibility of services for the low income population

and the financial barrier created by user fees. In other words, their concern is about equity consequences, the main subject of this study. The previous studies are reviewed in the following section; firstly on revenue generation and efficiency of health care service provision, secondly on utilisation of health care services.

2.3.2 EVIDENCE ON USER FEES AND REVENUE GENERATION

Several studies question whether the increase in resources achievable through direct payments is sufficient to increase the production of health care services at better quality levels (Waddington and Enyimayew, 1989; McPake, 1993). The proponents of direct payments argue that revenue should cover as much as 20% of the recurrent cost of operating health facilities (World Bank, 1993). However, experiences suggest that typically, only around 5% of the recurrent cost is raised through user fees (Gilson and Mills., 1995; Kutzin, 1995; Nolan and Turbot, 1995), although higher rates can be achieved in individual health facilities (Creese and Kutzin, 1994; Knippenberg et al., 1990). Contributing factors to this situation are low fees, reflecting the low income of the population and the recurrent costs of operating user fees collection (McPake et al., 1993; Gilson and Mills., 1995). Available information suggests that the resources raised through direct payments with user fees are likely to be inadequate to increase the production of health services with better quality (Wang'ombe, 1997; Gilson, 1997). These findings are one of the reasons why payment mechanisms with risk sharing such as voluntary prepayments are proposed as an alternative to user fees (Shaw and Griffin, 1995), since collecting premium from non-immediate health service users in addition to health service users is thought to be an additional source of revenue.

There are relatively few studies on the efficiency of health care service provision in the context of user fees (Wang'ombe, 1997; Gilson, 1997), while several ways of improving efficiency through behavioural change of providers and consumers are suggested (World Bank, 1987). Evidence is limited on provider behaviour. Inefficient provider behaviour encouraged by user fees, such as over-prescription of drugs to increase revenue has been raised as a concern (McPake et al., 1993). Evidence is weak, but experience suggests that direct payments with user fees may promote inefficiencies in provider behaviour (Gilson, 1997). There is more evidence on behavioural change of consumers, which is more relevant to the subject of this study. Some studies find positive impact on efficiency of health seeking behaviour resulting from the grading of prices according to the level of facilities (Creese and Kutzin, 1995; Gilson, 1997). Faced with a lower price at primary care facilities and a higher price at higher care facilities, consumers attend the more appropriate level of health facility for their illness and respect the referral system, which results in improving efficiency at health system level (Collins et al., 1995). However, whether there is any inefficient utilisation to discourage is questioned by some who argue that the high travel and time cost of seeking care already discourages unnecessary utilisation (Abel-Smith and Rawal, 1992).

2.3.3 EVIDENCE ON THE UTILISATION OF HEALTH CARE SERVICES

Previous studies on the utilisation of health care services share a theoretical concern on the distribution of benefits from health care under direct payments with user fees. The increased cost of care may deter utilisation by the low income group more severely compared to the high income group, because the low income group

may be more sensitive to financial costs. Any increased production of health services at higher quality levels will be enjoyed more by those who use services more. If so, the introduction or increase of user fees fails to achieve its intended improvement in utilisation among the most severely underserved people. It may make the less well off worse off still (Gilson, 1988; Mills, 1997).

In order to overcome the problem, the counter argument by the proponents of direct payments is an adoption of the exemption or waiver mechanism that allows the poor to receive health services at a reduced price or free of charge (World Bank, 1987; Shaw and Griffin, 1995). However, critics question the feasibility of these counter measures. They argue that it is difficult to implement the exemption or waiver mechanism, because identifying the poor in the field is difficult (Nolan and Turbat, 1993; Russell and Gilson, 1995).

A number of empirical investigations have been reported on the utilisation of health care services under user fees. A few studies show an increase in utilisation of health care services along with improvement in quality of care after the introduction or increase in fees (Litvack and Bodart, 1993; Diop et al., 1995; Chawala, 2000). However, these studies are based on experiments, which are supported by substantial external inputs. Generalisability of these findings is considered to be limited. In contrast, studies that show the deterioration of health care service utilisation under user fees have been accumulating. A decrease in utilisation is observed in several field studies (e.g. Waddington and Enyimayew, 1990; Mwabu et al., 1995). These results are confirmed by one international survey of 26 low income countries including 13 Sub-Saharan African countries

(Russell and Gilson, 1997). Heavier financial burdens borne by low income groups compared to high income groups are found in some field studies (Sauerborn et al., 1994; Fabricant et al., 1999), and the malfunction of the exemption or waiver mechanism is also found (Huber, 1993; Fabricant et al., 1999). This evidence needs to be interpreted with caution, since each of these case studies reflects a different set of circumstances. However, it can be concluded that the balance of evidence points towards deterioration of utilisation under user fees.

2.3.4 UNDERLYING THEORY OF VOLUNTARY PREPAYMENT

Voluntary prepayment alongside user fees is proposed on the basis that it would overcome some shortcomings of user fees. Firstly, the revenue from premium, which is collected not only from immediate health service users but also from non-immediate users, is potentially larger and more stable than that from user fees if the level of premium is set appropriately and coverage is expanded. Furthermore, increased resources would have positive impact on the efficiency of health service production. Secondly, both health risk and financial risk (Jack, 1999), borne by the community would be reduced. When falling ill, people who paid relatively small amounts in premium in advance could seek health care without facing financial difficulties. This would have positive impact on the utilisation of health care services.

2.3.5 EXPERIENCES OF VOLUNTARY PREPAYMENT

Empirical studies on voluntary prepayment in the region are limited, and they

mainly discuss its feasibility, since the design and operation of voluntary payments with large membership and generous benefits are considered to be more complicated than that of user fees. Advocates for such payment mechanisms report descriptive evaluations of successful examples (e.g. Stavem and Eklund, 1995; Arhin, 1995; Criel and Kegels, 1997) or draw lessons from unsuccessful examples such that risk selection can be minimised through appropriate design and implementation (Noterman et al., 1995). However, most of the examples were implemented with relatively intense external support. Therefore, the generalisability of these lessons to more typical situations without external support is questionable. Reviewing these experiences, critics point to limited population coverage, low cost recovery rates, and limited ability to protect the poorest members of the society. They question if the theoretical advantages of voluntary prepayments alongside user fees against user fees only can be realised in practice (Creese and Bennett, 1997).

The practice of several small facility based voluntary prepayment schemes alongside user fees in rural areas and a few district level voluntary prepayment schemes are reported in the reviews of direct payments in Zambia (Kalyala et al., 1998; Daura et al., 1998). The cases other than those of Lusaka and Kitwe are reported to be dysfunctional, since a limited number of people use prepayments as their payment mechanism. The two cases of Lusaka and Kitwe are studied in depth focusing on design and operation, and the problems of these schemes which have been discussed above are also reported.

Theoretically, an extensive coverage, which means a large size of risk pool, is

necessary for the positive impact of voluntary prepayments. For example, if the number of subscribers is limited, it is difficult to raise enough resources to realize a positive impact on efficiency. In addition, the smaller the number of subscribers, the smaller the number of people who benefit from reduced financial barriers to health care services when falling ill. However, the prepayments in this context are voluntary, not compulsory as under social insurance. Therefore, the success of voluntary prepayments is entirely dependent on individual's choices.

There are two field studies, which suggest people's positive willingness to pay for voluntary prepayments using hypothetical questions (Arhin, 1995; Asenso Okyere et al., 1997). Studies to date pay insufficient attention to people's preference for voluntary payments. Peoples' attitudes toward voluntary payments alongside user fees is not well known and hence cannot inform a discussion of the potential of voluntary prepayments as an alternative payment mechanism to user fees alone.

2.3.6 DISCOUNT CARD

For the first time in low income countries to the author's knowledge, discount cards alongside coexisting user fees are applied to the health sector in Lusaka and Kitwe. It is hoped that these will overcome some practical shortcomings of voluntary prepayment in Zambia, such as abuse of a third person's prepayments, avoiding continuous payment of premium, and collecting drugs at several health centres to sell, as previously described. These problems can be avoided with the use of discount cards. Theoretically, it is a payment mechanism that spreads risk over time for an individual. In Zambian design, discount cards can be shared with

anybody, which allows a family or a small group of people to share the risk. In this sense, the risk sharing function of discount cards stays somewhere in-between user fees and voluntary prepayments that spread risk among all subscribers. The financial barrier to health care services when falling ill is also reduced, since those who have discount cards do not need cash for their visits to health centres. However, its theoretical impact is not yet clear. And the experiences of the trial have not been studied to date.

2.3.7 SUMMARY

In summary, the empirical evidence suggests that the introduction or increase of direct payments through user fees results in reduced utilisation of health care services by the low income population. Voluntary prepayments and discount cards alongside user fees are sought as alternative payment mechanisms, on the basis that they could reduce the financial barrier to health care services at the time of illness. There are several studies of the feasibility of voluntary prepayments. However, less attention has been paid to the community attitudes to voluntary prepayments. As for discount cards, no studies have been performed either theoretical or empirical.

2.4 RESEARCH QUESTIONS

Given the international and Zambian contexts mentioned in Chapter 1 and the experience of direct payments in health care in the region, an unanswered question is whether the institutionalization of voluntary prepayments and discount cards

alongside user fees would produce an impact that is more positive for equitable access to health care. The overall research question for this study is: 'What are the equity implications of use of direct voluntary prepayment or discount card together with user fees as direct payment mechanism?' In order to answer this question comprehensively, careful observations of the responses of people both in the community and in the health sector, and their implications for equity and efficiency are needed.

In addressing the research question, the approach taken is to seek to understand people's utilisation of health care under the three payment mechanisms, narrowing the endpoint down to horizontal equity in health care provision. Equity consequences of alternative payment mechanisms can be discussed, once this is understood.

Within this context, individuals make two choices in utilizing health care services: a choice as to whether to seek health care or not, and a choice as to which payment mechanism to use. Taking the characteristics of voluntary prepayments and discount cards into account, people are assumed to make these choices at two different points of time. They make the choice of seeking health care services when they are ill, and they make the choice of payment mechanism before they fall ill. Therefore, it is necessary to understand both choices in order to understand utilisation of health care under the three payment mechanisms.

Three further specific questions; two of them concerning people's choice related to health care services and the other concerning the endpoint of this study, equity, are

derived from the following arguments.

Firstly, how do people seek health care under each payment mechanism? In other words, is people's access to health care facilitated by the institution of voluntary prepayment or discount cards relative to user fees alone? Observing the effect of removing or reducing the financial barrier at the point of utilisation provides information on each alternative mechanism's potential effect on access to health care.

Secondly, how do people choose alternative payment mechanisms? In other words, do people choose to pay for health care in advance through voluntary prepayments or discount cards instead of paying user fees, and if so, what factors influence the choice? Understanding the way people make choices informs each mechanism's potential performance.

Thirdly, is equity in health care provision improved through the institutionalization of voluntary prepayments or discount cards? Combining the answers to the above two questions produce a theory and evidence on the distribution of benefits that illustrates equity consequences.

Exploring these three questions informs the debate on health care financing in the region and the policy options in organising payment mechanisms.

The analytic approach to address these research questions is straightforward. Economics techniques for theoretical modelling and empirical study of demand are

employed since the utilisation of health care and the voluntary choice of alternative payment mechanisms are the 'demand', or consumer's choice, in economic terms. In the following chapters, the method for economic analysis of demand to answer these research questions is developed.

CHAPTER 3

LITERATURE REVIEW II

ECONOMIC THEORY

3.1 INTRODUCTION

The purpose of this chapter is to establish the groundwork for a theoretical approach to address the research questions specified in Chapter 2, especially the second one; "how do people choose alternative payment mechanisms?" through literature review. In the literature, some developments of demand models in the health sector through application of basic economic theories of demand are found, which provide a foundation for the theoretical investigation in this study. Therefore, these developments are reviewed in order to specify a prototype of the demand model for this study.

In the next section, basic economic theories, or demand models, are briefly reviewed as a starting point, before reviewing application of these basic models to demand in the health sector. In 3.3, major commodities in the health sector; health care and health insurance, which are also the subjects of this study, are defined and the scope of this review is limited. In 3.4, the developments of demand models in the health sector are reviewed. The relevance of the reviewed models for this study is also examined. In the final section, the prototype of the demand model for this study is specified.

3.2 BASIC ECONOMIC THEORIES OF DEMAND

Two basic theories, or demand models, underlie theoretical economic models of demand in the health sector reviewed in this chapter: the utility maximisation model and the expected utility maximisation model. In this section, these basic models are specified and defined as a starting point of the review.

3.2.1 UTILITY MAXIMISATION MODEL

In demanding commodities, a consumer makes choices: what, how much, or when to purchase. The theory of choice is a basic economic theory, which seeks to explain these choices (e.g. Varian, 1992; Parkin and King, 1995). In this theory, a consumer is assumed to demand a commodity at a given price in the market based on his/her taste within his/her resource constraint, that is, a budget or income, in order to maximise his/her utility, that is, the benefit or satisfaction he/she gains from the consumption of the commodity. Therefore, this is also called the utility maximisation model.

Taste is the view of a consumer on the relative merits of two or several commodities, which contribute to determine utilities. In applying the utility maximisation model for demand for a specific commodity in a specific context, factors other than price and resource constraint, which are thought of as determining consumer's choices, are incorporated on an assumption that these factors comprise taste (Nicholson, 1997).

3.2.2 EXPECTED UTILITY MAXIMISATION MODEL

The utility maximisation model assumes that a consumer making choices is certain about the outcome of any choice (Estrin and Laidler, 1995). In general, the model is not suitable for dealing with uncertain outcomes. However, there is a type of uncertainty described as risk for which all outcomes can be listed and the probability of incurring each outcome can be assigned. The expected utility maximisation model is an extension of the utility maximisation model to deal with choices in face of risk by incorporating probabilities. Although this model requires cardinal measurability of differences in utility which contradicts conventional neoclassical economics, this is a commonly used basic model for choices in the face of risk (Estrin and Laidler, 1995).

In the expected utility maximisation model, a consumer is assumed to demand a commodity at a given price in the market based on his/her taste within his/her resource constraint in order to maximise his/her expected utility taking probabilities of uncertain event occurrences into account.

3.2.3 SUMMARY

Application of these basic models to specific contexts makes it possible to analyse factors around consumer's choice and the effects of these factors on the choice. Demand functions can be reduced from the utility maximisation models, in which quantity demanded is determined by relevant factors. And the nature of demand such as marginal effects of factors, or elasticities, are predicted.

In summary, there are two basic demand models in economics: the utility maximisation model and the expected utility maximisation model. The latter is an extension of the former in order to deal with consumer's choices when facing risk.

3.3 SCOPE OF THIS REVIEW

3.3.1 COMMODITIES IN THE HEALTH SECTOR

In the context of the health sector, these basic models have been applied to consumer's demand for two types of commodities: health care and health insurance, both of which are the subjects of this study. Although both health care and health insurance imply diverse commodities in the real world, for this review, health care is defined as the diagnosis and treatment provided by professionals at health facilities, and health insurance is defined as the entitlement to receive health care in exchange for premium paid in advance. Voluntary prepayment in this study is an example of health insurance as introduced in Chapter 1.

Under the second specific research question, the choice a consumer faces in the context is whether to subscribe to voluntary prepayment, or to purchase discount cards, or to obtain neither in face of both health and financial risk. Therefore, the other type of commodity, a discount card, is also under consideration. Since this is a new payment mechanism in the health sector, there is no experience of application of the theories of demand to discount cards in the literature. Therefore, this review does not cite any literature on demand for discount cards.

However, the choice of discount card allows a consumer future utilisation of health care to some extent, which is essentially regarded as obtaining entitlement to receive health care. This has some similarity to the choice of health insurance. To this extent, demand models for health insurance reviewed may have implications for the modelling of demand for discount cards, too.

3.3.2 TYPES OF DEMAND MODELS

Development of application of basic demand models to demand for health care has occurred in the economic literature. However, there are relatively limited examples of application to demand for health insurance. Health insurance is often incorporated as a price modifying factor in demand models for health care. In these studies, health care is usually a research endpoint and researchers try to develop a single comprehensive model of demand for health care. This is probably because health insurance is often organized as social insurance, which is compulsory and not sold in the market (Normand and Weber, 1994) - consumers do not choose whether to subscribe or not. Examples of demand models for health insurance are largely found in the U.S. where marketed private health insurance, for which consumers make choices, plays a major role in health care financing. However, even in this literature, models of consumer choices are fewer in number than those of employer choices, reflecting the dominance of employer decision making in the US market (Strombom et al., 2002).

The purpose of this review is to specify a prototype of the model to answer the second research question, in which the choice of payment mechanism is featured.

Therefore, application to demand for health insurance is reviewed. However, this is relatively limited as the groundwork for the theoretical investigation in this study as mentioned above.

Since consumers are assumed to subscribe to health insurance in order to consume health care, demand for health insurance is a derived demand from the demand for health care. Therefore, factors which constitute taste in the models of demand for health care are expected to be largely common to those in the models of demand for health insurance. Therefore, application of the basic models of demand for health care is also expected to be informative and these are reviewed in the next section.

3.4 THEORETICAL MODELS OF DEMAND FOR HEALTH CARE AND HEALTH INSURANCE

In this section, applications of the utility maximisation model and the expected utility maximisation model to demand for health care and demand for health insurance are reviewed.

Developments of these demand models have occurred across two dimensions. One dimension is the assumption concerning the way consumers gain utility from the consumption of health care and health insurance, which fundamentally refers to the nature of these commodities. The other dimension is the incorporation of variables, which are intuitively important in determining consumer taste.

In the following, demand models for health care are classified into four groups

according to these dimensions. The demand models for health insurance are reviewed separately as a fifth group. Algebraic presentations of the models are shown in Appendix 1. Assumptions and treatment of factors incorporated in the reviewed models are examined focusing on their relevance to the modelling of demand in order to answer the second research question of this study.

3.4.1 SIMPLE UTILITY MAXIMISATION MODEL

The first group of the five may be called the Simple Utility Maximisation Model. Health care is regarded as a consumption good in the models in this group. It is assumed that consumers gain utility directly from the consumption of health care. The more they consume health care, the more they are satisfied. It can be said that this is a straightforward application of the utility maximisation model to health care.

Joseph (1971) developed one of the prototypes of this group. He incorporated the price of health care, the price of other goods, and income to his model, all of which are conventional variables incorporated in the utility maximisation model for consumption goods.

Acton (1975) made one of the influential extensions of Joseph's model introducing time price. He noticed the time consuming nature of receiving health care and considered that the resources a consumer has to give up when demanding health care is not only cash but also time. His model assumes that time price plays an important role in rationing as well as cash price. This assumption is used in a

number of following models.

In these models, consumer demand for health care relies on its own price, the price of other goods, income and consumer tastes. Elasticities may behave as for any ordinary consumption good, that is, negative price elasticity, and positive income elasticity if health care is a 'normal' good.

In order to answer the second specific research question, three critical points need to be examined in considering the prototype of the model.

The first point is the way consumers gain utility. In these applied models, health care is assumed as a consumption good, which means these models do not explicitly reflect the fact that the consumption of health care is often not enjoyable, and that consumers who consider themselves healthy enough refrain from consuming health care. Therefore, this assumption is a substantial simplification regarding demand for health care, and different assumptions are made in the models in the following groups.

However, since the choice of voluntary prepayment or discount card over user fees is considered to provide entitlement to receive health care, the choice has to be understood as related to the associated entitled quantities of health care. It is plausible that consumers gain more satisfaction through an entitlement to a greater quantity of health care. This suggests that modelling health care as a consumer good may not be inappropriate.

The second critical point is the treatment of price. Price is a conventional factor in the utility maximisation model and thought of as influential to the choice of payment mechanism in this study as well. In Joseph's model, price is defined as an unit cost of health care and compared with prices of other goods. In this study, the "prices" of alternative payment mechanisms, defined as the costs of choosing payment mechanisms according to the fee schedule, are not comparable straightforwardly, since it is difficult to formulate the cost per unit of entitlement obtainable by paying premium, purchasing discount cards, or choosing user fees. For the comparison of price factors in the modelling of this study, comparison of unit cost of health care depending on the choice of payment mechanisms may be useful, assuming that demand for alternative payment mechanisms is a derived demand for health care.

Time price is featured in Acton's model. Time price may be influential in the choice of alternative payment mechanisms in this study. For example, time cost related to the choice of payment mechanisms may be higher when choosing voluntary prepayment than user fees, if it is necessary to travel to pay the premium on a monthly basis, for example. The time price of each choice can be complicated depending on arrangements for payment in practice. The price comparison in terms of cash price is already complicated as above mentioned. It may be wise to take the simpler approach of Joseph than to attempt to model the complications introduced by Acton's approach, and to disregard time price, in order to make the demand model more operational.

The third critical point is the treatment of income. The prediction of these models

is that income elasticity is positive on the assumption that health care is a normal good. This is insufficiently powerful in explaining the effect of income level on choice since one of the endpoints of this study is the distribution of health care among people with different levels of income. An alternative approach is needed.

3.4.2 HOUSEHOLD PRODUCTION MODEL

The second group of models consists of Household Production Models. What makes this group different from the first group is the approach taken in the underlying theory of consumer choice. Household production theory, initiated by Becker (Becker, 1965) assumes that consumers are involved in production as well as in consumption activities, and that they gain utility from fundamental commodities produced at home when they consume goods and services. In these models, health is regarded as such a fundamental commodity. Health care is regarded as an input to household production as well.

Holtsman and Olsen (1976) undertook the first application of household production theory to health care focused on dental care. In their model, households were assumed to gain utility not directly from the consumption of dental care but from the dental hygiene produced at home using inputs of market goods and personal time. Dental care is regarded as one of the inputs obtained in the market. Dental hygiene is regarded as an endogenous variable with a production function, which is produced at home, and increases utility. The predicted effects of variables in this model are similar to those of Acton's model, although the approach taken is different.

Heller (1982) extended this model in the context of the demand for health in Malaysia. In his health production function, health is assumed to be produced with preventive health services, which are separated from curative health services, and a composite of other goods and services. In addition, the form of production function is assumed to differ among individuals depending on their age, the hygienic quality of their home environment, and the virulence of disease agents in their community. In his utility function, utility is assumed to derive from the consumption of preventive health services, the discretionary purchase of medical care, and a composite of other goods and services. Discretionary health care is separated from necessary curative health care through the introduction of a health need function.

This model is innovative in three respects compared with Holtsman and Olsen's model. Firstly, Heller incorporated several variables into his model, which he considered important to explain demand. Some of them are especially important in the context of developing countries. For example, preventive services, age, hygienic quality of home environment, and virulence of disease agents in the community were incorporated. Secondly, he defined health need, which was an intuitively important variable, as an inverse function of health status and incorporated this explicitly into his model. Thirdly, he divided curative health care into necessary and discretionary components, and assumed that households gain utility from discretionary health care. Among his wide range of predictions, one interesting result on the effect of price is that demand for necessary health care may not decrease even when price increases. This is derived from the separation of necessary health care from discretionary health care.

The assumptions based on the household production theory and the treatment of various incorporated factors in Heller's model are to be examined in considering the prototype of the model to answer the second specific research question of this study. The assumption that consumers gain utility from health produced at home can be used for theoretical modelling of this study, because it is reasonable to assume that the demand for alternative payment mechanisms is a derived demand from health care, which is in turn a derived demand from health, a fundamental commodity. However, this assumption of two tier derivation of demand may make the theoretical model too complicated to be operational. Assumptions concerning the way consumers gain utility similar to the ones in the Simple Utility Maximisation Models may work better in explaining consumer choice among alternative payment mechanisms.

However, introduction of the health production function is informative from another point of view. Quality of care, which is featured in previous studies on cost recovery policy in Sub-Saharan Africa as reviewed in Chapter 2, can be interpreted as a level of productivity of health care to produce health. This interpretation may be useful for the way quality of care is treated.

The variety of factors incorporated according to the context of health care in developing countries, as in Heller's model, can provide a basis for identifying factors to be incorporated into the model of this study. For example, health status is considered influential in the choice of alternative payment mechanism in this study, since risk is regarded as one of the reasons why consumers choose to subscribe to insurance in the literature (e.g. Varian, 1992; Parkin and King, 1995) and the

health risk of consumers is assumed to be associated with their health status. The way Heller incorporates health status may be informative for the modelling in this study.

3.4.3 HUMAN CAPITAL MODEL

The third group of models is based on the Human Capital or Grossman Model (Grossman, 1972). Grossman applied Becker's approach to the theory of consumer behaviour, human capital theory (Becker, 1964), to health care.

Becker, dealing with demand for education, suggested that education embodied in a human is a type of capital because it can increase income in the future. Accordingly, Grossman assumes that the individual owns a stock of health capital and derives utility over a lifetime from his stock of good health. Health care is regarded as an investment good as well as a consumption good.

The model explains consumer choice between investment in health and in other utility increasing arguments within his/her discounted lifetime income. Two sub-models are reduced with further assumptions; health care being regarded as purely an investment good or purely a consumption good. Based on these models, Grossman suggests a positive relationship between demand for health care and age, wage rates and education.

This model is an elegant application of human capital theory to health care. However, it is important to distinguish the nature of economic phenomenon

modelled from those in previous models in the first and second groups. This model illustrates the individual's health care consumption pattern over a life time rather than individual's choice of health care consumption at a given point in time and in a given market condition, which is the context of this study. Therefore, the human capital model is not considered to be helpful for this study.

3.4.4 DISCRETE CHOICE MODEL

The fourth group, Discrete Choice Models, explain consumer choice among alternative methods of obtaining health care. Consumers are assumed to choose an alternative, which brings them the highest utility. When assessing utilities from each alternative, they are assumed to take price, budget, social, demographic and biological variables into account.

Akin et al. (1985) initiated this group of models in the context of the Philippines. Social, demographic and biological control variables were considered important in explaining demand for health care in a developing country context. The assumption of discrete choice was justified on the basis that most people in developing countries were considered to have limited alternatives. Although this model incorporates various variables, which are intuitively important, it does not predict their effect without further assumptions. In the context of developing countries, a number of studies use models within this group (e.g. Bolduc et al., 1996; Tembon, 1996).

This approach is considered helpful in formulating the modelling in this study

which is concerned with a limited number of payment mechanism options (three). It is considered a reasonable approximation to the process of choice of payment mechanisms that three independent utility functions are compared and the one yielding the greatest utility is chosen.

However, this type of model is not informative as to how various factors, which are intuitively influential in the demand for health care affect the choice, since variables in the utility function are treated in a linear form. No theory of the role of variable interaction in explaining choice is associated with this approach. This type of model is rather a conceptual framework for empirical analysis based on quantitative data, and not theoretically operational. Since the modelling for the second research question aims to present an explanation for the way consumers choose alternative payment mechanisms through not only the empirical but also the theoretical investigation, the treatments of variables in the Discrete Choice Model reviewed here are thought of as insufficient.

3.4.5 MODELS FOR HEALTH INSURANCE

As mentioned above, there are relatively few models of demand for health insurance. In this section, two types of models are reviewed. The first type of model aims to explain the consumer's subscription to insurance including health insurance in preference to paying user fees. The second type provides specifications of the statistical model in empirical analysis based on quantitative data regarding demand for health insurance.

An example of the first type is developed by Pauly (1968). He sought to explain demand for insurance in general including health insurance using the expected utility model. In this model, the consumer is assumed to gain utility from expected wealth. Expected wealth depends on loss, probability of loss, coverage of insurance, and premium. It predicts more insurance is consumed with more expected wealth.

This model essentially describes the choice of payment mechanism for risky events applying the expected utility maximisation model. There are two critical points to be examined in this model in considering the prototype for the modelling of this study.

Firstly, it assumes that expected utility derives from wealth. This assumption allows a description of the resource constraint and a formulation of uncertainty in resource utilisation in the expected utility maximisation model. Since health insurance is a form of insurance in the context of the health sector, this is applicable to the modelling of this study.

Secondly, it illustrates the influence of premium on the choice by associating with expected wealth. This treatment is considered useful, since the variables which relate to the price of voluntary prepayment and discount card can be treated in a similar way.

Similar models of the demand for health insurance are described in text books of micro economics or health economics (e.g. Parkin and King, 1995; Heshmat 2001). These are considered to follow Pauly rather than constituting separate models.

In these models, the consumer faces the choice of insurance or a gamble, and gains utility from the expected value of the outcome. He/she is assumed to know the monetary values associated with the outcome of risky events, and to calculate expected values associated with his/her choice, summing up the products of each outcome's probability of occurrence and its value. This model may be called the Expected Value Model.

In this model, the choice of purchasing insurance is made by comparing expected utility associated with the probability of occurrence of an event with negative utility consequences, and a certain utility associated with wealth net of an insurance premium. When the expected value and certain value are equal, the expected value is called the certainty equivalent.

Forms of individual utility function depending on attitudes toward risk are also considered in this model. A risk averse consumer is assumed to have a utility function representing diminishing marginal utility of wealth; a risk neutral consumer is assumed to have a utility function without diminishing marginal utility of wealth; and a risk loving consumer is assumed to have a utility function with increasing marginal utility of wealth.

The model explains that a risk averse consumer may purchase insurance even when expected value is less than the certainty equivalent, since certainty is valuable to him/her. Phelps (1997) formulated this difference between the certainty equivalent and the expected value by defining as the risk premium, which can be

interpreted as the cost of uncertainty borne by the insurer.

There is one critical point to be examined in this model in considering the prototype for the modelling of this study which is that it may be helpful to model the consumer's attitude toward risk by formulating alternative utility functions. When expressing a utility function in an equation form, use of the risk premium as a term is likely to be helpful.

A different type of model is exemplified by Holmer (1984). In this model, households pick one insurance plan from optional plans available in the market. They are assumed to choose one plan and spend their remaining income on other goods in order to maximise their utility. Although these models are developed independently from the Discrete Choice Model reviewed in the previous section, the basic frameworks are similar. Holmer concentrates on the specification of this choice framework into a statistical model for the purpose of empirical analysis rather than seeking to explain how utility derives from the interaction of various factors. In this sense, this model has the same problem as Akin's model (1985). Holmer selects variables which could relate to utility through literature review of empirical studies and intuition, and applies regression analysis straightforwardly for these variables without consideration of theoretical relationships among utility and these variables. Therefore, this model is thought of as useful only as an example to guide the empirical rather than theoretical work of this study, similar to Discrete Choice Model, which is considered helpful in formulating the modelling of a limited number of payment mechanism options (three).

Holmer's model is followed by several studies of empirical estimation of demand functions; some focus on the effect of price on consumer's choice (Short and Taylor, 1989; Royality and Solomon, 1999; Strombom et al., 2002) and recently others on the significance of quality (e.g. Chernew and Scanlon, 1998; Harris et al., 2002).

3.5 PROTOTYPE OF THE MODEL FOR THIS STUDY

In this section, the prototype of a theoretical model addressing the second research question is specified based on the literature review in previous sections. Three points are discussed: formulation of choice of three alternatives, basic model, source of utility, and consumer's attitude toward risk.

Firstly, since the second specific research question focuses on choosing one option out of three independent payment mechanisms, the comparison framework seen in Akin's model (1985) and Holmer's model (1984) is taken as a prototype. However, these models lack theoretical underpinnings, as discussed above. In this study, it is preferred to develop more detailed hypotheses concerning the interaction of variables in consumers' utility functions to guide the selection of variables for empirical analysis.

Secondly, the choice of payment mechanism in this study is a choice in the face of risk. The expected utility maximisation model, as developed by Pauly for health insurance (1968) is considered a useful basic model for this study. The expected utility function of each payment mechanism is formulated by adding variables related to financial arrangements and factors related to tastes to this model.

Thirdly, wealth is considered an important factor as a source of utility in subscribing to insurance as described in Pauly's model (1968). In addition, as demand for health insurance is considered a derived demand from demand for health care, and demand for health care is considered a derived demand from demand for health, the quantity of health care obtainable and the health status after consuming health care are considered to be important factors as a source of utility in subscribing to health insurance or purchasing discount cards. This is consistent with the notion that health insurance reduces two types of risk, financial risk and health risk.

Finally, consumer attitude toward risk is relevant to the choice of purchasing health insurance. The concept of risk premium employed by Phelps is useful in order to incorporate this factor into the model in this study.

Based on these discussions, the theoretical model addressing the second specific research question is elaborated in Chapter 6, after more detailed discussion identifying variables that represent important factors in Chapter 5.

CHAPTER 4

LITERATURE REVIEW III

STATISTICAL MODEL

4.1 INTRODUCTION

The purpose of this chapter is to establish the groundwork for the empirical investigation of how people choose alternative payment mechanisms, through literature review. In the empirical investigation of this study, a theoretical demand model elaborated from those specified in the section 3.5 will be tested using regression analysis and the data collected. There are various statistical models or ways of quantification in regression analysis. The model to be developed will employ the utility maximisation model as a basis and will use the discrete choice formulation. These two steps in the model building process lay the foundations for the regression analysis.

This chapter starts by reviewing the idea that underlies the regression analysis of the utility maximisation model. Then, the relevance of the discrete choice formulation to specify the statistical model is reviewed. This is followed by consideration of the introduction of use of the qualitative response model in section 4.3. Qualitative response models for binary choice, (the probit and logit models), and their expansions to multinomial choice are reviewed in section 4.4. Finally, the choice of the logit formulation is justified in section 4.5.

4.2 REGRESSION ANALYSIS AND THE UTILITY MAXIMISATION MODEL

Regression analysis is a statistical technique that attempts to "explain" movements in one variable, the dependent variable, as a function of the movements in a set of other variables, called the independent (or explanatory) variables, through the quantification of a single equation (Studenmund, 1996). In order to empirically analyze economic phenomena using observed data, regression analysis is usually employed, since most economic propositions (though not all) can be expressed in such single equation functional forms (Studenmund, 1996).

As discussed in Chapter 3, the consumer's choice of alternative payment mechanisms will be theoretically modelled based on a basic economic theory of consumer's choice, that is, the utility maximisation model. In principle, the utility maximisation model is transformed into a single equation for the purpose of regression analysis in the following way (Deaton and Muellbauer, 1980).

The utility maximisation model in a general form, which models consumer's choice of consumption of n items within his/her income, is formulated as below (Deaton and Muellbauer, 1980):

Maximise $U(q)$

Subject to: $\sum_k p_k q_k = x$

where U = utility function

$p = (p_1, p_2, \ldots, p_n)$

p_k = price of each item

$q = (q_1, q_2, \ldots, q_n)$

q_k = quantity of each item

x = income

This model explains that a consumer chooses to consume each item in a way which maximises his/her utility within his/her income.

This formulation is transformed into a single equation, which is called the Marshallian demand function (after Marshall, 1920):

$$q_k = g_k(x, p) \qquad (k = 1, 2, \ldots, n)$$

This equation can be interpreted as follows: the quantity of each item demanded is a function of income and the price of each item under consideration. In empirically examining this equation with regression analysis, the quantity of each item demanded is a dependent variable and income and the price of each item are independent variables. When quantities demanded are observed under various sets of income and prices, an empirical demand function can be estimated by regression analysis through the quantification of this equation.

4.3 REGRESSION ANALYSIS FOR QUALITATIVE RESPONSE

Although the use of regression analysis is introduced and the underlying idea of applying regression analysis for the utility maximisation model is clarified in the previous section, an appropriate statistical model needs to be chosen in the

quantification of the equation accordingly, and there are many alternatives to quantify the same equation (Studenmund, 1996). The demand model chosen uses the discrete choice formulation.

An important characteristic of the discrete choice formulation in considering quantification approaches is that this formulation models the consumer's qualitative response rather than quantitative response. In other words, the consumer's choice modelled is not how much a payment mechanism is used but which payment mechanism is chosen, consistent with the consumer choice observed being not the quantities of payment mechanisms demanded but choice among available alternative payment mechanism options.

In economics, it is often the case that the economic phenomenon to be modelled involves qualitative response rather than quantitative response (Maddala, 1983, Greene, 1997). For example, participation in the labour market and decision making in relation to the purchase of expensive durable goods are examples of qualitative responses. The data observed from these choices are categories the subject belongs to. In applying regression analysis to these economic phenomena, the dependent variable is always discrete and limited. The more conventional quantification used for regression analysis, the linear regression model, assumes a continuous dependent variable. This is usually not fit for dealing with a discrete and limited dependent variable (Greene, 1997), and another approach to regression analysis, the qualitative response model, is often employed (Amemiya, 1985; Maddala, 1983). Since the choice modelled and observed in the second research question, the choice of one payment mechanism among three alternatives is discrete

and limited, a qualitative response model is employed in the empirical analysis of this study.

4.4 QUALITATIVE RESPONSE MODELS

There are several types of qualitative response models in regression analysis. These models can be classified into two groups according to the number of responses (Amemiya, 1994). Binary response models apply when the number of qualitative responses is limited to two; multinomial response models, when the number of qualitative responses is three or more. Since under the second research question, two alternative payment mechanisms are available to those using health centres outside the discount card trial, and three alternative payment mechanisms are available to those using health centres inside the discount card trial, qualitative response models for both binary response and multinomial response are reviewed for the empirical analysis of this study in the following.

4.4.1 REGRESSION ANALYSIS FOR BINARY RESPONSE

This section considers the choice between two options, for example, "A" or "B". In order to describe consumer's qualitative response in regression analysis, dummy variables are usually used (Greene, 1997). For example, when Y is used to describe the dependent variable, let "0" represent the choice of "A", and "1" to represent the choice of "B". In analyzing this binary response, especially the choice of "B" instead of "A", the probability of Y being "1" is examined coupled with independent variables which are thought to have impacts on the movement of this probability.

For example, in the case of choosing whether or not to purchase expensive durable goods, the choice of purchase is described as "1", otherwise "0". In the context of this study, the choice of voluntary prepayment as opposed to user fees outside the discount card trial is the probability to be examined.

In the quantification of qualitative response models for binary choice, let vector X_i be a set of variables, which are considered to have impacts on the probability of the ith individual's choice, Y_i; and let vector α be a set of parameters, which reflects the impact of changes in X_i on the probability. The probabilities of Y_i being "1" or "0" are written as a function F* of X_i as below:

$$\text{Prob}\ (Y_i = 1 \mid X_i) = F^*(X_i, \alpha)$$

$$\text{Prob}\ (Y_i = 0 \mid X_i) = 1 - F^*(X_i, \alpha)$$

The problem of the quantification of regression analysis here is choosing a functional form of F*. One of the simplest candidates associated with conventional linear regression models is a linear probability model as below:

$$F^*(X_i, \alpha) = \alpha' X_i$$

However, this formulation allows the value of $F^*(X_i, \alpha)$ to be more than one or less than zero depending on the value of X_i. This is inconsistent with the definition of probability, which is no less than 0 and no more than 1. In order to overcome the shortcomings of choosing a simpler linear equation, assumptions such as interpreting the out of range values of $F^*(X_i, \alpha)$ as 1 or 0 have been made in the

past (e.g. Fisher 1936; Ladd, 1966). But these statistical models are rarely used these days, since the fitness of the model around $F^*(X_i, \alpha)$ being 1 or 0 is bad (Maddala, 1983; Mukherjee et al., 1998). In other words, squeezing the out of range values into 1 or 0 is too crude as an approximation.

Most current and commonly used regression analysis for qualitative response and binary choice is built on an additional assumption (Maddala, 1983; Amemiya, 1985), the index function approach (Greene, 1997). This assumes that the outcome of a discrete choice reflects an underlying regression by the introduction of a hypothetical factor Y^*_i, which determines the ith individual's choice whether Y_i equals 1 or 0. In the underlying regression, Y^*_i is an unobservable continuous variable, but is assumed to be written as the sum of systematically determined components depending on X_i ,of which part is $\alpha' X_i$, and an error term, of which a component is ε_i, similar to conventional linear regression models. This is written as:

$$Y^*_i = \alpha' X_i + \varepsilon_i$$

Then, Y_i is assumed to be determined by the sign of Y^*_i as below:

$$Y_i = 1 \text{ if } Y^*_i > 0$$

$$Y_i = 0 \text{ otherwise}$$

In this formulation, Y_i is called the index function.

This formulation can be explained with an example. In the case of purchasing expensive durable goods, the consumer's choice is the result of his/her calculation of marginal benefit and marginal cost when spending his/her income on the durable good or on other goods. However, net benefit is unobservable in principle, and what is observable is whether the good is purchased or not. Therefore, Y^*_i is defined as the difference between benefit and cost, so that the sign of Y^*_i corresponds to the observation of whether the goods are purchased or not, since a consumer purchases the goods when benefit exceeds cost.

Alternatively, this equation can be directly induced from the discussion of utility (Greene, 1997). Suppose that U_{0i} and U_{1i} represent the ith individual's utilities between the two choices, the choice of "A" and the choice of "B", respectively. An individual chooses "B" instead of "A", when the utility of choosing "B" is more than the utility of choosing "A", which is written as below:

$$U_{1i} > U_{0i}$$

When U_{1i} and U_{0i} are assumed to be written as the sum of a systematically determined component, of which $\alpha' X_i$ is part and an error term, of which a component is ε_i, and Y^*_i is defined as the difference between U_{1i} and U_{0i}. Then, Y^*_i, is written as:

$$Y^*_i = \alpha' X_i + \varepsilon_i$$

And the sign of Y^*_i corresponds to the observation of whether the goods are

purchased or not, since a consumer purchases the goods when utility of purchase exceeds utility of spending his/her income on other goods.

With this formulation, the probability of Y_i being "1" is written as below:

$$\text{Prob}\,(Y_i = 1 \mid X_i) = \text{Prob}\,(Y^*_i > 0)$$
$$= \text{Prob}\,(\varepsilon_i > -\alpha' X_i)$$

A statistical model for binary choice is developed on top of this formulation with assumptions regarding the error term, ε_i. Suppose ε_i is subject to proper, continuous probability distribution defined over the real line, and let F be the cumulative probability distribution function of $-\varepsilon_i$. The probability is written as:

$$\text{Prob}\,(Y_i = 1 \mid X_i) = F\,(\alpha' X_i)$$

With this formulation, the probability stays within the 0-1 interval, overcoming the shortcomings of the linear regression model as below:

$$\lim_{\alpha' X_i \to \infty} \text{Prob}\,(Y_i = 1 \mid X_i) = 1$$
$$\lim_{\alpha' X_i \to -\infty} \text{Prob}\,(Y_i = 1 \mid X_i) = 0$$

Two alternative probability distributions for the error term are commonly used in empirical analysis of qualitative response under binary choice: standard normal distribution and logistic distribution (Greene, 1997; Amemiya, 1994), although other distributions have been suggested (Aldrich and Nelson, 1984). The

statistical model assuming standard normal distribution is usually called the probit model (Finney, 1971); and logistic distribution, the logit model (Ashton, 1972). These two models are reviewed in the following.

In the probit model, the error term ε_i is assumed to be subject to standard normal distribution. Since standard normal distribution is symmetric with a mean of 0, the cumulative probability distribution function of $-\varepsilon_i$ and ε_i are similar. Therefore, the cumulative probability distribution of the standard normal distribution function $\Phi(z)$ is assumed as F, and the probability of Y_i being "1" can be written as below:

$$\Phi(z) = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-x^2/2} dx$$

$$\begin{aligned} \text{Prob}(Y_i = 1 \mid X_i) &= F(\alpha' X_i) \\ &= \Phi(\alpha' X_i) \end{aligned}$$

The standard normal distribution is an intuitively reasonable assumption because it is often used for describing error terms in other regression models.

In the logit model, the error term ε_i is assumed to be subject to logistic distribution. Since logistic distribution is also symmetric with a mean of 0, the cumulative probability distribution function of $-\varepsilon_i$ and ε_i are similar. Therefore, the cumulative probability distribution of logistic distribution function $\Lambda(z)$ is assumed as F, and the probability of Y_i being "1" can be written as below:

$$\Lambda(z) = \frac{e^z}{1+e^z}$$

$$\text{Prob}\,(Y_i = 1 \mid X_i) = F\,(\alpha' X_i)$$

$$= \Lambda(\alpha' X_i)$$

Logistic distribution is used because it has mathematical convenience in that the distribution function is expressed in a relatively simple form, and the logarithm of the ratio of Prob $(Y_i = 1 \mid X_i)$ and Prob $(Y_i = 0 \mid X_i)$ is a linear function of X_i. The latter is written as below:

$$\log \{\text{Prob}\,(Y_i = 1 \mid X_i) / \text{Prob}\,(Y_i = 0 \mid X_i)\} = \alpha' X_i$$

Since there are two commonly used statistical models for binary response: probit model and logit model, a researcher needs to choose the appropriate one in carrying out his/her empirical analysis. However, in comparing standard normal distribution and logistic distribution, there is only a slight difference in the tails of the distributions. Both distributions tend to bring out similar probabilities on the real line, and the results from regression analysis are likely to be similar as well. Although Amemiya (1985) discusses the comparison between probit model and logit models for binary response in detail, there is no general guide on how to choose from these models when analysing a particular data set (Greene, 1997). In practice, a researcher may choose the probit model, giving greater weight to the use of the normal distribution as in conventional regression models, or the logit model giving greater weight to mathematical convenience (Amemiya, 1993).

These models include unknown parameters, α, so that they need to be estimated using observed data drawn from samples. These estimations are usually based on the method of maximum likelihood (Greene, 1997). The joint probability or likelihood function is written with function F, as below:

$$L(\alpha) = \prod_{Yi=1} F(Xi'\alpha) \prod_{Yi=0} \{1 - F(Xi'\alpha)\}$$

Most statistical software currently used in econometrics is equipped to estimate α with this likelihood function. This is one of the reasons why the linear probability function is now rarely used (Greene 1997).

It is important to note that the parameters of the probit model and logit model are not the marginal effects as in conventional linear regression models when interpreting the estimated models. Let X_k be the kth element of the vector of independent variables X, and let α_k be the kth element of α. Then, the derivative of the probabilities given by the linear probability model, probit model, and logit model are written as below:

$$\frac{\partial}{\partial X_k}(X'\alpha) = \alpha_k$$

$$\frac{\partial}{\partial X_k}\Phi(X'\alpha) = \phi(X'\alpha)\alpha_k$$

$$\frac{\partial}{\partial X_k}\Lambda(X'\alpha) = \frac{e^{X'\alpha}}{(1+e^{X'\alpha})^2}\alpha_k$$
$$= \Lambda(X'\alpha)\{1-\Lambda(X'\alpha)\}$$

The derivative of the probabilities given by the linear probability model is a constant and the estimated parameter α_k represents the marginal effect of X_k, while the values of those derivatives given by probit model and logit model vary depending on the values of X, and the parameter α_k does not represent the marginal effect of X_k. Therefore, marginal effects in probit model and logit model need to be calculated according to the values of independent variables. It is useful to calculate slope parameters or derivatives by means of independent variables or some appropriate level of independent variables in interpreting the estimated variables (Greene, 1997). Logit model is mathematically convenient for this purpose, since the derivative is written only with the estimated function as above described.

The maximum likelihood estimators of probit and logit models are not unbiased estimators in general, but consistent estimators in general. Therefore, it is very difficult to know the exact distribution of estimators $\hat{\alpha}_k$, but their asymptotic distributions are normal by the nature of maximum likelihood estimators. Therefore, the t-test is applicable in the same manner as conventional linear regression analysis. This is the case with slope parameters as well.

4.4.2 REGRESSION ANALYSIS FOR MULTINOMIAL RESPONSE

The qualitative response models for binary response can be expanded in the case of

multinomial response. In this section, multinomial probit and logit models, which are straightforward expansions of probit and logit models are reviewed.

Ternary choice, that is, the choice among three, can be modelled in a similar manner as by the probit model reviewed in the previous section (Thurstone, 1927). Ternary choice is described with dummy variables. For example, when Y is used for describing the dependent variable in regression analysis, let "0" represent the choice of "A", "1" the choice of "B", and "2" the choice of "C". The probabilities of Y being "0", "1", or "2" are examined coupled with independent variables, which are considered to have impact on the movement of these probabilities. For example, in the case of choosing transportation between London and Edinburgh, the choice of car is described "0", train "1", and plane "2". In the context of this study, the ternary choice in question is determined by the probability of choosing either user fees, voluntary prepayment, or discount card at health centres where both voluntary prepayment and discount card are available.

In expanding the probit model for ternary choice, let U_{i0} be the ith individual's utility of choosing "A", U_{i1} "B", and U_{i2} "C", respectively. Then, the condition of the ith individual's choice is written as:

$$Y_i = 0, \text{ when } U_{i0} > U_{i1} \text{ and } U_{i0} > U_{i2}$$

$$Y_i = 1, \text{ when } U_{i1} > U_{i0} \text{ and } U_{i1} > U_{i2}$$

$$Y_i = 2, \text{ when } U_{i2} > U_{i0} \text{ and } U_{i2} > U_{i1}$$

Additionally, suppose that the ith individual's utility of choosing option j is written

as a sum of systematically determined components depending on independent variables μ_{ij} and error term ε_{ij}, this is written as:

$$U_{ij} = \mu_{ij} + \varepsilon_{ij}$$

The choice depends solely on the relative size of U_{ij}. Let U^*_{ij} be the difference between U_{ij} and U_{i0}, which is written as:

$$U^*_{ij} = U_{ij} - U_{i0} = v_{ij} + \varepsilon^*_{ij}$$

where $v_{ij} = \mu_{ij} - \mu_{i0}$, $\varepsilon^*_{ij} = \varepsilon_{ij} - \varepsilon_{i0}$

Then, the condition of the ith individual's choice is written with U^*_{ij} as:

$Yi = 0$, when $0 > U^*_{i1}$ and $0 > U^*_{i2}$

$Yi = 1$, when $U^*_{i1} > 0$ and $U^*_{i1} > U^*_{i2}$

$Yi = 2$, when $U^*_{i2} > 0$ and $U^*_{i2} > U^*_{i1}$

In the quantification of the probit model for ternary choice, the error terms (ε^*_{i1}, ε^*_{i2}) are assumed to be subject to bivariate normal distribution. This formulation can be expanded for the qualitative response model for multinomial choice assuming that error terms are subject to multivariate normal distribution. Through the use of multivariate normal distribution in this formulation, error terms are consistent with a popular assumption in the conventional regression model, which makes this formulation natural and understandable, the computation of multiple integral is required in estimating parameters with this formulation.

For example, let $f(\varepsilon_1, \varepsilon_2)$ be joint probability function of $(\varepsilon^*_{i1}, \varepsilon^*_{i2})$. The probability of Yi being 1 in the case of ternary choice is written as below:

$$P_{i1} = \int_{-v_{i1}}^{\infty} \{ \int_{-\infty}^{v_{i1}-v_{i2}+\varepsilon_1} f(\varepsilon_1, \varepsilon_2) d\varepsilon_2 \} d\varepsilon_1$$

Due to the difficulty in the computation of the multiple integral, the multinomial probit model is rarely used in empirical studies.

The logit model reviewed in the previous chapter can be expanded to ternary choice in a relatively simple manner (McFadden, 1974). Suppose that the ith individual's utility of choosing option j is written as a sum of systematically determined components depending on independent variables μ_{ij} and error term ε_{ij}, this is the same as the case of multinomial probit model, which is written as:

$$U_{ij} = \mu_{ij} + \varepsilon_{ij}$$

Then, the multinomial logit model is formulated assuming the error terms ε_{ij} are independent and their cumulative distribution function is type I extreme-value distribution or log Weibull distribution of z, which is written as:

$$\exp(-\exp(-z))$$

For example, the probability of Yi being 1 in the case of ternary choice is written as below:

$$P_{i1} = \text{Prob}\,(U_{i1} > U_{i0},\ U_{i1} > U_{i2})$$

$$= \text{Prob}\,(\varepsilon_{i1} + \mu_{i1} - \mu_{i0} > \varepsilon_{i0},\ \varepsilon_{i1} + \mu_{i1} - \mu_{i2} > \varepsilon_{i2})$$

$$= \int_{-\infty}^{\infty} f(\varepsilon_1)\{\int_{-\infty}^{\varepsilon_1-\mu_{i1}-\mu_{i0}} f(\varepsilon_0)d\varepsilon_0\}\{\int_{-\infty}^{\varepsilon_1-\mu_{i1}-\mu_{i2}} f(\varepsilon_2)d\varepsilon_2\}d\varepsilon_1$$

$$= \exp(\mu_{i1})/\sum_{j=0}^{2}\exp(\mu_{ij})$$

$$= \exp(\mu_{i1} - \mu_{i0})/\sum_{j=0}^{2}\exp(\mu_{ij} - \mu_{i0})$$

Estimating parameters under multinomial logit is mathematically convenient which makes the multinomial logit model more often used in empirical studies (Maddala, 1984). This formulation can also be expanded to the qualitative response model for multinomial choice.

4.5 CONCLUSION

In order to empirically analyze the economic phenomenon under consideration, that is, the consumer's choice of alternative direct payment mechanisms, regression analysis is employed in this study. A theoretical model which explains the choice based on utility maximisation is transformed into a single equation, the Marshallian demand function for the purpose of regression analysis as described in section 4.2. The method for quantifying this equation is determined by the formulation of a theoretical model, which is the discrete choice model. The qualitative response model, which is a statistical model, is useful and often used for

quantifying discrete choice. In the quantification of the qualitative response under binary choice, there are two commonly used statistical models: probit model and logit model. In principle, these two models are interchangeable in empirical analysis, since both tend to produce similar results from the same observed data set. A researcher can choose either according to his/her emphasis on the consistency with conventional linear regression models in formulation, or mathematical convenience. Both models can be expanded to the estimation of multinomial response. However, the multinomial probit model presents difficulty in the estimation of parameters, while the multinomial logit model is operational in this computation, due to its mathematical convenience.

The empirical analysis of this study involves ternary choice among direct payment mechanisms, so the logit and multinomial logit models will be employed in analysing the data collected through the surveys.

CHAPTER 5

METHOD

STUDY DESIGN

5.1 FRAMEWORK OF THE STUDY

In order to answer three research questions specified in Chapter 2, this study employs the framework of econometrics. Econometric study aims to elaborate a theoretical model explaining economic phenomena, by reference to evidence from observed data. Therefore, the study consists of two investigations: theoretical investigation, or modelling, and empirical investigation, or data collection and analysis. Policy implications are drawn from both theoretical and empirical findings.

In this study, two theoretical demand models are elaborated that correspond to the first and second specific research questions: "how do people seek health care under each payment mechanism?" and "how do people choose alternative payment mechanisms?". Then, theoretical equity implications, responding to the third specific research question, are drawn from the combination of these demand models. Supporting evidence for these theoretical models and implications are sought from the analysis of data collected in the field.

In the next section, the strategy for theoretical modelling is described. This starts with an explanation of methodological ground, followed by the strategy taken in this study. In section 5.3, background theory for modelling is introduced and factors to

be modelled are specified. The specification of factors is preparation for both theoretical investigation and empirical investigation. In 5.4 the strategy for data collection is described. The variables to be collected are specified based on the specification of factors in the previous section, and three data sources are identified. In section 5.5, the protocols for data collection are described. After reference to the use of Living Conditions Monitoring Survey 1998 data, methods of collecting data from records and conducting outpatient questionnaire survey at health centres are described. Finally, in 5.6, the strategy for the data analysis is described.

5.2 STRATEGY FOR THEORETICAL MODELLING

There are two strategies of theoretical modelling in econometrics: traditional modelling and modern modelling (Mukherjee et al., 1998). In the following, both strategies are briefly compared.

The point in distinguishing two strategies is the role of data in modelling. Theoretical modelling and data analysis are not independent. In traditional modelling, a specific to general approach, the theoretical model is supposed to guide the empirical analysis of data, and the model is tested by the data. The use of data is limited to the test of hypotheses generated by theoretical considerations. In principle, once the model fails the test, researchers are expected to restart theoretical modelling again and test all over again with brand new data.

In modern modelling, on the contrary, the data is supposed to guide the refinements of the theoretical model in addition to hypothesis testing. Modern modelling has

several variations such as general to specific modelling (Charemza and Deadman, 1992), exploratory data analysis (Tukey, 1977), or fragility or sensitivity analysis (Leamer, 1983). In general to specific approach, researchers first develop the model, which covers the hypothesis based on opposing theories. Then, the model is refined through testing. In exploratory data analysis, researchers focus on the behaviour of residuals (error terms in the statistical model), to explore hidden relationships. In fragility or sensitivity analysis, the model is tested with changes made in assumptions. The common characteristic of modern modelling in contrast to traditional modelling is the attitude; learning from data through modelling.

Traditional modelling may be more scientifically sound in traditional terms. If there are rival theories to account for a phenomenon, tests with data may offer judgement without bias. However, it is difficult and costly to obtain new data sets to test each model in practice. Therefore, researchers tend to make ad hoc modifications to theoretical models behind the scenes until they succeed in tests. From this point of view, traditional modelling came under increasing methodological attack in the 1970's (Morgan, 1990).

The approach of traditional modelling as a method of science including economics was also criticised in terms of epistemology. It was deemed based deeply on falsification theory (Popper 1957; Lakatos 1978), which is attacked by, for example, Feyerabend (1993), arguing that science neither had developed nor should be developed by falsification. As a result, scope for the theory of science was broadened. Guba and Lincoln (1994), for example, made distinction between positivism paradigm and post-positivism paradigm. While the former requires

rigorous hypothesis testing like traditional modelling, the latter allows interpretive inquiry as far as the objectivity of the investigator is kept. This epistemological position justifies the approach of modern modelling.

In modern modelling, how data have been allowed to modify the model is explicitly discussed. Two researchers with the same data set do not necessarily come to the same conclusion. This is particularly the case with non-experimental data. The data analysis involves interpretative or simplifying searches rather than hypothesis testing. Even when modification processes are explicitly discussed, there is a danger of being caught up in a circular argument. Using the data to improve the model and subsequently using the model to draw inferences from the data can be a series of ad hoc modifications with the potential to introduce bias. The problem of how much modification following data analysis is appropriate remains unsolved. Generally speaking, appropriateness depends on the nature of the economic phenomenon under consideration. If the phenomenon can be modelled based on relatively conventional theory, theory and empirical examples can provide guidance such as formal statistical inference. If a set of vague ideas is under consideration, the study is likely to involve exploratory empirical work to the point that a theoretical explanation is induced.

In this study, a modern strategy, specifically, general to specific approach is taken, since the availability of data in developing countries including the field of this study is by no means abundant. The study uses non-experimental survey data, which requires interpretative search. The study's theoretical models are elaborated based on both conventional and other relevant pre-existing models which guide the

use of data. The models which guide the exploration of the second specific research question have been presented in Chapter 3, and will also be discussed in the next section which summarises the conventional theories both for the first and second specific research questions.

Although the use of the modern modelling strategy is explicitly noted here, the chapters of this thesis separate theoretical and empirical investigation for the purpose of legibility. Chapter 6 presents theoretical models that result from taking a general to specific approach; and Chapters 7 to 9 present empirical results involving interpretative searches.

5.3 BACKGROUND THEORY FOR MODELLING AND FACTORS TO BE MODELLED

In this section, the starting points for the theoretical modelling of two demand models are summarised in order to give explicit guidance to the use of data in the modelling of this study avoiding over-guidance by the data. The factors to be modelled in two theoretical models are then specified based on the literature reviews of Chapters 2 and 3. This provides preparation for both theoretical and empirical investigation .

5.3.1 DEMAND FOR HEALTH CARE UNDER ALTERNATIVE PAYMENT MECHANISMS

For the first specific research question, the demand for health care under

alternative payment mechanisms, the relationship between two factors will be modelled. These are, quantity of health care demanded and the financial barrier faced by the consumer under each payment mechanism at the point of utilisation. Financial barrier is interpreted as price, the opportunity cost of obtaining service. The difference in quantity of health care demanded between a consumer with or without insurance is modelled in the literature applying the law of demand (e.g. Jacobs, 1996; Folland et al., 1997), explaining the effect of insurance on quantity demanded or 'consumer moral hazard' (Pauly, 1968). Consumer moral hazard refers to the consumer's greater consumption of health care resulting from reduced cost at the point of service utilisation due to insurance subscription. Although this concept is generally used to explain the market failure of private (voluntary) insurance in the theoretical modelling of this study in Chapter 6, it is interpreted differently here, following the assumption that under-utilisation is more prevalent than over-utilisation in this context, which was introduced in Chapter 2. The model is expanded to model the demand for health care under alternative payment mechanisms.

5.3.2 DEMAND FOR ALTERNATIVE PAYMENT MECHANISMS

For the second research question, the demand for alternative payment mechanisms, the consumer's choice of one payment mechanism will be modelled. The groundwork for this modelling is presented in Chapter 3, the theory of choice, which derives demand functions by examining a model of the consumer's utility maximising behaviour coupled with a description of underlying economic constraint. This utility maximisation model is regarded as a conventional theory to account for

demand in the literature (Varian, 1992; Nicholson, 1997). In addition, in order to illustrate consumer choice under uncertain conditions, the expected utility maximisation model, which is an expansion of the utility maximisation model incorporating probability, will be used (Varian, 1992; Nicholson, 1997; Chapman and Sonnenberg, 2000). This is also regarded as a conventional theory accounting for choice made in facing risky events, that is, falling ill. Additionally, the theory of 'adverse selection' (Pauly, 1986) will be used to explain the market failure of private (voluntary) insurance. Under adverse selection, high risk consumers have higher tendency to subscribe. Again, this is a conventional theory accounting for the choice under consideration, although its implications are interpreted differently given the under-utilisation assumption. These models are expanded to model the demand for alternative payment mechanisms in this study.

Three factors, which are considered to affect consumer preferences, and one factor, which is considered as the consumer's constraint, are incorporated in this model based on the literature reviews in Chapter 2 and Chapter 3.

Voluntary prepayments are a kind of health insurance and discount cards also have risk reducing properties, as argued in Chapter 3. Theoretically, the reason why a consumer chooses to purchase insurance is to reduce risk. In the case of health insurance, two types of risks, financial risk and health risk, are reduced if a consumer purchases insurance (Jack, 1999). Therefore, price, which determines financial cost, and health status of the consumer, which determines health risk, are incorporated in the model.

The price is defined as the financial cost of obtaining a health service under each payment mechanism, since the choice of payment mechanism is considered a derived demand from the demand for health services. Moreover, this is further operationalised to mean the financial cost paid to health centres (excluding costs of transport, for example), which reflects the financial barrier to health services associated with direct payments.

Health status is defined as the consumer's perception of needing health care services in the future, since a consumer assesses his/her own health risk based on his/her perception of health status not on absolute, or professionally assessed, health status. Moreover, this is further operationalised to mean the expected number of attendances at health centres in the future, on the assumption that the consumer is concerned about the number of episodes of common acute ailments treatable at primary care facilities such as health centres.

In addition to these, variables quality of care is incorporated in the theoretical modelling, since it is found to affect consumer's utilisation of health care services under direct payments with user fees significantly (Litvack and Bodart, 1993; Diop et al., 1995; Chawla, 2000), and it is found to affect the coverage of voluntary prepayments in the population (Creese and Bennett, 1997) in empirical studies. Quality of care is defined as the consumer's perception of the level of quality of health services he/she will receive in the future, since the consumer is considered to assess quality of care based on his/her perception when choosing a payment mechanism, not on perfect information, or professionally assessed quality of care.

Wealth, defined as the stock of consumer assets in monetary terms, is incorporated as a constraint. Wealth, rather than income, is used because a consumer is considered to derive satisfaction from assets, and because health care expenses can potentially affect the amount of consumer assets, not just the level of his/her income (Jacobs, 1996). Health care expenditure in low-income settings may have direct impact on asset holding and will not always be absorbed in reduced current expenditures on other goods or services (Russell, 1996)

5.4 VARIABLES TO BE COLLECTED AND DATA SOURCES

The target of data collection is quantitative data, which enables the test of theoretical models as well as the empirical discussion of equity consequences. In the next sub-section, the variables to be collected are specified followed by the discussion of the factors to be modelled in the previous section, and data sources are identified.

5.4.1 VARIABLES TO BE COLLECTED

In the model of the demand for health care, factors such as quantity of health care and different financial barrier faced by a consumer with each payment mechanism at the point of utilisation, are incorporated as discussed in section 5.3. In the model of the demand for alternative payment mechanisms, four factors are incorporated as discussed in section 5.3: price, defined as financial cost payable to the health centre, perceived health status, defined as expected frequency of health centre attendance , perceived quality of care, and wealth. Utilisation indicators,

especially focusing on two categories of population groups: income and choice of payment mechanism, are used in order to discuss equity consequences as discussed in section 2.2.

Data on six variables, which represent the following factors: choice of payment mechanism, utilisation, financial cost of health centre visit, wealth, expected frequency of attendance at health centre, and perceived quality of care, should be collected for the purpose of empirical analysis of the two theoretical models. Income and choice of payment mechanism should be collected for the purpose of the discussion of equity consequences focusing on two categories of population groups. Both wealth and income represent economic status of a consumer. Since wealth is usually difficult to measure in empirical investigation, income is collected and used as a proxy for wealth in the data collection.

5.4.2 DATA SOURCES

For the collection of these variables, three data sources are used in this study. These enable the compilation of the needed variables at the needed levels of analysis.

5.4.2.1 LIVING CONDITIONS MONITORING SURVEY 1998

The first source is the Living Conditions Monitoring Survey 1998 (LCMS98). This is a nation wide sample household survey carried out by the Central Statistical Office of Zambia, which aims to monitor the effects of government policies on households and individuals. The access to health care by households and

individuals, especially by economically disadvantaged groups is one of the featured areas of investigation in this survey. The data set for the two districts of the study, Lusaka and Kitwe, are available in this survey. LCMS98 is the best data available but it has limitations. It lacks two of the six variables needed. Expected frequency of attendance at health centre and perceived quality of care are not surveyed. Additionally, with regard to choice of payment mechanism, choice of discount cards is not surveyed because the sample was too small in this nation wide sample survey, to include a large enough number of people who had paid using discount cards in the small scale trial.

In spite of missing choice of discount cards, LCMS98 allows an appropriate test of the model of the demand for health care under alternative payment mechanisms with regard to two prevailing payment mechanisms: user fees and voluntary prepayments. Taking the small scale of the discount card trial into account, it allows reasonable discussion of the equity consequences of these two major payment mechanisms. However, it is limited in testing the model of the demand for alternative payment mechanisms due to the lack of variables representing expected frequency of attendance at health centre and perceived quality of care. In addition to these analyses which are closely related to the research questions, LCMS98 allows a general description of health care utilisation in the study context including utilisation at health facilities other than health centres. This demonstrates the picture of health care utilisation described in Chapter 1 and provides background for the discussion of equity at a district level.

5.4.2.2 RECORDS AT HEALTH CENTRES

The second source is the records at health centres. Specifically, outpatient registers and outpatient books are useful for the empirical investigation. In particular, data on the choice of discount cards are available at trial health centres. This complements the limitation of LCMS98. However, these records also have limitations. They lack the variables wealth, expected frequency of health centre attendance, and perceived quality of care.

The records at health centres allow a limited test of the model of the demand for health care under alternative payment mechanisms. The limitation stems from the bias of the outpatient population in the general population. Those who were healthy enough to keep away from health centres during the observation period relevant to this study are not observable in health centre records. Therefore, caution is needed in interpreting the results. The records are also limited in testing the model of the demand for alternative payment mechanism due to the lack of variables representing wealth, expected frequency of health centre attendance and perceived quality of care. However, the records allow the construction of a picture of payment mechanism choice at health centres and a comparison among health centres. This provides background for empirical discussion of the equity consequences of alternative payment mechanisms.

Another point to be noted is that the standard of record keeping practice at each health centre limits the feasibility of data collection and the accuracy of the data. This point needs careful handling in the design and implementation of the data

collection, as well as the analysis and interpretation of the data. For example, the selection of sample health centres is inevitably based on record availability rather than random sampling. Awareness of bias due to this sampling is needed in interpreting the results. If there is a systematic difference in record keeping practice among sampled health centres, other systematic differences may also apply.

The variables, expected frequency of attendance at health centre and perceived quality of care, are not obtainable either in the LCMS98 or health centre records. Therefore, these two data sources do not allow an appropriate test of the model of the demand for alternative payment mechanisms. A third data source was sought to complement the shortcomings of the previous two sources.

5.4.2.3 OUTPATIENT QUESTIONNAIRE SURVEY

In order to collect variables which represent consumer perceptions like expected frequency of attendance at health centre and perceived quality of care, it is needed to ask consumers. For this purpose, carrying out a cross sectional household survey in the relevant community would be one possible way. However, using this method, respondents' actual decisions regarding alternative payment mechanisms will be hypothetical or separated from perceptions at the time of questioning for the majority of the respondents, since most of them will not be attending health centres at the time of the survey. Hence, data collected by this method may bias analysis of the relationship between perceptions and choice of payment mechanism. Limiting the question to a recent episode of health care utilisation or organising a

follow up study targeting the incidence of clinical episodes can overcome the shortcomings, but this results in the exclusion of a large number of observations from the core of the analysis dealing with the respondent's illness episode. These are not considered to be optimal approaches. Therefore, households in the relevant communities are not taken as the data source for this study.

Another potential data source is outpatients at health centres. The data from them are more appropriate for the analysis of the relationship between perceptions and choice of payment mechanism because outpatients are actually making a decision on health care utilisation and choosing from alternative payment mechanisms at the time of the survey, and all data from the respondents can be included in the analysis. Outpatients are considered to be an appropriate data source for this purpose. Nevertheless, this data source, like the health centre records, is biased in excluding non health centre users in the general population. Non-attending people with illness are not reflected in the data from outpatients. It is impossible to analyse the decision whether to attend at a health centre or not when falling ill. In this sense, an outpatient survey is limited in testing the model of the demand for health care under alternative payment mechanisms. However, LCMS98 and the records at health centres complement the shortcomings. Therefore, an outpatient survey was conducted to provide the third data source.

The combination of these three data sources is considered to allow a reasonable level of empirical analysis and discussion.

Table 5.1 shows the relationship between the variables and data sources.

Table 5.1 Matrix of needed variables and data sources

FACTOR	DATA SOURCE & INFOR-MANT / VARIABLE	LIVING CONDITIONS MONITORING SURVEY 1998	RECORDS AT HEALTH CENTRES	OUTPATIENTS
		households	outpatients	outpatients
UTILISATION	use	available	available	available
PAYMENT MECHANISMS	user fee	available	available	available
	prepayment	available	available	available
	discount card	not available	available	available
PRICE	financial cost	available	available	available
INCOME	income	available	not available	available
FREQUENCY OF ATTENDANCE	perceived health status	not available	not available	available
QUALITY OF CARE	perceived quality of care	not available	not available	available

5.5 PROTOCOLS OF DATA COLLECTION

5.5.1 LIVING CONDITIONS MONITORING SURVEY 1998

The Central Statistical Office allows access to the LCMS98 data set and supporting documents to the public for the purpose of research under certain conditions. The use of these for this study was applied for, following the established procedures, and approved. The outline of the survey is presented in Appendix 2. The data from the sample in two districts, Lusaka and Kitwe, are used in the analysis.

5.5.2 SAMPLING OF HEALTH CENTRES FOR SURVEYS AND RECORDS

The sampling method of health centres was structured sampling based on three criteria. The first required that the sampling enabled comparisons among the three payment mechanisms. The second sought to contrast experience in different sizes of health centres. Daura et al. (1998) concluded that small health centres tended to decrease the misuse of the prepayment scheme by patients, and it was therefore sought to control for this variable. The third criterion was the level of record keeping practice. Although guidelines for record keepers and the provided outpatient registry book required the recording of items, which enabled the test of models and the discussion of equity consequences, this was not always completed. Well kept records were needed and it was desirable that the outpatient survey was conducted at the same sites from which records were collected to maximise the potential to cross reference across data sources.

Although the sampling of health centres according to record availability violated the principles of random sampling, it was inevitable in the fields of this study. Therefore, health centres were sampled with non random sampling and these three criteria, and each sampled health centre was treated as an independent case, in order to maximise the power of the tests of the two demand models. Caution is needed in discussing the evidence of equity implications based on the data from the records.

In relation to the first criterion, discount cards were sold at two pilot health centres, one large and one small, in each district, and eight health centres in total were intended to be sampled: one large health centre out of trial, one small health centre out of trial, one large health centre in trial, and one small health centre in trial in each district.

Preliminary visits to examine the record keeping practice and the stage of the discount card trial were made at all 23 health centres in Lusaka and 18 health centres in Kitwe. According to the two criteria of record keeping practice and ability to compare three payment mechanisms, four health centres in Lusaka and three health centres in Kitwe were screened as candidates. Table 4.2 shows these health centres.

Table 5.2 Sampling of health centres

DISTRICT	HEALTH CENTRE	SIZE	RECORD KEEPING PRACTICE	DISCOUNT CARD TRIAL
Lusaka	Chipata	Large	Nov 98 to Mar 99 New registration only	No involvement
	Chawama	Large	Oct 98 to Sep 99 New registration only	Started in October 1998. Discount cards were continuously sold alongside low cost prepayment at the time of survey.
	Matero Reference	Large	Irregular	Started in November 1998. Discontinued in August 1999 due to lack of supply of cards from the district.
	Kabwata	Small	Nov 98 to Oct 99 Every episode	Started in October 1998. Discontinued and replaced by Matero Reference Clinc by management decision in November 1998.
Kitwe	Chimwemwe	Large	Dec 98 to Nov 99 Every episode	Started in November 1998. Discontinued in January 1999 due to complaints from people in community.
	Mwekera	Small	Oct 98 to Sep 99 Every episode	Started in November 1998. Discount cards were continuously sold at the time of survey. Low cost prepayments were sold only to pregnant women.
	Cosetco	Small	Dec 98 to Nov 99 Every episodes	No involvement

The outpatient new attendance registry book was the primary data source in the data collection from the records at health centres. All outpatients with a new episode were supposed to be registered in this record book in principle. The items to be recorded were: outpatient card number, date, name & address, origin code (representing the distance from home to the health centre), age, sex, fee paid (representing the choice of payment mechanism), diagnosis, treatment given, dosage, whether or not referred, and remarks. From these, seven items: outpatient card number, date, origin code, age, sex, fee paid, diagnosis, were intended to be collected for one year beginning from the autumn of 1998, when this style of recording and the trials of discount cards had been launched.

The records of the choice of payment mechanism were examined to exclude those health centres whose record keeping practice was inadequate for the study's purpose. Good record keeping was found at two health centres, Chawama and Kabwata in Lusaka, and three health centres, Chimwemwe, Mwekera, and Cosetco in Kitwe. These were identified as possible candidates. Other health centre records were interrupted or were incorrectly coded, which meant choice of mechanism was not differentiated in the records. Chipata maintained good records only for six months, then failed to record choice of payment mechanism due to lack of supply of a blank outpatient new attendance registry book from the district health management team. However, this was the second best record keeping practice in Lusaka and Chipata was identified as a possible candidate for the sampling of a large health centre out of the discount card trial.

As for the stage of the discount cards trial, only one health centre in each district

was still selling discount cards at the time of the survey. In Lusaka, the trial started at one large health centre, Chawama, and one small health centre, Kabwata. The sale of discount cards at Kabwata discontinued in a month due to administrative decision. Matero Reference, a large health centre, started sales of discount cards at that time, but it was discontinued after ten months due to lack of supply of cards from the district. Therefore, only Chawama, a large health centre, continued to sell discount cards at the time of the survey. This centre sold discount cards alongside low cost prepayment.

In Kitwe, the trial started at one large health centre, Chimwemwe, and one small health centre, Mwekera. The sale of discount cards at Chimwemwe discontinued after three months following complaints from people in the community. Therefore, only Mwekera, a small health centre, was continuing the sale of discount cards at the time of the survey. They sold low cost prepayment only to pregnant woman and discount cards only to other patients.

Matero Reference is selected as a possible candidate because of its involvement with the discount cards trial. However, it failed to keep records of the choice of payment mechanism in the outpatient new attendance registry book.

The four initial pilot health centres for the discount cards trial, Chawama and Kabwata in Lusaka, and Chimwemwe and Mwekera in Kitwe, had good record keeping practice. This is not a coincidence because the level of record keeping practice was taken into account in selecting pilot health centres for the discount cards trial for the purpose of evaluation.

Based on these observations in the preliminary visits, health centres for the data collection were sampled.

Among the health centres which were not part of the discount cards trial, but which offer outpatients a choice of payment mechanism between user fees and voluntary prepayments, one large health centre and one small health centre were sampled in each district, instead of four health centres in total as planned. Chipata from seven large health centres and Kabwata from fifteen small health centres were sampled in Lusaka, and Chimwemwe from seven large health centres and Cosetco from eleven small health centres were sampled in Kitwe.

Two health centres, Kabwata in Lusaka and Chimwemwe in Kitwe, were not health centres outside the discount cards trial in a strict sense. They were involved in the trial at the beginning. However, they were sampled as health centres outside the trial because they discontinued the sale of discounted cards within a couple of months, and other health centres had been excluded because they lacked the records of the choice of payment mechanism, and were out of the trial at the time of the outpatient survey. In addition, the records of discount card sales in the early months were considered informative.

Two health centres with discount card trial, Chawama, a large health centre in Lusaka, and Mwekera, a small health centre in Kitwe, were sampled instead of the four health centres initially planned. It is to be noted that these two health centres apply different rules to the sale of discount cards. Discounted cards were

sold alongside low cost prepayment at Chawama; discount cards were not sold for outpatients unless pregnant in Mwekera. Attention should be paid to this difference in analysing and interpreting the data.

Within these six sampled health centres, there was a significant variation in the record keeping rules applied to the outpatient new attendance registry book. All outpatients with a new episode were supposed to be registered in this record book in principle. However, at two large health centres in Lusaka, Chawama and Chipata, similar data were not available. Only outpatients who attended the health centre for the first time were recorded at these health centres, and other episodes after this were not recorded.

The omission of recording the episode after the first one at these health centres made it impossible to analyse the frequency of attendance, which would be used as a proxy for expected frequency of attendance and indicator of utilisation. Therefore, individual patients' outpatient books, which recorded every consultation, were additionally surveyed at Chawama, which allowed the comparison among the three alternative payment mechanisms.

In order to obtain the number of attendances during the year after registration, adult paying outpatients were sampled from the records of the outpatient new attendance registry book from October to December 1998. In this period, 70 patients chose discount cards; 2,524 patients chose low cost prepayments; 657 patients chose user fees. 70 patients using each of low cost prepayment and user fees were randomly sampled for comparison with those who chose discount cards.

The number of episodes these 210 patients had in the following twelve months were collected from individuals' outpatient books.

5.5.3 OUTPATIENT QUESTIONNAIRE SURVEY

The outpatient questionnaire survey was also carried out at the six sampled health centres. The questionnaire, which is shown in Appendix 3, was designed to measure outpatients' expected frequency of attendance at health centres and their perceived quality of care along with their choice of alternative payment mechanism and backgrounds.

In measuring the expected frequency of attendance, the question was asked straightforwardly. This question is simple enough to be answered by the respondents since most of the health problems treated at the health centres are common ailments at primary care level and the fee schedule was based on fee for episode in principle. It will be seen that responses accorded with expectations in statistical analyses, suggesting that on average, reasonable information was obtained.

In measuring the perceived quality of care, a battery of questions was asked, taking the multidimensional nature of quality of care into account (Donabedian, 1980). Each question in the battery was designed to refer to one of six concrete dimensions of individuals' perceptions of quality of care which were identified in an earlier study of quality of care in Lusaka, through qualitative research (Ruwe et al., 1996). These six dimensions were: behaviour of health staff, technical care provided,

convenience of health services, organisational aspects, medicine availability and quality, and structural aspects of the health centre.

The questionnaire was initially tested with local volunteers in Lusaka. Then, a pilot survey was carried out at Ndeke, a large health centre in Kitwe, before the survey at six health centres. The questionnaire was administered by trained nurses from different health centres attended by the researcher.

The number of outpatients surveyed was determined based on a statistical sample size calculation predicated on the detection of difference in one variable of interest, that was, the difference in the choice of alternative payment mechanisms between income groups. According to the preliminary analysis of the outpatient new attendance registry book at three health centres in Lusaka, about 75 percent of outpatients chose voluntary prepayments as their payment mechanism. Assume the detection of a 30 percent difference such that 90 percent of the upper half of outpatients in the income distribution, and 60 percent of the lower half chose voluntary prepayments, 96 outpatients were needed for the two-tailed test of proportion at each health centre (Fleiss, 1980).

In order to reduce potential bias through seasonal change of outpatients' characteristics, the survey was carried out in two phases, in dry season and in rainy season, although all responses from each health centre were combined in one analysis. Therefore, around 50 outpatients were questioned at each health centre in one season. Outpatients from 16 to 64 years old who were supposed to pay fully were targeted and those who were being exempted from payment such as attending

after hours or suffering from too severe conditions were not questioned. All eligible respondents from all outpatients were screened at the registry, which was the first contact point, and asked to proceed to an interview room which provided privacy, either before or after the consultation between 8:00 am and 5:00 pm. The number of outpatients who rejected the questioning was also recorded. The survey at each health centre in each season continued up to the end of the day when the responses amounted to around 50. In Lusaka, it took one day to reach the sample size since the number of outpatients treated was large. However, in Kitwe, it took two days even at the large health centre and about two weeks at small health centres. Outpatients aged between 6 and 15 years were also questioned at the same time. In this case, when the patient was accompanied by a carer who was responsible for the payment, the carer was questioned.

5.6 DATA ANALYSIS

The quantitative data sets collected from three data sources were analysed separately.

Lusaka and Kitwe data were separately extracted from the nationwide data in the LCMS98. Health care related variables such as health episode, mode of health care obtained, and method of payments were extracted as well as background variables such as household income and household size. Since there are two levels of questions: one to be answered at household level and the other at individual level, two sets of samples: a household data set and an individual data set were prepared for each district.

Two types of statistical analysis were carried out: descriptive analysis and statistical test. In the descriptive analysis, individual consumer samples' health episodes were cross tabulated by coping behaviour, health facilities, and the choice of payment mechanism in order to describe the health care utilisation pattern in each district. This was to develop a foundation for all the following data analysis and discussion.

Statistical tests of derived hypotheses from the model of demand for health care under alternative payment mechanisms and the model of demand for alternative payment mechanisms were carried out. Since this data set was not designed for these tests, interpretive analysis was carried out, in which variables or sets of variables were interpreted in relation to the hypotheses. In testing the hypotheses from the model of demand for health care under alternative payment mechanisms, stratified cross tabulation was made to estimate odds ratios of seeking health care at health facilities by payment method. In testing the model of demand for alternative payment mechanisms, a logit model was estimated using available variables as discussed in Chapter 4.

From data from the records at health centres, descriptive analysis of the detailed health care utilisation pattern at the sample health centre level, and statistical tests of outpatient frequency of attendance were carried out. The description of health care utilisation provides a foundation for the analysis and discussion of data from the outpatient questionnaire survey.

In order to test the hypotheses derived from the theoretical models developed, an index, outpatient frequency of attendances, was calculated from the data from the records at health centres. This index is relevant both to utilisation in the model of demand for health care under alternative payment mechanisms and health status in the model of demand for alternative payment mechanisms. Therefore, interpretation is made during the analysis. In comparing frequency of attendances by payment method, one-way analysis of variance is used.

The outpatient questionnaire survey was mainly designed to test hypotheses derived from the model of demand for alternative payment mechanisms. After univariate analysis and bivariate analysis, logit models were estimated.

CHAPTER 6

RESULTS 1

RESULTS OF THEORETICAL INVESTIGATION

6.1 INTRODUCTION

This chapter presents the results of theoretical investigation. Two demand models, which illustrate the consumer's behaviour regarding health care at governmental health centres in the study field and the equity consequences of them, are described. These two models are to answer the first and second research questions and equity consequences, the third question, specified in Chapter 2. Then the hypotheses are deduced for empirical investigation.

6.1.1 PAYMENT MECHANISMS UNDER CONSIDERATION

Based on the health system in the study field introduced in Chapter 1, the payment arrangement at governmental health centres to be modelled is detailed as below. Three payment mechanisms - user fees, low-cost prepayments (a form of voluntary prepayments) and discount cards - are in operation as the methods of direct payment. With user fees, a certain level of flat fee per diagnosis and treatment is payable. The prepayments are a kind of insurance with a specified monthly premium for free diagnoses and treatments at the time of utilisation. Once an individual subscribes to prepayments, he/she is supposed to pay the premium continuously. A discount card comprises coupons for diagnosis and treatment, the price of which is set lower than the equivalent costs payable with user fees. A

coupon can be used whenever the holder falls ill. Each coupon in the discount card covers all diagnosis and treatment for one episode of illness. An individual does not need to pay any additional charges for follow-up consultations and treatments for each episode.

Subscription to prepayments or the purchase of discount cards are encouraged by the government, with the intention of changing the major method of direct payments from user fees to these two alternative payment mechanisms. One reason for this is that these two methods are believed to facilitate the utilisation of health care, compared with user fees. Therefore, a model of the health care utilisation under the alternative payment mechanisms is firstly developed below to illustrate this effect; this is to answer the first research question. Then, another model of the demand for alternative payment mechanisms, which describes the consumer's choice of alternative payment mechanisms, is elaborated, and will answer the second research question. Finally, the impact on equity of the alternative payment mechanisms is discussed using the two demand models developed, which is to answer the third research question.

The list of variables in these models is shown in Appendix 4.

6.2 MODEL OF THE DEMAND FOR HEALTH CARE UNDER ALTERNATIVE PAYMENT MECHANISMS: UTILISATION MODEL

In order to answer the first research question on how people seek health care under each payment mechanism, a demand model, called the utilisation model hereafter,

is elaborated in this section. This model is to illustrate the relationship between the quantity of health care demanded and financial barriers to health care under alternative payment mechanisms, extending a basic demand model for health care under insurance described in the literature (e.g. Jacobs, 1996; Folland et al., 1997), as specified in Chapter 5.

6.2.1 CONTEXT

The economic phenomenon to be modelled in this section is as detailed below. A consumer at a health centre is asked to pay for the cost of his/her utilisation of health care with one of three direct payment mechanisms: user fees, voluntary prepayments, or discount cards, although voluntary prepayments should have been subscribed to in advance, and discount cards will need to be purchased unless any unused coupons are held. Payment mechanisms such as voluntary prepayments or discount cards modify the market for health care at the point of health care utilisation. Once a consumer chooses one of these two payment mechanisms at a health centre, his/her health seeking behaviour, or the expression of his/her demand for health care, will change from that if he/she chooses user fees. The fundamental difference a consumer faces is the price signal. Under voluntary prepayments, the payments at the time of health care utilisation are removed. Under discount cards, the transfer of a coupon replaces the payments at the time of utilisation. In other words, financial barriers to health care at the point of utilisation vary according to the choice of payment method. These changes affect the consumer's notion about the cost at the point of health care utilisation. The ways in which a consumer's behaviour responds to these changes are to be modelled.

6.2.2 DEMAND CURVE FOR HEALTH CARE

The demand for health care by a consumer is modelled initially. He/she is assumed to be a price taker, that is, to express his/her demand according to the price in the market, ceteris paribus. He/she is assumed to consider non-cash costs of health care, such as travel, a cost as well. The law of demand is good, which means the demand curve is assumed to be downward sloping. Thus, he/she consumes a large amount of health care when the price is low; a small amount of health care when the price is high, ceteris paribus.

A demand curve with these assumptions is illustrated in Figure 6.1.

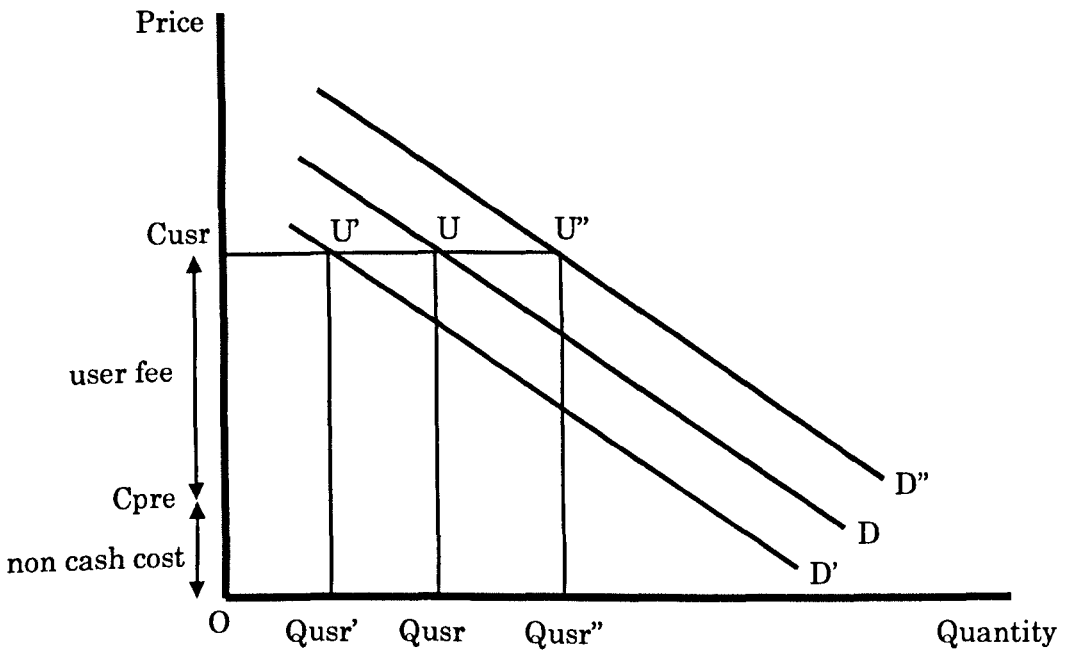

Figure 6.1 Demand curve for health care

Under user fees, a consumer with demand curve D faces the total price OCusr,

which consists of a user fee CpreCusr and non-cash cost OCpre. The quantity demanded is determined at the point U on the demand curve. Therefore, OQusr is demanded.

The demand curve is assumed to shift according to factors other than price. For example, a consumer with high health status may have demand curve D'. The quantity demanded is determined at the point U' on the demand curve D'. Therefore, OQusr' is demanded, which is less than OQusr. On the contrary, a consumer with low health status may have demand curve D". The quantity demanded, OQusr", is determined at the point of U", which is more than OQusr. Factors such as the consumer's income or perceived quality of health care are demand shifters as well.

6.2.3 UTILISATION UNDER VOLUNTARY PREPAYMENT AND DISCOUNT CARD

The demand for health care under voluntary prepayments and discount cards is explained with Figure 6.2.

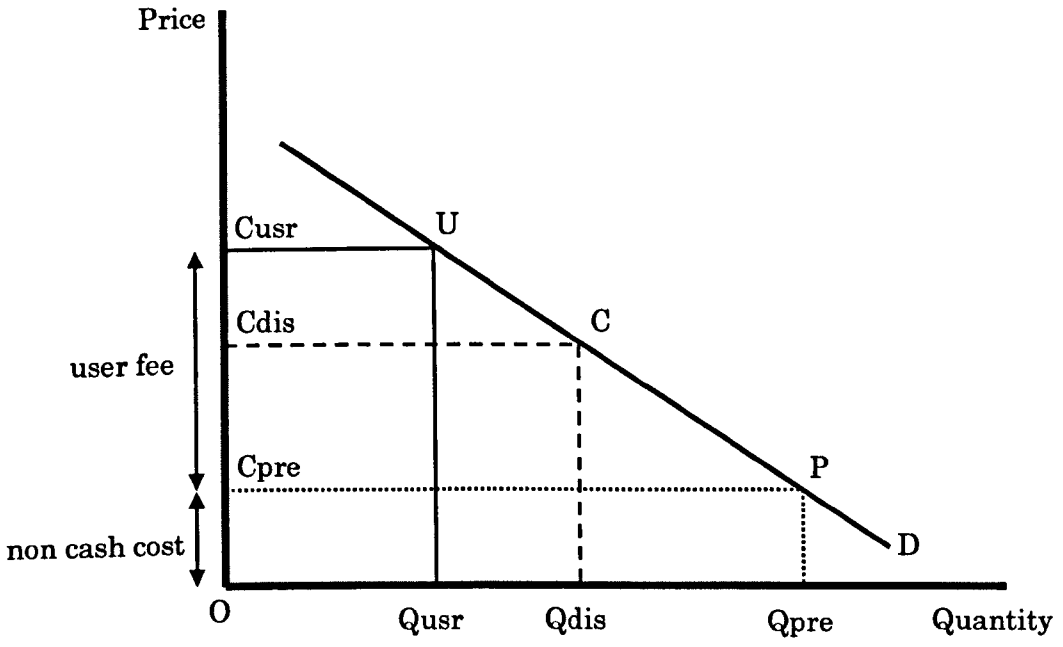

Figure 6.2 Demand curve for health care under alternative payment mechanisms

A consumer has a demand curve D. When he/she subscribes to prepayments, he/she is not asked to pay cash at the point of utilisation since he/she has already paid the premium as the cost for health care in advance. The cost he/she faces this time is the non-cash cost OCpre only. The quantity demanded is determined at point P on the demand curve. Therefore, OQpre is demanded. Since OQpre is larger than OQusr, the utilisation is facilitated by the subscription of prepayments, ceteris paribus. The level of increase in the quantity demanded, QusrQpre, is determined by the shape of the demand curve.

The demand for health care under discount cards is also explained with Figure 6.2. A consumer with a discount card is not asked to pay cash at the point of utilisation, but is asked to give up one coupon in the discount card in exchange for receiving health care. This accompanies opportunity cost, the value of each coupon, which is

not less than zero. And it is not more than a user fee since he/she chooses to pay a user fee if the value of one coupon is more than a user fee. Let CpreCdis be the value of one coupon. When he/she faces the total cost OCdis, which consists of the value of a coupon CpreCdis and non-cash cost OCpre, the quantity demanded is determined at the point D on the demand curve. Therefore, OQdis is demanded. Point C can locate on the demand curve between U and P depending on the value of one coupon, and OQdis is not less than OQusr and not more than OQpre. Since OQdis is larger than OQusr, the utilisation is facilitated by the purchase of discount cards in advance as opposed to user fees, ceteris paribus. The level of increase in the quantity demanded, QusrQdis, is determined by the value of each coupon and the shape of the demand curve.

The value of one coupon is an essential element of the above discussion. Yet, a consumer may put various values on each coupon in a discount card. Some may value each coupon as the quotient of the cost of one card divided by the number of coupons included. If they have time preference, they value the first coupon more than the last one. The value of each coupon may diminish toward the last one in the card. Others may value the coupons toward the last one more than the former, since finishing them leads to the need to purchase a new discount card. However, the most important point is that the range of the value is not less than zero and not more than a user fee regardless of the consumer's valuation. Therefore, it can be said that the level of the effect of discount cards on utilisation increase is not more than that of voluntary prepayments.

6.3 MODEL OF THE DEMAND FOR ALTERNATIVE PAYMENT MECHANISMS: CHOICE MODEL

In order to answer the second research question how people choose alternative payment mechanisms, a demand model, called the choice model hereafter, is elaborated in this section. This model is to illustrate the relationships among factors such as price, income, perceived health status and perceived quality of care based on a utility maximisation model following the prototype specified in Chapter 3 and the brief discussion in Chapter 5.

6.3.1 CONTEXT

The economic phenomenon to be modelled in this section is as detailed below. A consumer seeking health care at a health centre is asked to pay the cost of health care provision. Three types of payment mechanisms are offered at health centres: user fees, voluntary prepayments, and discount cards. The choice of voluntary prepayments is only allowed before seeking health care. This implies that a consumer chooses user fees or discount cards as a payment mechanism before falling ill unless choosing voluntary prepayment. Two consumer choices, of health care utilisation and of choice of alternative payment mechanisms, occur separately in terms of timing. This is the reason why the first and the second research questions are separated in this study.

Factors such as price, income, perceived health status and perceived quality of health care are considered to be influential to this choice, as discussed in Chapter 3

and Chapter 5. However, little is known about the way that an individual chooses voluntary prepayments, or discount cards instead of user fees. It is this choice of alternative payment mechanisms at health centres that is to be modelled.

To simplify the argument, two sub-models of the demand for two alternatives, the choice between voluntary prepayments and user fees and the choice between discount cards and user fees, are developed first. These sub-models are to illustrate the reasons why a consumer may choose two alternatives other than user fees. Then, a general model of the demand for alternative payment mechanisms, which illustrates the choice among the three, is elaborated.

6.3.2 SUB-MODEL OF THE DEMAND FOR PREPAYMENT

Consumer's choice of payment mechanism between user fees and prepayments is modelled according to the prototype specified in Chapter 3 in the following.

6.3.2.1 APPLICATION OF UTILITY MAXIMISATION MODEL

The utility maximisation model is applied to this context. The general form of utility maximisation model is written, which has been introduced in Chapter 4, as below.

Maximise $U(q)$

Subject to: $\sum_k p_k q_k = x$

where U = utility function

$p = (p_1, p_2, \ldots, p_n)$

p_k = price of each item

$q = (q_1, q_2, \ldots, q_n)$

q_k = quantity of each item

x = income

In this formulation, a consumer is assumed to gain more utility from more consumption of various items of commodities. He/she consumes a set of quantities of the items at market prices, which produce the maximum utility with his/her income.

In applying this model for a specific context, it is useful to specify the items that a consumer gets utility from, the way that a consumer gets utility from the consumption of each item, and the way that a consumer maximises their utility.

A consumer faces a choice between prepayments and user fees in this study context. He/she is assumed to be concerned about the consumption of other items of commodities as well. The items that a consumer gets utility from may be written in a form of utility function as below:

$$U = U(q_p, q_u, q_o)$$

where q_p = quantity of prepayments

q_u = quantity of user fees

q_o = quantity of other items

However, this formulation is not operational. It is impossible to interpret the meaning of the quantity of prepayment and quantity of user fees. These are not quantifiable commodities but a qualitatively chosen payment mechanism. In order to address this problem, the concept of derived demand reviewed in Chapter 3 is useful. The choice of alternative payment mechanisms is assumed to be derived from demand for health care. Therefore, a consumer is assumed to get utility from the consumption of health care, and the choice of payment mechanism determines the cost of health care. With this argument, the utility function with resource constraint can be rewritten as below:

$$U = U(q_h, q_o)$$

Subject to: $c_h + p_o q_o = x$

where q_h = quantity of health care

c_h = cost of health care depending on the choice of payment mechanism

p_o = price of other item

With this formulation, it is possible to interpret the meaning of the consumption and the quantities of items as independent variables in the utility function.

In considering the way that a consumer gets utility from each item, it is possible to assume a consumer gets more utility from more consumption of health care as well as the other goods in a similar way to that used in the Simple Utility Maximisation Model reviewed in Chapter 3. In other words, health care can be assumed a consumption good. However, it is useful to put further assumptions on the way a

consumer consumes health care in this context. It can be assumed that a consumer does not demand health care unless he/she falls ill, because receiving health care such as that provided at primary health care facilities is useless for healthy people. In addition, health care is often not enjoyable for patients. It is plausible to consider that the greater consumption of health care does not always bring greater satisfaction to a patient/consumer. Instead, he/she receives utility from recovering health from illness. This assumption is equivalent to the concept of derived demand, that demand for health care is derived from demand for health. With this argument, a consumer can be assumed to get utility from his/her health. He/she becomes most satisfied when health care cures his/her illness. If health care is not effective enough for the patient to recover his/her health fully, the utility he/she gets from health becomes lower. Then the utility function with resource constraint can be rewritten as below:

$$U = U(H(q_h), q_o)$$

Subject to: $c_h + p_o q_o = x$

where H = health

The formulation taken in Pauly's model of the demand for insurance, reviewed in Chapter 3, can be added to this formulation in order to take the characteristics of choice between prepayments and user fees into account. In Pauly's model, a consumer is assumed to maximise expected utility using his/her knowledge of probability of loss from risky events for a time period. In the context of prepayments, or health insurance, the risky event insured is illness episodes, of which occurrence is random. Therefore, a consumer is assumed to know his/her

probability of falling ill for a time period. He/she is also assumed to have demand for health care when falling ill in order to recover his/her health. Then, the utility function with resource constraint can be rewritten as expected utility function with resource constraint as below:

$$EU = EU(H(q_h), q_o)$$

Subject to: $c_h + p_o q_o = x$

where EU = expected utility

c_h = expected cost of health care to maintain health depending on the choice of payment mechanism for a time period

A consumer is assumed to know the expected cost of health care, based on expected use of health care, based on the probability of falling ill and the fee schedule of alternative payment mechanisms.

With this formulation, it is possible to specify the way that a consumer maximises his/her expected utility by making a choice between prepayment and user fees. A consumer gets utility from two sources: health and the consumption of other goods. Regarding health, as already assumed, he/she knows his/her probable amount of consumption of health care. He/she gains expected utility from recovered health by health care consumption. What he/she does by choosing a payment mechanism is to determine the cost of health care according to a fixed fee schedule. As for the consumption of other goods, he/she can increase his/her expected utility by increasing the quantity of consumption. Since the price of the other goods is fixed,

increasing the allocation of resources for the consumption of the other goods increases his/her expected utility. Therefore, in order to maximise expected utility, he/she chooses a payment mechanism which lowers the cost of health care.

This expected utility maximisation behaviour also describes how a consumer makes the decision of whether to subscribe to prepayments or not in order to maximise resources for the consumption of other goods. The Discrete Choice Model reviewed in Chapter 3 is applicable to this expected utility maximising behaviour. Assuming that wealth is a resource constraint of a consumer, he/she maximises the expected wealth that can be used for consuming other goods for a time period in choosing a payment mechanism. The formulation is transformed into the expected utility maximisation model as below:

maximise	EU = EU(EWalt)
subject to	TCH ≦ IW
where	EU = expected utility
	EW = expected wealth
	TCH = total cost of health care depending on the choice of payment mechanism
	IW = initial wealth
	alt = (usr, pre)
	'usr' stands for the choice of user fees
	'pre' stands for the choice of voluntary prepayments

This model is similar to a typical simple explanation for the demand for insurance

and health insurance seen in many economics textbooks, and is reviewed as the Expected Value Model in Chapter 3 (e.g. Parkin and King, 1995; McPake et al., 2002). In these models, expected monetary values depending on the choice of payment mechanisms are compared with the utility function that assumes diminishing marginal utility of wealth.

6.3.2.2 EXPECTED WEALTH WITH PREPAYMENTS AND USER FEES

In order to investigate the effects of various factors on payment method choice, expected wealth expressed in monetary values for each choice is further modelled in the following.

Expected wealth with user fees, EWusr, is written with an operationalisation of the consumer's estimation of health risk into the expected number of illnesses he/she will suffer in a time period. Since a user fee is set as a flat rate for the diagnosis and treatment of one illness episode, the cost of health care depends only on numbers of episodes. On the contrary, expected wealth with voluntary prepayments, EWpre, is written with the premium of voluntary prepayments for a time period.

$$EWusr = IW - n*F / (1 + t)$$

$$EWpre = IW - R$$

given relationship $n = n(HS)$

where R = premium of prepayment for a time period

n = expected number of episodes he/she has

during a time period

F = user fee

t = private time preference rate

HS = current health status

With user fees, he/she pays the fees for n episodes from his/her initial wealth. The user fees paid are discounted with a time preference rate with a further assumption that they are paid at the end of the time period, as shown in the first equation. With voluntary prepayment, he/she pays the premium, R, for a time period from his/her initial wealth at the beginning of the time period and may receive the compensation in the form of free diagnoses and treatments. No further payment is needed, as shown in the second equation.

The condition for the choice of voluntary prepayment is written with sign analysis of the expected utility as below.

$$\Delta EU = EU(\ EWpre\ ) - EU(\ EWusr\ ) > 0$$

In order to examine this condition, the form of utility function needs to be specified.

In the Expected Value Model, a consumer is considered to purchase insurance not solely based on the amount of expected wealth corresponding to the payment mechanism. A consumer may choose prepayments instead of user fees even when EWpre is smaller than EWusr according to their utility function.

This choice can be explained by the consumer's attitude to risk. EWpre represents certain value of expected wealth once he/she chooses prepayment at the beginning of the time period, and EWusr represents uncertain value of expected wealth reflecting the uncertainty of the number of episodes at the end of the time period. He/she knows only a probable number of episodes not an exact number when making the choice. If a consumer prefers certainty to uncertainty, he/she chooses prepayments instead of user fees, even when EWpre is smaller than EWusr.

Phelps' model reviewed in Chapter 3 formulated this consumer's attitude to risk into the choice of payment mechanism, introducing a concept of risk premium. The risk premium is defined as a cost of transferring risk from a consumer to the health care provider paid by a consumer. Applying this concept for the context of this study, the expected utility function is written with the definition of a variable which represents the consumer's risk premium as below:

EU = EUalt

given relationship EUusr = EWusr

EUpre = EWpre + Apre

where Apre = a consumer's risk premium corresponding to the choice of prepayment

Apre is assumed to be positive if a consumer is risk averse, negative if risk loving, and zero if risk neutral.

Then, the condition for the choice of voluntary prepayment is transformed into the

sign analysis of expected utility as below.

$$\Delta EU = (EWpre + Apre) - EWusr > 0$$

This condition is written as:

$$(IW - R + Apre) - \{ IW - n^*F / (1 + t) \} > 0$$

It is reduced to:

$$R - Apre < n^*F / (1 + t)$$

This means that voluntary prepayment is preferred when the premium payable minus the risk premium is less than the expected user fees payable with time discounting. In other words, he/she chooses alternative payment mechanisms based on R, F, n, t and Apre. Voluntary prepayment is more likely preferred with lower R, higher F, higher n, lower t and higher Apre. Since n is a function of current health status, the choice of alternative payment mechanisms depends on HS. Voluntary prepayment is more likely preferred with low health status.

6.3.2.3 INCOME

The income factor is incorporated through an argument on the relevance of time preference as below. The conditions of the choice of voluntary prepayment above suggest that strong time preference leads to a preference for user fees. This is

simply interpreted that payment in advance is not preferred by a consumer with strong time preference. Yet, the more insightful point here is the consideration of determinants of time preference. Although there are several determinants of time preference rate such as interest rate or culture, the level of income is one of the essential factors in the context of the study field. This is because 69.2 percent of the population in Zambia is in poverty, which is defined as experiencing scarcities and deficiencies in the consumption of commodities needed for healthy living (CSO, 1997). People with low income may not be able to pay for health care in advance, rather only purchasing commodities of immediate need. It is likely that there is an association between strong time preference and low income. People in poverty find difficulty in saving money or subscribing to insurance in preparation for future loss, as opposed to people with relatively high income (World Bank, 1990). In such case, user fees are more likely preferred by people with low income.

6.3.2.4 PERCEIVED QUALITY OF CARE

The modelling so far fails in incorporating another factor to be modelled, that is, perceived quality of care. This is done through a relaxation of an assumption above that through the consumption of health care, a consumer will recover their health after illness.

Additionally, a consumer is assumed to be uncertain about the effectiveness of health care to maintain health. In other words, he/she sometimes doubts the recovery of health from illness by the diagnosis and treatment provided at health centres. In a sense, he/she is assumed to face the risk of unavailability of

appropriate health care to maintain his/her health. This assumption reflects the context of primary care at health centres in the field and in the region, such that consumers sometimes experience drug shortage when they fall ill; for example, appropriate drugs for infectious diseases, a common health problem there, are not always assured. And consumer's perception of quality of care largely depends on drug availability in the field and in the region, as discussed in Chapter 3.

According to this assumption, the assumption on consumer's health-care-seeking behaviour that he/she consumes health care as possible as he/she can in order to maintain health with the least cost changes into the following. A consumer who perceived the quality of care to be low seeks health care at health centres only when he/she thinks he/she can receive effective health care. He/she refrains from seeking care when he/she thinks appropriate health care is not available at health centres at the time of illness, since the cost of ineffective health care in such cases is thought of as unnecessary.

Taking this assumption of perceived quality of care into account, EWusr is reformed as below.

$$EWusr' = IW \cdot q*n*F / (1 + t)$$

given relationship $Q = Q(q)$

where q = probability of receiving appropriate health care

Q = perceived quality of care

A consumer assesses the probability of receiving appropriate health care for his/her

illness, which also determines his/her perceived quality of care. Then, he/she estimates the financial cost of receiving appropriate health care according to the fee schedule.

On the contrary, EWpre is not affected by the consumer's perceived quality of care, since the financial cost of the voluntary prepayment premium is unconnected to the number of times health care accessed.

Therefore, with the incorporation of quality of care, the condition of the choice is written as below:

$$\Delta EU = (EWpre + Apre) - EWusr'$$
$$= (IW - R + Apre) - \{IW - q^*n^*F / (1 + t)\} > 0$$

This condition is reduced to:

$$R + Apre < q^*n^*F / (1 + t)$$

This means that voluntary prepayment is more likely preferred with higher q. Since perceived quality of care is a function of q, the choice of alternative payment mechanisms associates with Q. Voluntary prepayment is more likely preferred with higher perceived quality of care. In other words, user fees are more likely preferred with lower perceived quality of care.

This modelling has an interesting implication for the relationship between

consumer's attitude against risk and their choice of payment mechanism. Voluntary prepayments are primarily considered as a risk-reducing payment mechanism. The choice of voluntary prepayments reduces health risk and financial risk, since the payment of premium, R, assures no additional cost for health care to maintain health in the future. Therefore, voluntary prepayments are supposed to be preferred by a risk averse consumer with higher positive Apre. On the contrary, choosing user fees is accompanied by health risk and financial risk. This is because the expected number of illness episodes in the time period, n, is a stochastic variable, so that the actual number of episodes experienced by the end of the time period may turn out to be more than n, and the cost of obtaining health care to maintain health may amount to an unaffordable level. This is often explained by diminishing marginal utility of wealth as discussed previously. Yet, regarding the risk of unavailability of appropriate health care, which is incurred where there is low perceived quality of care, the choice of user fees reduces this risk. Therefore, a risk averse consumer may prefer user fees if he/she perceives quality of care to be unpredictable or low.

6.3.2.5 SUMMARY

In conclusion, the predictions of this sub-model are: 1) In terms of price factor, the relative price of a payment premium and a user fee has an effect on the choice - a low premium in comparison to the user fee leads to a preference for voluntary prepayment; 2) In terms of income, high income leads to a preference for voluntary prepayment; 3) In terms of perceived health status, low perceived health status leads to a preference for voluntary prepayment; and 4) In terms of perceived quality

of health care, high perceived quality of care leads to a preference for voluntary prepayment.

6.3.3 SUB-MODEL OF THE DEMAND FOR DISCOUNT CARDS

This sub-model is developed in a similar way. The choice of a consumer between paying user fees at each illness episode and purchasing discount cards in advance is modelled in this section.

He/she is assumed to need to make this choice in advance in order to harmonize with the sub-model of choice between prepayments and user fees elaborated in the previous section. He/she is assumed to be able to estimate the risk of illness in the time period according to the self assessment of his/her current health status. He/she is also assumed to purchase discount cards at a point in the beginning of the time period in accordance with the characteristic of advance payment corresponding to discount cards. He/she seeks health care at health centres to maintain health if he/she thinks he/she is able to receive appropriate health care. Otherwise, he/she refrains from seeking for health care.

He/she is assumed a utility maximiser with resource constraint. His/her expected utility is assumed to be derived from the level of expected wealth. These assumptions are exactly the same as for the previous sub-model.

6.3.3.1 EXPECTED WEALTH WITH DISCOUNT CARDS AND USER FEES

Expected wealth with user fees, EWusr, is written the same as in the previous sub-model. Expected wealth with discount cards, EWdis, is written with expected number of discount cards purchased at the beginning of the time period.

$$EWusr = IW - q*n*F / (1 + t)$$

$$EWdis = IW - k*m*d*F$$

given relationships $q*n \leqq k*m$

where k = expected number of discount cards purchased

m = number of coupons in one discount card

d = discount rate for the price of discount card

'dis' stands for the choice of discount cards

With user fees, he/she pays user fees for q*n visits from his/her initial wealth. With discount cards, he/she pays k*m*d*F from his/her initial wealth to obtain k*m coupons to cover the cost of health care for q*n episodes at the beginning of the time period.

The relationship shows that the number of coupons in purchased discount cards, k*m, covers q*n visits.

The condition for the choice of discount cards is written with sign analysis of expected utility function as below.

$$\Delta EU = EU(EWdis) - EU(EWusr) > 0$$

The form of utility function needs to be specified. In order to create a general model of demand for three payment mechanisms later on by combining this sub-model with the sub-model on choice of prepayment described previously, the relevance of Phelps' formulation of expected utility function, employing the concept of risk premium used in the other sub-model, needs to be examined.

In Chapter 1, it is intuitively discussed that discount cards as a payment mechanism have a function of spreading risk for a person over a time period. However, the risk premium defined in Phelps' formulation is the cost of transferring risk from a consumer to a health care provider. In the case of discount cards, the health care provider bears no risk because they provide a limited amount of health care in exchange for the already paid coupon. In this sense, there is no risk premium corresponding to discount cards.

In terms of certainty of expected wealth value, EWdis represents uncertain value of expected wealth reflecting uncertainty of the number of episodes at the end of the time period. This also indicates that risk is still held by a consumer with discount cards.

However, it is useful to examine the situation where a consumer may choose discount cards even when EWdis is smaller than EWusr. Since discount cards as a payment mechanism are essentially a "discount" on user fees, EWdis tends to be larger than EWusr when a relatively large number of visits is expected. Only

when a consumer expects to hold a number of unused coupons at the end of the time period may EWdis be smaller than EWusr. Regarding this situation, it can be assumed that if a consumer is risk averse in terms of cash payment accompanying an illness episode, he/she may choose discount cards even when EWdis is smaller than EWusr. By purchasing discount cards, he/she transforms the risk of cash payment into the risk of giving up coupons. In this sense, discount cards reduce the level of financial risk to some extent, although they do not remove the risk totally due to uncertainty around the expected number of illness episodes, and the risk of having unused coupons left do exit.

Therefore, if the definition of risk premium is expanded as the cost of reducing financial risk, there may be a risk premium related to the choice of discount cards in a limited situation. A financially risk averse consumer may choose discount cards, paying the difference between EWdis and EWusr in order to reduce his/her financial risk.

There is another characteristic of discount cards that needs to be examined in order to specify utility function. There may be several unused coupons left at the end of the time period. A consumer is likely to get utility from the possession of unused coupons in addition to health and the consumption of other goods.

Therefore, the expected utility function is written as below:

EU = EUalt

given relationship EUusr = EWusr

$$EUdis = (EWdis + Adis, Bdis)$$

where Adis = a consumer's risk premium corresponding to the choice of discount cards

Bdis = unused coupons in the last card

Adis is assumed to be positive if a consumer is financially risk averse, negative if financially risk loving, and zero if financially risk neutral.

It is possible to write the monetary value of the unused coupons in order to make a comparison of utilities depending on the choice available. The expected number of unused coupons in the last discount card at the end of the time period is estimated from the expected number of times health care will be sought in the time period, the arrangement of discount cards such as discount rate against the user fees payable, and the number of coupons in one discount card. Bdis is written assuming the value of unused coupons attached by a consumer as below.

$$Bdis = \{ (k*m - q*n)*V / (1 + t) \}$$

given relationships $0 \leqq V \leqq F$

where V = value of one unused coupon by a consumer

The relationship shows that the value of one coupon is not less than 0 and not more than F, as discussed in 6.2.3.

The condition of purchasing discount cards is equivalent to the condition below.

$$\Delta EU = (EWdis + Adis + Bdis) - EWusr > 0$$

This condition is written as:

$$[IW-k*m*d*F+\{(k*m-q*n)*V/(1 + t)\}] + Adis - \{IW-q*n*F/(1 + t)\} > 0$$

This is reduced to:

$$k*m*d*F - \{ (k*m - q*n) * V / (1 + t) \} - Adis < q*n*F / (1 + t)$$

This means that discount cards are preferred when the cost of discount cards minus the value of unused coupons with time discounting minus risk premium corresponding to the choice of discount card is less than expected user fees payable with time discounting. In other words, a consumer chooses alternative payment mechanisms based on k, m, d, F, q, n, V, t and Adis. In order to interpret this complicated inequality, analysis is done according to the size of k and V.

The factor k (number of discount cards purchased) relates to a consumer's health status, since k is a function of n. When k is large, i.e. a consumer needs a large number of discount cards to seek health care in order to maintain health, the value of unused coupons can be considered much smaller than the cost of discount cards. Then, the number of unused coupons can be approximated to 0, which means k*m equals q*n. In such case, the condition is approximated to:

$$k*m*d*F - Adis < q*n*F / (1 + t)$$

This is transformed further to:

$$d - Adis/k*m < 1/(1+t)$$

Since k is assumed to be large and there is no room for Adis because k is large, this is approximated further to:

$$d < 1/(1+t)$$

This means that the choice by a consumer depends on d and t. Discount cards are more likely preferred with large discount and weak time preference. The relevance of other factors is negligible.

As the number of purchased discount cards, k, decreases, which implies a consumer's health status is correspondingly getting higher, the relevance of the value of unused coupons is considered to increase. For example, when k equals 1, which means that a consumer expects not to use up one discount card within the time period, the condition is written as:

$$m*d*F - \{(m - q*n)*V/(1+t)\} - Adis < q*n*F/(1+t)$$

Since V is not less than 0 and not more than F, the cases of three representative levels of V – 0, the lowest possible; F, the highest possible; and d*F, a representative of intermediate valuation – are analysed in order to interpret this inequality.

These three levels of V give reasonable illustration of the effect of various valuations of V in interpreting the effects of other variables on the choice of two alternative payment mechanisms.

When V equals 0, the condition is:

$$m*d*F \cdot Adis < q*n*F / (1 + t)$$

This is transformed to:

$$F\{ m*d \cdot q*n / (1 + t)\} < Adis$$

This means that the choice by a consumer depends on F, m, d, q, n, t and the consumer's attitude towards risk. Discount cards are more likely preferred if there is a small user fee, small number of coupons in one discount card, large discount, high perceived quality of care, large number of illness episodes anticipated, weak time preference, and higher risk aversion. This is also interpreted with regard to q*n that discount cards are more likely preferred when the number of unused coupons decreases.

When V equals F, the condition is:

$$m*d*F \cdot \{ (m \cdot q*n) * F / (1 + t)\} \cdot Adis < q*n*F / (1 + t)$$

This is transformed further to:

$$F*m\{ d - 1/(1+t) \} < Adis$$

This means that the choice by a consumer depends on F, m, d, t and consumer's attitude towards risk. Discount cards are more likely preferred with small user fee, small number of coupons in one discount card, large discount, weak time preference, and higher risk aversion. The relevance of other factors is negligible.

When V equals d*F, the condition is:

$$m*d*F - \{ (m - q*n) *d* F / (1 + t) \} - Adis < q*n*F / (1 + t)$$

This is transformed further to:

$$F\{ t *m*d - q*n(1- d) \} < Adis$$

or

$$F\{ m*d - q*n(d - 1 - m*d/q*n)/(1 + t) \} < Adis$$

or

$$F/(1+ t)\{ d*q*n(m*t/q*n + 1) -q*n \} < Adis$$

These means that the choice by a consumer depends on F, m, q, n, t, d and consumer's attitude to risk. Discount cards are more likely preferred if there is a small user fee, small number of coupons in one discount card, high perceived quality of care, large number of illness episodes anticipated, weak time preference, large discount and higher risk aversion. This is also interpreted with regard to q*n that

discount cards are more likely preferred when the number of unused coupons decreases. These effects are the same as in the case of low valuation of V.

In summary, when a consumer's health status is low and he/she needs a large number of discount cards to access health care to maintain health in the time period, discount cards are more likely preferred if there is a large discount and weak time preference, which implies high income assuming the association between strong time preference and low income. The relevance of other factors is negligible. The same preference is good when a consumer's health status is relatively high, for example, he/she needs one discount card to access health care in order to maintain health in the time period, and he/she values an unused coupon highly, close to a user fee. The interpretation of this is that a consumer who expects to have a larger number of health care visits will enjoy the discount, and that a consumer who regards the value of unused coupons as similar to cash for user fees will enjoy the discount from user fees on discount cards.

When a consumer's health status is relatively high - for example, he/she needs one discount card for seeking health care to maintain health in the time period and he/she values an unused coupon from low, close to none, to intermediate - discount cards are more likely preferred if there is a small number of coupons in one discount card, large discount, high perceived quality of care, large number of illness episodes anticipated (implying a small number of unused coupons), and weak time preference (implying high income). This is interpreted as: a consumer who can afford one discount card in advance and is likely to use up most of the coupons (which implies that he/she seeks health care several times, close to the number of

coupons in one discount card, and that his/her perception of quality of care is high) enjoys the discount from user fees on discount cards.

As for the relevance of the relationship between consumer's attitude to risk and the choice of payment mechanism, choosing discount cards is thought of as reducing health risk and financial risk and the risk of health care unavailability. Holding unused coupons assures no additional cost from health care to maintain health, and it is possible to refrain from seeking care and keep coupons unused when appropriate care is unavailable. Therefore, a risk averse consumer is supposed to prefer discount cards. Yet, the level of coverage of the risk of health care unavailability by discount cards is not attractive to a consumer with relatively high health status and low to intermediate valuation of V. He/she is more likely to choose user fees when his/her perception of quality of care is low, since advance payment for unused coupons is thought of as costly. In this sense, a risk averse consumer may prefer user fees in terms of the risk of the unavailability of health care.

6.3.3.2 SUMMARY

In conclusion, the predictions of this sub-model are as follows. In terms of price factor, the relative price of a discount card and a user fee has an effect on the choice. A large discount rate and small number of coupons in one discount card lead to a preference for discount cards. In terms of income, high income leads to a preference for discount cards when perceived health status is high. In terms of perceived health status, low health status leads to a preference for discount cards.

In terms of perceived quality of care, high perceived quality of care leads to a preference for discount cards when perceived health status is high and the valuation of unused coupons is low to intermediate.

6.3.4 GENERAL MODEL OF THE DEMAND FOR ALTERNATIVE PAYMENT MECHANISMS

A general model for alternative payment mechanisms is developed in a similar way. The choice made by a consumer between paying user fees each time he/she falls ill, subscribing to voluntary prepayments in advance and purchasing discount cards in advance is modelled here based on the sub-models developed above. Whatever concerns he/she has around the choice, it is assumed that he/she chooses one of the alternative payment mechanisms in order to maintain health through the consumption of health care. He/she is assumed to be a utility mximiser with resource constraint. What he/she is going to maximise in the decision making is assumed to be the expected utility, which is exactly the same as in the previous sub-models. The model is written as follows:

maximise	$EU = EU(EWalt, Aalt, Balt)$
subject to	$TCH \leqq IW$
given relationship	$EWusr = IW - q*p*F / (1 + t)$
	$EWpre = IW - R$
	$EWdis = IW - k*m*d*F$
	$EUusr = EWusr$
	$EUpre = EWpre + Apre$

$$EUdis = EWdis + Adis + Bdis$$

$$Ausr = 0$$

$$Apre = constant$$

$$Adis = constant$$

$$Busr = 0$$

$$Bpre = 0$$

$$Bdis = (k*m-q*n)*V/(1 + t)$$

$$n = n(HS)$$

$$q = q(Q)$$

where $alt = (usr, pre, dis)$

The arguments about the comparisons between user fees and voluntary prepayments, and between user fees and discount cards are the same as in the previous sub-sections. A comparison between voluntary prepayments and discount cards is presented hereafter.

The condition for the choice of voluntary prepayment is written with sign analysis of expected utility function as below.

$$\Delta EU = EU(EWpre, Apre, Bpre) - EU(EWalt, Adis, Bdis) > 0$$

Applying the form of expected utility function specified above, the condition above is equivalent to the condition below:

$$\Delta EW = (EWpre + Apre) - (EWdis + Adis + Bdis) > 0$$

This condition is written as:

$$(IW - R + Apre) - [IW - k*m*d*F + Adis + \{(k*m - q*n)*V / (1 + t)\}] > 0$$

This is transformed into:

$$R - Apre < k*m*d*F - \{ (k*m - q*n)*V / (1 + t) \} - Adis$$

This means that prepayment is preferred when the premium payable minus the risk premium is less than the cost of discount cards minus the value of unused coupons with time discounting minus the risk premium. In other words, he/she chooses alternative payment mechanisms based on R, k, m, d, F, q, n, V, t, Adis and Apre. In order to interpret this complicated inequality, analysis is done according to the size of k and V, which is the same as the analysis in the previous sub-section.

The relevance of k is the level of health status, since k is a function of health status. When k is large, that is, a consumer needs a large number of discount cards to access health care to maintain health, the value of unused coupons can be considered much smaller than the cost of discount cards. Then, the number of unused coupons can be approximated to 0, which means k*m equals q*n. In such case, the condition is approximated to:

$$R - k*m*d*F < Apre - Adis$$

Since R is a constant and k is assumed to be large, R is likely to be less than k*m*d*F. Therefore, voluntary prepayment is more likely preferred with low perceived health status. The choice also depends on R, m, d, F, Adis and Apre as well. Voluntary prepayment is more likely preferred with low premium, large number of coupons in one discount card, small discount, and higher user fee. Since the effect of risk reduction by prepayments is perfect and that by discount cards is partial according to the definition, |Apre| is larger than |Adis|, voluntary prepayments are more likely preferred with risk aversion.

As the number of purchased discount cards, k, decreases, the relevance of the value of unused coupons is considered to increase. For example, when k equals 1, which means that a consumer expects not to use up one discount card within the time period, the condition is written as below:

$$R - m*d*F + (m-q*n)*V / (1 + t) < Apre - Adis$$

Since V is not less than 0 and not more than F, the cases of three representative levels of V - 0, the lowest possible; F, the highest possible; and d*F, a representative of intermediate valuation - are analysed in order to interpret this inequality. These three levels of V give reasonable illustration of the effect of various valuations of V in interpreting the effects of other variables on the choice of two alternative payment mechanisms.

When V equals 0, the condition is:

$$R \cdot m*d*F < Apre - Adis$$

Since m*d*F is the price of one discount card, this is interpreted to indicate that voluntary prepayment is more likely preferred when the premium is lower and when the price of one discount card is higher. The choice also depends on R, m, d, F, Adis and Apre as well. Voluntary prepayment is more likely preferred with low premium, large number of coupons in one discount card, small discount, high user fee and risk aversion.

When V equals F, the condition is:

$$R \cdot m*d*F + \{ (m \cdot q*n)*F / (1 + t) \} < Apre - Adis$$

This is transformed further to:

$$R \cdot F\{ m*d \cdot (m \cdot q*n)/(1 + t) \} < Apre - Adis$$

or

$$R - F[m\{ d(1 + t) - 1 \} + q*n]/(1 + t) < Apre - Adis$$

This means that the choice by a consumer depends on R, F, d, q, n, t, Adis, Apre and m. Voluntary prepayments are more likely preferred with low premium, high user fee, small discount, high perceived quality of care, larger number of anticipated illness episodes, weak time preference, and risk aversion. The relevance of the number of coupons in one discount card is not clear, and depends on d and t.

When V equals d*F, the condition is:

$$R - m*d*F + \{ (m-q*n)*d*F / (1 + t) \} < Apre - Adis$$

This is transformed further to:

$$R - d*F\{ m - (m - q*n)/(1 + t) \} < Apre - Adis$$

or

$$R - d*F(m*t - q*n)/(1+ t) < Apre - Adis$$

This means that the choice by a consumer depends on R, d, F, q, n, t, Apre, Adis and m. Voluntary prepayments are more likely preferred when there is a low premium, low discount rate, high user fees, high perceived quality of care, large number of illness episodes anticipated, weak time preference, risk aversion, and a large number of coupons in one discount card. These effects are the same as the case of large k and high valuation of V.

In summary, when a consumer's health status is low and he/she needs a large number of discount cards for seeking health care to maintain health in the time period, voluntary prepayment is more likely preferred. This is interpreted that a consumer who will likely need to access health care a large number of times prefers voluntary prepayment regardless of the other factors.

When a consumer's health status is relatively high, for example, he/she needs one

discount card for seeking health care to maintain health in the time period, and he/she places a low value on an unused coupon (close to 0), voluntary prepayment is preferred with a low premium, large number of coupons in one discount card, high user fees, and small discount rate, which implies high income assuming the association between strong time preference and low income. This is interpreted that a consumer who does not finish one discount card in the time period will prefer voluntary prepayment when the premium is lower than the price of one discount card.

On the other hand, when a consumer's health status is likewise relatively high (for example, he/she needs one discount card for seeking health care to maintain health in the time period), but he/she values an unused coupon high (close to a user fee) to intermediate, voluntary prepayment is more likely preferred with a low premium, large number of coupons in one discount, card, low discount rate, high perceived quality of care, high user fees, large number of illness episodes anticipated (implying small number of unused coupons), and weak time preference (implying high income). This is interpreted thus: a consumer who is likely to use a small number of coupons is more likely to prefer voluntary prepayment.

As for the relevance to the relationship between a consumer's attitude towards risk and the choice of payment mechanism, voluntary prepayments reduce health risk and financial risk, and discount cards reduce the risk of health care unavailability in addition to health risk and financial risk, as discussed in previous sub-models. Therefore, a risk averse consumer with high perceived quality of care is more likely to prefer voluntary prepayments. And a risk averse consumer with low perceived

quality of care may prefer discount cards.

In conclusion, the prediction of this comparison is as follows. In terms of price factor, the relative price of the prepayment premium and the price of a discount card has an effect on the choice. A low premium compared to a small discount rate and large number of coupons in one discount card leads to a preference for voluntary prepayment. In terms of income, high income leads to a preference for voluntary prepayment when perceived health status is high and the valuation of unused coupons is high to intermediate. In terms of perceived health status, low health status leads to a preference for voluntary prepayment. In terms of perceived quality of care, high perceived quality of care leads to a preference for the voluntary discount card when perceived health status is high and the valuation of unused coupons is high to intermediate.

Finally, these three are compared in terms of important factors which are considered in the above arguments of coupled comparisons.

In terms of falling health status, prepayment is more likely preferred than discount cards, and discount cards are more likely preferred than user fees. Therefore, the order of preference with low health status is (prepayment > discount card > user fees).

In terms of falling perceived quality of care, user fees are more likely preferred than prepayment and discount cards. And discount cards are more likely preferred than prepayment. Therefore, the order of preference with low perceived quality of

care is (prepayment < discount card < user fees).

In terms of falling income, if the association between strong time preference and low income is assumed, user fees are more likely preferred than prepayment and discount card. And discount cards are more likely preferred than prepayment. Therefore, the order of preference with low income is (prepayment < discount card < user fees).

In conclusion, the predictions of the model are as follows. In terms of price factor, the relative prices of alternatives have an effect on the choice. The lower one is the more likely choice. In terms of income, the order of preference is (prepayment < discount card < user fees). In terms of perception of initial health status, the perception of low health status may lead to a preference for prepayment. The order is (prepayment > discount card > user fees). In terms of perception of the quality of health care, the perception of low quality may lead to a preference for user fees. The order is (prepayment < discount card < user fees).

6.3.5 CHOICE AT HOUSEHOLD LEVEL

One of the characteristics of the discount card operated in the study fields is that it allows sharing between people, for example, a household, while fees and premiums are paid by individual users. In this sense, the decision of purchasing discount cards can be made by a group of people. In order to incorporate this characteristic into the model, let it be assumed that a household chooses one payment mechanism. This means that members of the household choose the same payment mechanism.

Then, the expected utility is as below.

$$EUusr' = EWusr' = IW - q*n'*F / (1 + t)$$

$$EUpre' = EWpre' + Apre' = IW - h*R + Apre'$$

$$EUdis' = EWdis' + Adis' + Bdis' = IW - k*m*d*F + Adis' + \{(k*m - q*n')*V / (1 + t)\}$$

where n' = expected number of episodes a group of consumers (e.g. household) have during a time period

h = number of persons in the group of consumers

Prepayment is subscribed instead of paying user fees with a condition as below.

$$\Delta EW = EUpre' - EUusr' > 0$$

This condition is written:

$$(IW - h*R + Apre') - \{IW - q*n'*F / (1 + t)\} > 0$$

It is reduced to:

$$h*R - q*n'*F / (1 + t) < Apre'$$

In terms of h, this means that prepayment is preferred when the number of household members is small.

Discount cards are purchased instead of subscribing to prepayment with a condition

as below.

$$\Delta EU = EUdis' - EUpre' > 0$$

This condition is written:

$$[IW - k*m*d*F + Adis' + \{ (k*m - q*n')*V / (1 + t) \}] - (IW - h*R + Apre') > 0$$

It is reduced to:

$$h*R - [k*m*d*F + \{ (k*m - q*n')*V / (1 + t) \}] < Apre' - Adis'$$

In terms of h, this means that the discount card is preferred when the number of household members is large.

In short, prepayment is preferred compared with both user fees and discount cards when the number of household members is small.

In order to compare the effect of h between discount cards and user fees, further assumption is needed, since h itself does not appear in the expected utilities of them. A condition that discount cards are purchased instead of paying user fees is written as below.

$$\Delta EU = EUdis' - EUusr' > 0$$

This condition is written:

$$[IW - k*m*d*F + Adis' + \{ (k*m - q*n')*V / (1 + t) \}] - (IW - q*n'*F/(1+t)) > 0$$

It is reduced to:

$$k*m*d*F - \{ (k*m - q*n')*V / (1 + t) \} - q*n'*F / (1 + t) < Adis'$$

In order to interpret the effect of h, let it be assumed that n' increases as h increases. This means that larger households tend to experience more illness episodes by family members. This is plausible when equal individual risks are assumed. Then, as discussed with n in section 6.2.3., discount cards are preferred when n' is large. Therefore, discount cards are preferred instead of paying user fees when the number of household members is large.

In conclusion, for smaller households, discount cards are more likely preferred than user fees, and user fees are more likely preferred than prepayment. Therefore, the order of preference with large households is (prepayment < user fees < discount card). The prediction of the model is that a household being large will lead to a preference for discount cards. The order is (prepayment < user fees < discount card).

6.3.6 REDUCED FORM OF THE GENERAL MODEL

The demand function in reduced form from the choice model is written as below.

$$falt = falt(Calt, I(t), HS, Q, Zalt)$$

where f = whether an alternative is chosen or not

I = income

C = cost of health care under an alternative

Z = a vector of other factors

f stands for the choice of alternative payment mechanisms. One of them is chosen based on utility maximisation. If EU from one alternative exceeds EU from the other two, f takes a value of chosen. If not, the value is not chosen. The value depends on EU of each alternative, which basically depends on the characteristics of an alternative, the characteristics of an individual, and other influencing factors. The general model elaborated depicts parts of these three factors.

The role of the cost of health care under each alternative, as an economic variable, is shown in the explanation of EW, so this variable is taken as an independent variable in the function f. The model depicts the role of income associated with time preference, perceived health status and perceived quality of care, so that these three factors are incorporated as independent variables as well. An individual may choose a different alternative even when he/she faces the same cost with the same initial wealth, health status and quality of care. The choice may be due to the other factors or the different shape of utility function. These are called taste including risk preference. Z stands for these factors, of which the model fails in explaining the relevance.

If the choice at household level is assumed, this function is written as below.

falt = falt(Calt, I(t), HS, Q, h, Zalt)

6.4 EQUITY CONSEQUENCES

The equity as an endpoint of this study is derived from the concern about the financial barrier to access to health care, especially by the poor section of the population created or enhanced by direct payments, introduced in Chapter 1. This is about equal access for equal need irrespective of income status. Therefore, horizontal equity in health care provision defined as equal access for equal need is taken as a definition in this study in Chapter 2.

Based on the models elaborated in this chapter, the equity consequences of financial alternatives according to this definition are discussed in order to answer the third research question in this section.

Health care utilisation in the two demand models is considered as a proxy for access, and health status in the choice model is considered as a proxy for need in the following discussion. And unequal access to health care according to income status, not to need, is considered horizontal inequity as well.

Additionally, the implications of the two demand models for vertical equity in health care financing, defined as unequal payment according to unequal ability to pay, is also discussed.

In terms of horizontal equity in health care provision, both voluntary prepayments

and discount cards may facilitate access by a consumer when he/she falls ill in comparison with user fees. The variation of these effects by both health status and income are not clear in the utilisation model. This implies that both payment mechanisms may have a positive impact on horizontal equity if the membership coverage is expanded, assuming the deterioration of access by the financial barrier created or enhanced by user fees. Even if the membership coverage is limited, the prediction of the choice model that high-risk groups may prefer to choose voluntary prepayments or discount cards may lead to a positive impact on horizontal equity (according to the prediction of the utilisation model), since they are considered to have the effect of promoting access according to need. With an assumption that low income relates to low health status, both prepayment mechanisms may have a positive impact on horizontal equity. However, it is suggested that low income groups may not choose voluntary prepayments or discount cards. The cost of the premium or of discount cards may be too expensive for the lower income group with strong time preference. This may result in a negative impact, since both payment mechanisms only serve for higher income groups and may widen the gap in access across income levels irrespective of need. Voluntary prepayments are superior to discount cards in promoting horizontal equity if the quality of care is assured, since their facilitation of health care utilisation is larger than for discount cards according to the utilisation model. However, given the difficulty of achieving high quality of care in the context of the study fields, discount cards may attract more individuals, which may bring more positive impact.

In terms of vertical equity in health care finance, the weakness of the models in explaining the effect of income makes discussion difficult. Their failures in

explaining the costs of seeking health care other than direct price make this worse. Since there is no price discrimination for income group, the three payment mechanisms may have only marginal effect on vertical equity. Taking the adverse selection for voluntary prepayments and discount cards into account, it could be argued that frequent users enjoy a relatively cheap price for care. This may have a marginal positive impact on vertical equity with an assumption that low health status relates to low income. In this sense, voluntary prepayments in which cost is unaffected by utilisation may have a more positive impact than discount cards. However, if the prices of voluntary prepayments and discount cards are too high for the majority of people with strong time preference, this positive impact may be cancelled and even become negative.

6.5 HYPOTHESES DEDUCED FROM THE MODELS

Hypotheses deduced from the predictions of the models elaborated in the theoretical investigation to answer the three research questions are as below.

In regard to the first research question, 'how do people seek health care under each payment mechanism?', the hypothesis is:

1) The utilisation of health care is facilitated by voluntary prepayments and discounted cards compared with user fees. The order of this effect is:

Voluntary prepayments > Discount cards > User fees

In regard to the second research question, 'how do people choose alternative payment mechanisms?', the hypotheses are:

2-a) The pricing of payment mechanisms affects a consumer's choice of alternatives. A mechanism with low relative price to each individual will be more likely chosen.

2-b) Income affects a consumer's choice of alternative payment mechanisms. The preference in terms of decreasing income is:

Voluntary prepayments < Discount cards < User fees

2-c) The consumer's expected number of attendances at health centres due to illness based on perceived health status affects his/her choice of alternative payment mechanisms. The preference in terms of increasing number is:

Voluntary prepayments > Discount cards > User fees

2-d) The consumer's perceived quality of care affects his/her choice of alternative payment mechanisms. The preference in terms of decreasing perceived quality of care is:

Voluntary prepayments < Discount cards < User fees

2-e) The size of the household affects the consumer's choice of alternative payment mechanisms. The preference in terms of decreasing size of the household is:

Voluntary prepayments < User fees < Discount cards

In regard to the third research question, 'is equity promoted through the introduction of voluntary prepayments or discount cards?', the hypotheses are:

3-a) If the coverage is expanded, both voluntary prepayments and discount cards have a potential positive impact on horizontal equity.

3-b) People with a large number of expected attendances are more likely to choose voluntary prepayments or discount cards, which lead to a positive impact on horizontal equity.

3-c) People with low income are more likely to choose user fees. Since the utilisation facilitated by prepayment may be enjoyed by those with high income only, this may result in a negative impact on horizontal equity.

3-d) If the quality of care is assured, prepayments have more potential to improve horizontal equity. Given the difficulty of achieving this, discount cards may bring a larger positive impact.

CHAPTER 7

RESULTS 2

RESULTS OF EMPIRICAL INVESTIGATION 1

ANALYSIS OF LIVING CONDITIONS MONITORING SURVEY 1998

7.1 INTRODUCTION

This chapter presents the results of the analysis of the first data source, the Living Conditions Monitoring Survey 1998 (LCMS98) data set.

Five points are reported in this chapter. Firstly, the maps of consumers' health care service utilisation in the field are constructed. This is to empirically demonstrate the distribution of health care service utilisation in the field introduced in Chapter 1. There are several types of health facilities in the field such as governmental health centres, governmental hospitals, private hospitals, industrial hospitals, and traditional healers, for which individuals seek health care when they fall ill. The maps show that large volume of health care is consumed at governmental health centres compared to the volume of health care consumed at the other type of health facilities. Therefore, health centres have significance when considering equity in the field.

Secondly, consumers' choices of payment mechanism in the field are examined with two types of index representing choice; one is the choice at the time of utilisation and another is the choice before falling ill. This provides a basis for the analysis of the hypotheses derived from the theoretical models in the following sections.

Thirdly, the hypotheses derived from the utilisation model are tested. This is to show the effects of consumers' choice of payment mechanism to facilitate the utilisation of health care at the time of illness.

Fourthly, the hypotheses derived from the choice model are tested. This is to show the effects of various factors on consumers' choice of payment mechanism.

Finally, the consumers' utilisation of health care in terms of income is examined in order to examine how payment mechanisms impact on equity.

7.2 LIVING CONDITIONS MONITORING SURVEY 1998 (LCMS98)

As introduced in Chapter 5, the LCMS98 was a nationwide household survey, in which 93,471 individuals in 16,715 households were sampled over 72 districts. In this study, the data from the samples within Lusaka district and Kitwe district are extracted and analysed. Table 7.1 shows the numbers of household samples and individual samples within the two districts.

Table 7.1 Number of samples, weighted counts and illness episodes in the last two weeks

		Households	Individuals					
			Infant (0-5)	Child (6-15)	Adult (16-64)	Elderly (65-)	Age unknown	Total
Lusaka	No. of samples	2,123	1,835	3,022	6,484	100	1	11,442
	Weighted counts / No. of households and individuals (%)	218,524*	192,561 (16.6)	309,771 (26.6)	650,477 (56.0)	9,583 (0.8)	72 (0.0)	1,162,464** (100.0)
	No. of individuals having illness episodes in the last two weeks (%)		32,362 (29.8)	15,000 (13.8)	60,064 (55.4)	1,080 (1.0)	0 (0.0)	108,506 (100.0)
	% of individuals having illness episodes in the last two weeks		16.8%	4.8	9.2	11.3	0.0	9.3
Kitwe	No. of samples	560	599	1,023	1,826	31	2	3,481
	Weighted counts / No. of households and individuals (%)	75,657*	78,229 (17.4)	128,212 (28.5)	240,061 (53.3)	3,687 (0.8)	307 (0.1)	450,496** (100.0)
	No. of individuals having illness episodes in the last two weeks (%)		9,577 (31.3)	6,344 (20.7)	14,386 (47.0)	298 (1.0)	0 (0.0)	30,605 (100.0)
	% of individuals having illness episodes in the last two weeks		12.2	4.9	6.0	8.1	0.0	6.8

* Equivalent to the number of households. ** Equivalent to population.

The samples examined in the following analysis are 2,123 households and 11,442 individuals in Lusaka, and 560 households and 3,481 individuals in Kitwe.

7.2.1 USE OF WEIGHT

Since a stratified sampling method, in which households are sampled from geographical sampling areas used in national census, is used in the LCMS98, weights are attached to the samples to ensure an unbiased representativeness at the district level (CSO, 1999). Weights are set at the level at which the sampled households could represent all the households in their sampling geographical areas, so that total weighted counts of sampled households coincide with the population enumerated in the latest census in 1990. Table 7.1 also shows the weighted counts of household samples, 218,524 in Lusaka and 75,657 in Kitwe, which are equivalent to the numbers of households, and the weighted counts of individual samples, 1,162,464 in Lusaka and 450,496 in Kitwe, which are equivalent to the population in each district. The weights are used in the following analysis, and figures such as N in all results hereafter are weighted counts in order to make discussion at district level unbiased.

7.2.2 AGE GROUP

Table 7.1 shows the breakdown of the numbers of individuals by age group. Since this study focuses on the health behaviour related to direct payment at governmental health centres, child (6 to 15 years old) and adult (16 to 64 years old) age groups are analysed, both of which are supposed to pay for health care.

7.2.3 ILLNESS EPISODES

Individuals' illness episodes in the last two weeks of the survey are investigated in LCMS98. Table 7.1 also shows the numbers and the percentages of individuals who had at least one illness episode in the period. 9.3% of individuals in Lusaka and 6.8% in Kitwe report having illness episodes. With regard to the percentages of individuals who had illness episodes, child and adult age groups have relatively small figures compared with infant and elderly age groups in both districts. However, the share of child and adult age groups in the number of illness episodes amounts to 69.2% in Lusaka and 68.4% in Kitwe. These age groups are considered to bear a significant burden of illness episodes, and the treatment of these illness episodes is considered to be important to equity in the health system in the two districts in terms of the volume of illness episodes. Child and adult consumers' health behaviours upon these illness episodes are to be analysed in the following.

7.2.4 DISCOUNT CARD

Since the trials of discount cards at health centres in the two districts are operating on a small scale, the sampling frame of the LCMS98 is insufficient to observe consumers' choice of discount cards. The choice of discount cards is not investigated in the LCMS98 questionnaire. Therefore, the following analysis using the utilisation model is limited to the effect of low-cost prepayment, and the analysis using the choice model is limited to the choice between user fees, low-cost prepayments at governmental health centres and other options of payment mechanism available at health facilities other than governmental health centres.

7.3 MAPS OF CONSUMERS' HEALTH CARE SERVICE UTILISATION

In order to construct the maps of consumers' utilisation of health care in the two districts, individuals' illness episodes are analysed with the characteristics of the health system and the individuals' background in this section.

7.3.1 CONSUMERS' COPING BEHAVIOUR UNDER ILLNESS EPISODES

Table 7.2 shows patients' coping behaviour with illness episodes in child and adult age groups.

Table 7.2 Coping behaviour with illness episodes (%)

	Consulted	Used self-administered medicine	None	Unknown	Total
Lusaka	41.6	37.6	19.8	1.0	100.0
Kitwe	35.8	39.0	24.9	0.3	100.0

41.6% of patients in Lusaka and 35.8% in Kitwe who suffered from illness episodes in the last two weeks of the survey consulted at health facilities, although using self-administered medicines is a popular coping behaviour in the two districts as well.

7.3.2 GOVERNMENTAL HEALTH FACILITIES AS MAJOR PROVIDERS

Table 7.3 shows the type of health facilities where health care was sought by child and adult patients, and demonstrates the role of governmental health centres serving the majority of the population, as described in Chapter 1.

Table 7.3 Type of health facilities attended (%)

	Governmental		Industrial institution	Private institution	Traditional healer	Unknown	Total
	hospital	health centre					
Lusaka	18.1	59.0	2.1	10.8	1.3	8.7	100.0
Kitwe	13.2	50.8	28.4	0.0	0.0	7.7	100.0

More than half of the patients, 59.0% in Lusaka and 50.8% in Kitwe, sought health care at governmental health centres in both districts. Thus, health care provided at governmental health centres is considered to be significant to equity in the health system in the two districts in terms of volume of health care provided.

In Lusaka, 18.1% of patients sought health care at the governmental hospital. This share is second to that of health centres. The total share of governmental facilities amounts to 77.1%. Thus, governmental facilities, the hospital and health centres, serve as a major health care provider to the population.

Only 10.8% of Lusaka patients sought health care at private institutions. Utilisation of other health facilities such as industrial institutions and traditional healers was limited.

In Kitwe, 13.2% of patients sought health care at the governmental hospital. The total share of governmental facilities here amounts to 64.0%. Thus, governmental facilities, the hospital and health centres, serve as a major health care provider to the population here as well.

28.4% of patients in Kitwe sought health care at industrial institutions. Utilisation of other health facilities such as private institutions and traditional

healers was negligible.

The difference in the utilisation of non-governmental facilities between Lusaka and Kitwe is considered to reflect the difference in the distribution of facilities between the two districts, as introduced in Chapter 1. More private facilities than industrial facilities operate in Lusaka, while more industrial facilities than private facilities operate in Kitwe.

7.3.3 LEVEL OF CARE PROVIDED AT DIFFERENT HEALTH FACILITIES

Table 7.4a shows the breakdown of child and adult patients' illness episodes by diagnosis in the two districts and Table 7.4b shows shares of illness episodes dealt with by health facility and by diagnosis. These tables demonstrate the role of health facilities in terms of level of care as described in Chapter 1.

Table 7.4a Shares of illness episodes by diagnosis (%)

	Lusaka	Kitwe
Fever/malaria	32.9	40.1
Cough/cold	13.2	11.6
Diarrhoea/without blood	3.5	0.0
Diarrhoea/with blood	0.0	0.0
Diarrhoea/vomiting	1.6	0.0
Vomiting	0.9	2.1
Abdominal pain	8.0	6.3
Eye infection	2.9	2.3
Ear infection	0.3	0.0
Toothache/mouth infection	3.7	5.8
Headache	3.9	7.1
Measles	3.3	1.6
Injury	8.0	9.9
Other	18.0	10.2
Unknown	0.0	3.0
Total	100.0	100.0

Table 7.4b Shares of illness episodes by health facility and by diagnosis (%)

		Governmental		Industrial institutio n	Private institutio n	Traditional healer	Unknown	Total
		hospital	health centre					
Lusaka	Fever/malaria	8.6	58.7	4.2	11.8	1.0	15.8	100.0
	Cough/cold	28.1	58.7	0.0	9.1	0.0	4.0	100.0
	Diarrhoea/without blood	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	Diarrhoea/with blood	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Diarrhoea/vomiting	0.0	51.9	0.0	6.5	0.0	41.6	100.0
	Vomiting	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	Abdominal pain	11.7	55.0	4.0	18.6	3.5	7.3	100.0
	Eye infection	45.5	23.3	0.0	31.2	0.0	0.0	100.0
	Ear infection	0.0	0.0	0.0	0.0	0.0	100.0	100.0
	Toothache/ mouth infection	0.0	84.7	0.0	15.3	0.0	0.0	100.0
	Headache	0.0	64.5	0.0	17.8	17.6	0.0	100.0
	Measles	60.1	39.9	0.0	0.0	0.0	0.0	100.0
	Injury	18.3	64.4	5.5	8.2	0.0	3.5	100.0
	Other	32.5	53.1	0.0	7.4	0.0	7.0	100.0
	Unknown	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Total	18.1	59.0	2.1	10.8	1.3	8.7	100.0
Kitwe	Fever/malaria	8.0	66.0	19.4	0.0	0.0	6.6	100.0
	Cough/cold	7.8	44.7	47.5	0.0	0.0	0.0	100.0
	Diarrhoea/without blood	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Diarrhoea/with blood	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Diarrhoea/vomiting	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Vomiting	0.0	0.0	100.0	0.0	0.0	0.0	100.0
	Abdominal pain	29.3	31.0	39.6	0.0	0.0	0.0	100.0
	Eye infection	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	Ear infection	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Toothache/ mouth infection	0.0	31.9	28.1	0.0	0.0	40.0	100.0
	Headache	0.0	75.4	0.0	0.0	0.0	24.6	100.0
	Measles	0.0	0.0	100.0	0.0	0.0	0.0	100.0
	Injury	0.0	47.2	43.4	0.0	0.0	9.4	100.0
	Other	71.4	0.0	28.6	0.0	0.0	0.0	100.0
	Unknown	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	Total	13.2	50.8	28.4	0.0	0.0	7.7	100.0

Fever/malaria is the most frequent diagnosis in both districts, accounting for 32.9% of illness episodes in Lusaka and 40.1% in Kitwe. Governmental health centres,

industrial institutions, private institutions, and traditional healers deal with patients with fever/malaria approximately in proportion to their shares in providing health care shown in Table 7.3. However, governmental hospitals deal with fewer patients with fever/malaria than their proportionate share in all services. This pattern is also seen for the second most frequent diagnosis, cough/cold, and another relatively frequent diagnosis, injury, as well. This suggests that common illnesses are mainly dealt with at governmental health centres, industrial institutions, private institutions and traditional healers in the two districts.

On the contrary, governmental hospitals deal with more patients with illness episodes classified as 'other' than their proportionate share in all services. Although detailed diagnoses or severities of illness episodes classified as 'other' are not specified, they are thought of as less common illnesses, which may need specific services beyond the scope of services provided at facilities other than a governmental hospital. In this sense, governmental hospitals are considered to deal with illnesses that are difficult to treat in the field. Thus, they are considered to provide higher care to the population.

Private institutions in Lusaka and industrial institutions in Kitwe are considered to provide higher care in part as well, since they also deal with more than their share of patients with illness episodes classified as 'other'.

7.3.4 PATIENTS' CHOICE OF PAYMENT MECHANISM

Table 7.5 shows child and adult patients' choice of payment mechanism by type of

health facility.

Table 7.5 Patients' choice of payment mechanism by type of health facility (%)

		Direct payment			Third party payment		No payment				
		User fees	Prepayments		Employer	Private Insurance	Exemption		Other reason	Unknown	Total
			Low-cost	High-cost			Diagnosis	Low-income			
Lusaka	Governmental hospital	25.4	38.9	5.2	20.6	0.0	3.8	0.0	5.9	0.1	100.0
	Governmental health centre	32.0	58.3	1.2	2.3	0.0	0.7	0.0	3.9	1.7	100.0
	Industrial institution	46.7	0.0	0.0	53.3	0.0	0.0	0.0	0.0	0.0	100.0
	Private institution	71.7	0.0	0.0	28.3	0.0	0.0	0.0	0.0	0.0	100.0
	Traditional healer	44.4	0.0	0.0	0.0	0.0	0.0	0.0	55.6	0.0	100.0
	Unknown	34.5	0.0	0.0	35.3	0.0	0.0	0.0	1.8	28.4	100.0
	Total	35.8	41.4	1.7	12.4	0.0	1.1	0.0	4.2	3.5	100.0
Kitwe	Governmental hospital	43.9	19.0	14.0	0.0	0.0	16.2	0.0	0.0	6.8	100.0
	Governmental health centre	50.7	28.7	3.1	0.0	0.0	0.0	0.0	17.6	0.0	100.0
	Industrial institution	15.1	10.3	0.0	61.4	0.0	0.0	0.0	5.7	7.6	100.0
	Private institution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Traditional healer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	Unknown	45.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.5	100.0
	Total	39.3	20.0	3.4	17.4	0.0	2.1	0.0	10.6	7.2	100.0

This is to illustrate how patients pay for health care within the payment mechanism options available at various health facilities, and the segmentation between high-cost departments and low-cost departments at governmental hospitals described in Chapter 1.

7.3.4.1 GOVERNMENTAL HOSPITAL

In the low-cost department at governmental hospitals, user fees and low-cost prepayments are available as options of direct payment, although the latter can be used only by patients referred from health centres. Exemptions according to governmental guidelines are also practised. In the high-cost department, subscription to high-cost prepayments is required in order to receive services.

25.4% of patients in Lusaka and 43.9% in Kitwe report payment by user fees, and 38.9% in Lusaka and 19.0% in Kitwe report low-cost prepayments. Including the 9.7% of patients in Lusaka and 16.2% in Kitwe who were exempted, 74.0% of patients in Lusaka and 79.1% in Kitwe attended the low-cost departments.

5.2% in Lusaka and 14.0% in Kitwe report payment with high-cost prepayments, and attend the high-cost departments. 20.6% of patients in Lusaka report payment by their employers. These payments are usually made by subscription to high-cost prepayments according to observations made during the field work. They are assumed to have paid with high-cost prepayments and attend high-cost departments. Therefore, coupled with the 5.2% of patients reporting payment with high-cost prepayments, 25.8% of patients in total are assumed to attend the

high-cost department in Lusaka.

No patients in Kitwe report payment by their employer at governmental hospital. This is probably because those employers in Kitwe affluent enough to pay for employees' attendances at the high-cost department own industrial facilities themselves and provide health care directly.

With this analysis, the majority of patients are considered to seek health care at the low-cost departments in both districts.

7.3.4.2 GOVERNMENTAL HEALTH CENTRE

At governmental health centres, user fees, low-cost prepayments, and high-cost prepayments are available as payment options, and exemptions according to the governmental guidelines are practised.

In Lusaka, the majority of patients, 58.3%, report payment by low-cost prepayments, compared with 32.0% by user fees. In Kitwe, the majority, 50.7%, report payment by user fees, compared with 28.7% by low-cost prepayments. The option of payment by low-cost prepayments is exercised in both districts to a considerable extent.

Some patients, 1.2% in Lusaka and 3.1% in Kitwe, attend governmental health centres and have access to the high-cost departments at governmental hospitals with high-cost prepayments. In addition, a limited number of patients in Lusaka,

2.3%, report payment by their employers. No typical financial arrangement for these patients whose care is paid for by their employers was found during the field work.

7.3.4.3 EXEMPTION AT GOVERNMENTAL FACILITIES

With regard to the practice of exemption, patients in both districts were exempted from payment on the basis of diagnosis at governmental facilities, both hospitals and health centres. No patients report exemption on the basis of low income, while 5.9% of patients at governmental hospital and 3.9% of patients at governmental health centres in Lusaka, and 17.6% of patients at governmental health centres in Kitwe report no payment for other reasons. These may include patients who received health care even when they were unable to pay. Such cases are thought of as practically "exemption" on the basis of low income. However, this is not clear from this survey.

7.3.4.4 OTHER INSTITUTIONS

At private institutions in Lusaka, user fees and payment by employer are available as payment options. 71.7% of patients report payment by user fees, and 28.3% by their employers. No patients report payment with private insurance.

At industrial institutions in Kitwe, user fees and payment by the employer are available as payment options. In addition, some institutions accept low-cost prepayment through collaboration with the district health management team.

Others are open for non-employees, with user fees levied on them. 15.1% of patients report payment by user fees, and 10.3% by their employer. 5.7% of patients were exempted on the basis of unspecified reasons.

7.3.4.5 TWO DIVISIONS IN GOVERNMENTAL HEALTH CARE PROVISION

Since there is segmentation between high-cost departments and low-cost departments at governmental hospitals, this should be taken into account in constructing the map of consumers' utilisation of health care in terms of patients' income status.

The high-cost departments are considered to serve for the affluent section of the population. On the contrary, the low-cost departments at governmental hospitals are open in principle for patients referred from health centres, as mentioned in Chapter 1. Therefore, health centres and the low-cost departments at hospitals are considered to collaboratively serve for the poor section of the population. There are some patients who attend the low-cost departments at governmental hospitals directly paying user fees. These people are considered to be relatively poor compared to those who attend the high-cost departments, since they cannot afford to subscribe to high-cost prepayments.

At health centres, there are a few patients who use high-cost prepayments as their payment method, since patients with high-cost prepayments are allowed to attend health centres. They are considered to be patients from the affluent section of the population who choose to attend health centres instead of visiting the high-cost

department at a governmental hospital for some reason. These patients need to be treated differently from the majority of health centre users in analysing equity in terms of income.

With this analysis, governmental health care provision can be seen as the combination of two divisions with the collaboration between health centres and hospitals in terms of sections of the population they serve. These are: a low-cost division which serves the poor section of the population and consists of a low-cost department at hospitals and health centres; and a high-cost division, which serves the affluent section of the population with high-cost prepayments and consists of a high-cost department at hospitals and health centres. In other words, patients with high-cost prepayments attend the high-cost division, and others attend the low-cost division. Dividing governmental health care provision in this way rather than simply differentiating health centres from hospitals is thought of as useful in constructing the map of health care service utilisation in relation to income status in the following.

7.3.5 PATIENTS' INCOME

Table 7.6 shows child and adult patients' average household income per head by health facility taking the above mentioned division into account.

Table 7.6 Patients' household income per head by health facility

		Household income per head (K)	
		Mean	S.D.
Lusaka	Governmental low-cost division	61,902	63,887
	Governmental high-cost division	92,688	172,286
	Industrial	88,035	100,391
	Private	90,507	108,935
	Traditional healer	39,388	18,058
	All	67,625	84,543
Kitwe	Governmental low-cost division	83,881	125,228
	Governmental high-cost division	44,172	21,555
	Industrial	136,052	164,708
	Private	-	-
	Traditional healer	-	-
	All	98,439	138,977

In Lusaka, the average income among patients attending the governmental high-cost division, K 92,688 per month, is higher than that among patients attending the low-cost division, K 61,902. The average income among patients at private institutions is also high, K 90,507. These differences in average income demonstrate the differences in health facilities in serving different income groups, described in Chapter 1.

On the contrary, in Kitwe, the average income among patients attending the governmental high-cost division, K 44,172 per month, is lower than that among patients attending the low-cost division, K 83,881. The average income among patients attending another major health care provider, industrial institutions, is higher than that of patients attending governmental facilities, at K 136,052. The lower average income among patients at the governmental high-cost division than that of patients at the low-cost division contradicts with the assumed functions of

these two divisions. This may result from the bias due to the small number of patient samples at the high-cost division. Actually, only 2 sampled individuals are observed as high-cost division users in Kitwe, this is due to the limitation of the LCMS98 as data source. However, the differences in average income between patients at the governmental low-cost division and at industrial institutions demonstrate the differences in health facilities in serving different income groups of the population.

7.3.6 PATIENTS' EMPLOYMENT STATUS

Table 7.7 shows the employment status of adult patients by health facility taking functional division into account, and demonstrates the differences among health facilities in serving different groups in the population, described in Chapter 1.

Table 7.7 Adult patients' employment status by health facility (%)

		Employed	Not employed	Unknown	Total
Lusaka	Governmental low-cost division	45.5	52.4	2.2	100.0
	Governmental high-cost division	78.8	21.2	0.0	100.0
	Industrial	100.0	0.0	0.0	100.0
	Private	76.6	22.3	1.0	100.0
	Traditional healer	24.6	75.4	0.0	100.0
	Total	52.6	45.6	1.8	100.0
Kitwe	Governmental low-cost division	33.3	66.7	0.0	100.0
	Governmental high-cost division	100.0	0.0	0.0	100.0
	Industrial	63.1	36.9	0.0	100.0
	Private	-	-	-	100.0
	Traditional healer	-	-	-	100.0
	Total	43.5	56.5	0.0	100.0

The proportions of adult patients attending the governmental high-cost division who are employed, 78.8% in Lusaka and 100.0% in Kitwe, are higher than those attending the low-cost division, 45.5% in Lusaka and 33.3% in Kitwe. The proportion of adult patients attending private institutions in Lusaka who are employed is also high, 76.6%. And the proportion of individuals attending industrial institutions who are employed is also high, 63.1%. Thus, the governmental low-cost division serves the economically worse-off population in terms of employment status compared with the governmental high-cost division, private institutions, and industrial institutions in the two districts.

7.3.7 MAP OF CONSUMERS' HEALTH CARE SERVICE UTILISATION

In summary, the relationships between patients' attendances at health facilities and their backgrounds described in the introduction of health systems are suggested empirically through the analysis, except for the relationship between patients' income status and attendances at the governmental high-cost division in Kitwe.

Figures 7.1a and 7.1b show the map of child and adult consumers' health care service utilisation in both districts.

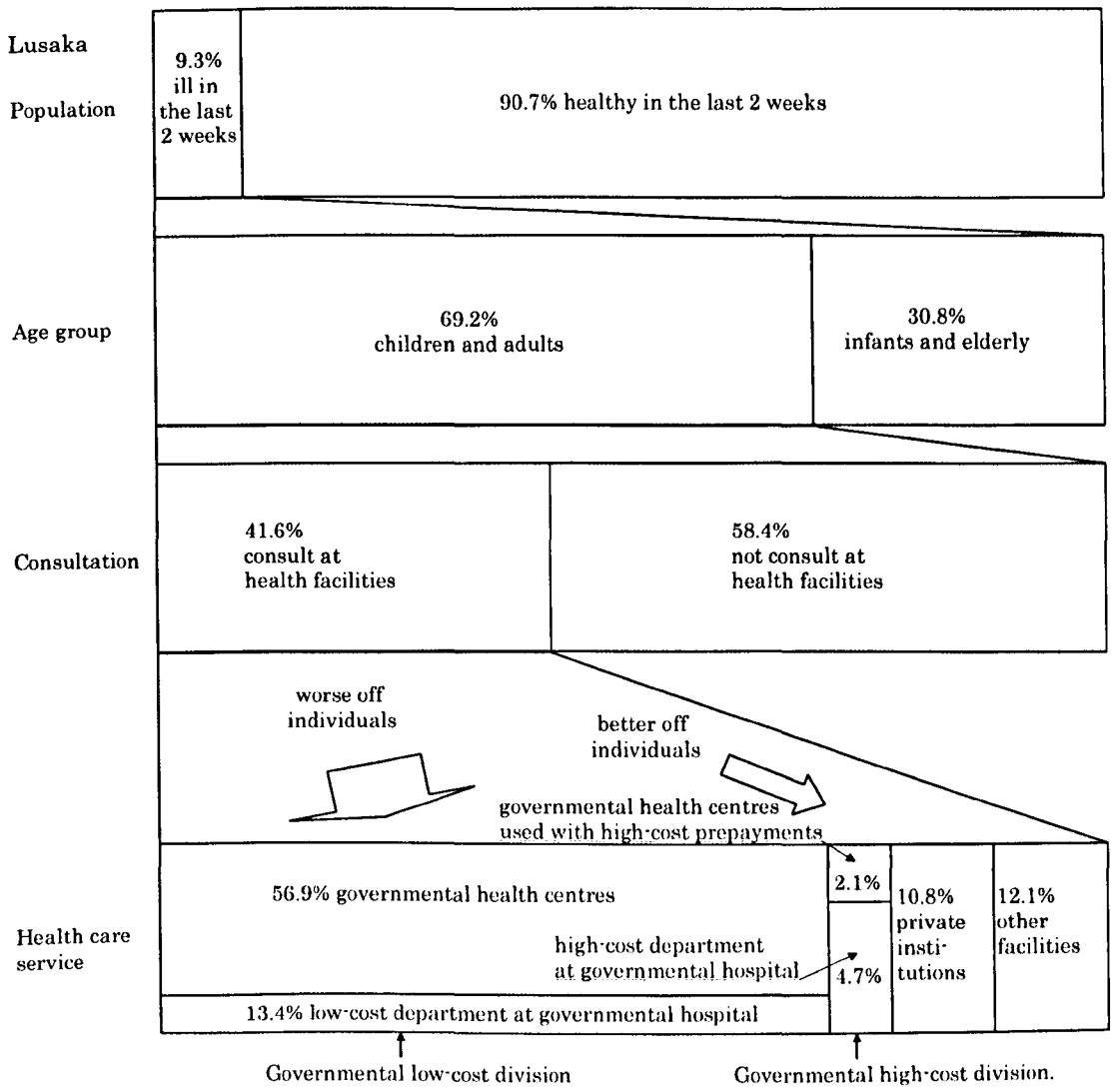

Figure 7.1a Map of consumer's health care service utilisation in Lusaka

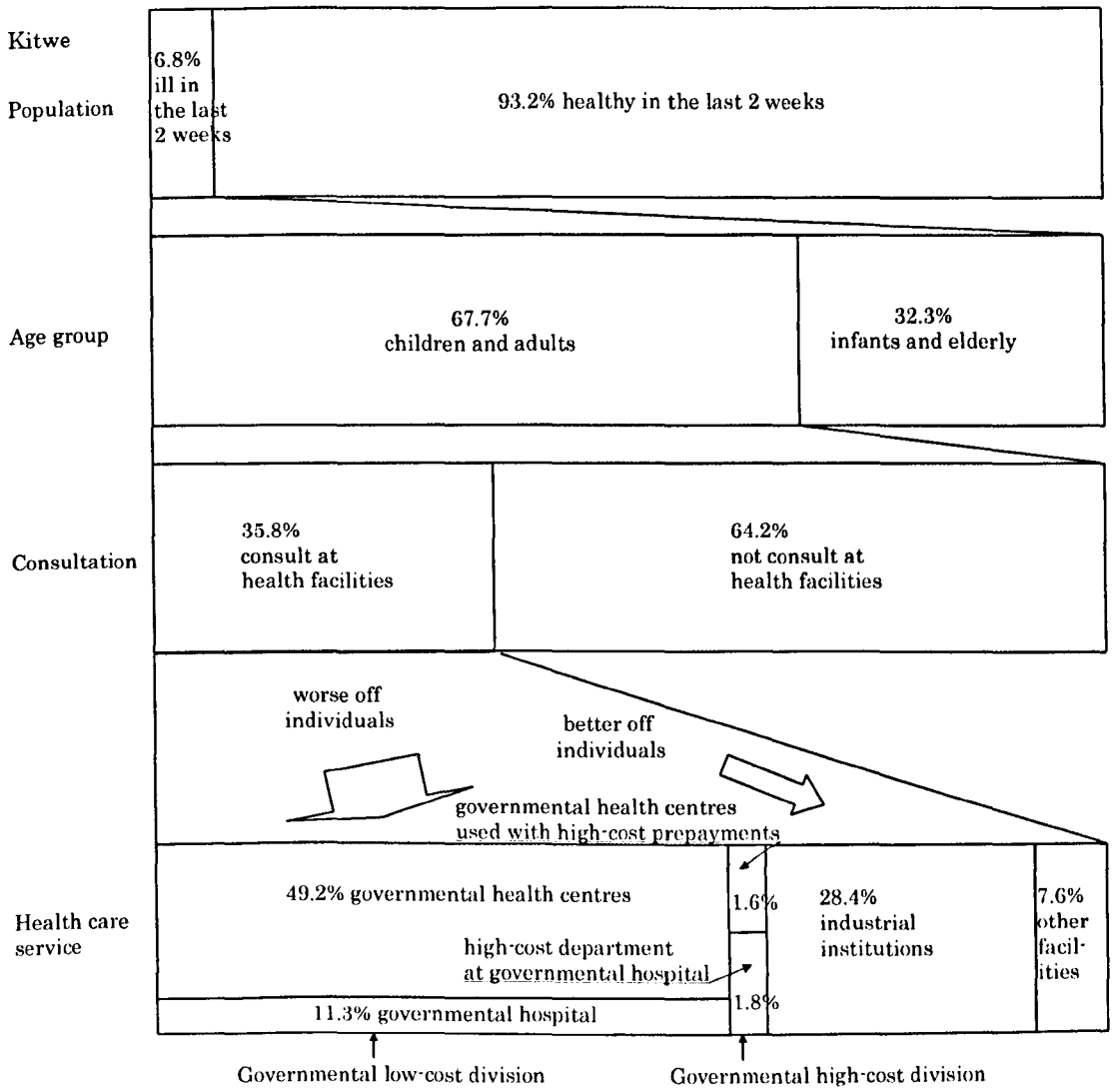

Figure 7.1b Map of consumer's health care service utilisation in Kitwe

The child and adult consumers bear the burden of nearly 70% of illness episodes in each district. Around 40% of those who have illness episodes seek health care at health facilities in both districts. In Lusaka, a small number of relatively better-off consumers with high income or secured employment, about 20%, attend the governmental high-cost division or private institutions. In Kitwe, a small number of relatively better-off consumers with high income or secured employment, about 30%, attend industrial institutions and the governmental high-cost division. However, a large number of relatively worse-off consumers with low-income or

unsecured employment, about 75% in Lusaka and about 60% in Kitwe, attend the governmental low-cost division. Within the governmental low-cost division, health centres mainly provide primary care and deal with almost 80% of patients within the division in both districts. Patients at governmental health centres pay for health care with user fees or low-cost prepayments, and the practice of exemption on the basis of low-income is negligible.

Therefore, health centres are considered to be an access point to health care by the majority of the poor section of the population. The financial barrier incurred by user fees and low-cost prepayments at health centres is considered to be significant for access to health care by the worse-off population, as introduced in Chapter 1 and as reviewed in Chapter 2.

7.4 CHOICE BETWEEN TWO TYPES OF PAYMENT MECHANISM

In this section, consumers' choice of payment mechanism is analysed in order to construct basis for the testing of hypotheses derived from theoretical models, detailed in the following sections.

Two types of choices of payment mechanism are observable in the LCMS98 data set. One is the choice made by patients at the time of health care service utilisation; the other is the choice made by households in face of the risk of illness episodes that may be suffered by household members.

7.4.1 PATIENTS' CHOICE OF PAYMENT MECHANISM AT THE TIME OF UTILISATION

Regarding patients who are suffering from illness, an overview of their choice of payment mechanism at various health facilities has already been shown in Table 7.5. It is possible to limit the analysis on the choice made by patients at health centres to those within the low-cost division, which is featured in the theoretical models of this study.

Table 7.8 shows patients' choice of payment mechanism within the governmental low-cost division.

Table 7.8 Patients' choice of payment mechanism at health centres within low-cost division (%)

	Direct payment		No payment		Unknown	Total
	User fees	Low-cost prepayments	Exemption by diagnosis	Other reason		
Lusaka	33.4	58.9	1.5	4.8	1.4	100.0
Kitwe	52.0	28.2	3.5	14.7	1.5	100.0

33.4% of patients in Lusaka and 52.0% in Kitwe chose user fees as their payment method. 58.9% in Lusaka and 28.2% in Kitwe chose low-cost prepayment.

7.4.2 CONSUMERS' CHOICE OF PAYMENT MECHANISMS BEFORE FALLING ILL

Payment choice by households is not directly investigated in the LCMS98 questionnaire. However, an index, which stands for all sampled households'

prepayment subscription status, can be generated through estimation using other variables, as described below.

In the questionnaire, respondents were asked about household monthly expenditures on various items. Among the items related to health care, expenditure on prepayments is asked separately, although the differentiation between high-cost prepayments and low-cost prepayments is not specified. Therefore, it is possible to estimate household subscription to prepayments with a criterion that a household is considered as a subscriber of at least low-cost prepayments if its monthly expenditure on prepayment covers the total premium for low-cost prepayments required for all household members. Other households are considered as non-subscribers to prepayments.

This criterion has two problems. Firstly, it cannot differentiate between high-cost and low-cost prepayment subscriber households, with both types categorised as prepayment subscribers. Therefore, it is not possible to limit the analysis to the choice of patients at governmental low-cost division, which is featured in the theoretical models. Secondly, it cannot exclude those households that usually attend industrial or private institutions, which are categorised as prepayment non-subscribers, since the preferred health facility of individuals or households is not investigated in the LCMS98. These cause biases in the estimated index affecting the test of hypotheses derived from the theoretical models. Therefore, adjustments are made in using this index in the following analysis.

Table 7.9 shows the proportion of households subscribing to low-cost prepayments

according to this index.

Table 7.9 Proportion of household subscribing low-cost prepayments

	% of subscribing household among all households	% of subscribing household among low-cost division users*
Lusaka	8.7	10.7
Kitwe	4.7	6.2

* Estimated from the share of low-cost division among patients' utilisation.

8.7% of all households in Lusaka and 4.7% in Kitwe subscribe to low-cost prepayments. Since the numerator of this proportion, subscribing households, includes those subscribing to high-cost prepayments (estimated at 14.0% in Lusaka and 16.6% in Kitwe according to Table 7.5 and Figure 7.1), and the denominator of this proportion, all households, includes potential users of health facilities other than the governmental low-cost division (estimated at 29.7% in Lusaka and 39.5% in Kitwe according to Figure 7.1), Table 7.9 also shows the percentage of subscribing households among potential low-cost division users through an adjustment, in which the estimated proportion of high-cost prepayments subscribers is excluded from the numerator and the estimated proportion of potential users of health facilities other than the governmental low-cost division is excluded from the denominator. These are estimated at 10.7% in Lusaka and 6.2% in Kitwe.

Substantial gaps are observed between the proportions of patients choosing prepayments, as shown in Table 7.8, and the proportions of households subscribing to prepayments, as shown in Table 7.9. Prepayment as the payment mechanism is more popular among patients, 58.9% in Lusaka and 28.2% in Kitwe, compared with households, 10.7% in Lusaka and 6.2% in Kitwe.

In order to address this gap, the congruence between the choice of patients and the choice of households is analysed. Table 7.10 shows the extent of this congruence.

Table 7.10 Coincidence of choice of prepayments between patient level and household level (%)

	Continuous subscriber	Subscription starter	Total
Lusaka	37.7	62.3	100.0
Kitwe	8.5	91.5	100.0

Patients using prepayments from subscribing households are categorised as continuous subscribers and patients using prepayments from non-subscribing households as subscription starters. The latter are considered to start the subscription when falling ill in the last two weeks, since their household did not expend on prepayments covering all household members in the last month. The subscription starters amount to 62.3% of health care users who pay by low-cost prepayments in Lusaka, and 91.5% in Kitwe.

If we assume the continuous subscription of the subscription starters after this illness episode, 0.84% of children and adults in Lusaka and 1.55% in Kitwe would become continuous subscribers in every two weeks. These figures are too large considering the low percentages of continuously subscribing households shown in Table 7.9. The majority of subscription starters are thought to discontinue the subscription after their illness episode. Therefore, the gap is considered to be a reflection of the patients' behaviour, as pointed out in a recent review (Daura et al., 1998) mentioned in Chapter 1, where they pay the first premium, which is lower than the user fee for one illness episode, and wait for 24 hours before consultation.

This type of subscription contradicts the concept of risk sharing by payment in advance assumed in the theoretical models. Therefore, due attention and adjustment are needed in testing the hypothesis using the data observed through the choice by patients.

7.5 TEST OF THE UTILISATION MODEL

In order to test the hypotheses derived from the utilisation model, consumers' choice of payment mechanism and their utilisation of health care services are analysed in this section.

A hypothesis to be tested in this section is: the utilisation of health care service is facilitated by voluntary prepayments compared with user fees.

The assumption regarding prepayments subscription in the hypothesis from the utilisation model is that consumers choose to subscribe to prepayments before falling ill. After falling ill, patients with prepayments decide whether to access health care services knowing that they face no financial barrier at the time of utilisation. A comparison is needed between patients who have sought health care services and patients who have not sought health care services. This comparison cannot be made from the observation in the LCMS98 on choice of payment mechanism by patients who attend health facilities, since information on patients who did not seek health care is not available.

The observations on households' subscription to prepayments can be applied for this

comparison, since information on patients who have refrained from seeking health care is available. However, the index of subscription status has problems, as discussed in the previous section. The problem in applying the index of prepayments subscription by household is the inability to separate potential users of the governmental low-cost division from the others. Potential users of the governmental high-cost division, industrial institutions, private institutions and traditional healers do not subscribe to low-cost prepayments not because they prefer to pay user fees, but because low-cost prepayments is not an option available to them. This causes a bias in testing the hypothesis.

However, by interpreting the essence of voluntary prepayments subscription as the removal of the financial barrier to health care services at the time of utilisation, a test of the hypothesis can be made. It examines whether the removal of the financial barrier at the time of utilisation by any payment mechanism facilitates health care utilisation when falling ill. In this test, it is assumed that high-cost prepayments subscribers and individuals whose health care is paid for by their employers, in addition to low-cost prepayments subscribers, face no financial barriers in the two districts.

The households subscribing to high-cost prepayments are thought of as mixed in with households subscribing to low-cost prepayments based on the criteria discussed in the previous section. Whether the cost of health care services is payable by the employer is not directly investigated in the LCMS98. However, an index that differentiates households where employers' pay for health care services can be generated through estimation from the other variables. In the

questionnaire, whether a household member's employment includes social security or not is questioned. Therefore, where a household has at least one member with social security through their employment, we would expect the employer to pay for the cost of health care services utilisation by that household member. Table 7.11 shows the percentage of individuals with social security based on this criterion.

Table 7.11 % of individuals with social security

	% of individuals with social security
Lusaka	15.9
Kitwe	12.3

15.9% of individuals in Lusaka and 12.3% in Kitwe are considered to expect their employer to pay for their health care services. These proportions are close to the share of employers' payment shown in Table 7.5, 12.4% in Lusaka and 17.4% in Kitwe.

Table 7.12 shows the cross tabulation of the subscription status taking these adjustments into account and attendance at health facilities among consumers with illness episodes.

Table 7.12 Cross tabulation between attendance and financial barrier

Lusaka		Financial barrier (+)	Financial barrier (-)	Total
	Attendance (+)	19,876	11,351	31,227
	Attendance (-)	34,018	9,047	43,065
	Total	53,894	20,398	74,292
Chi-square = 2139.2 p = 0.000 Odds ratio (95% C.I.) = 2.147 (2.078, 2.219)				
Kitwe		Financial barrier (+)	Financial barrier (-)	Total
	Attendance (+)	6,044	1,379	7,423
	Attendance (-)	11,669	1,574	13,243
	Total	17,713	2,953	20,666
Chi-square = 173.92 p = 0.000 Odds ratio (95% C.I.) = 1.691 (1.563, 1.830)				
Two-districts		Financial barrier (+)	Financial barrier (-)	Total
	Attendance (+)	25,919	12,730	38,649
	Attendance (-)	45,686	10,621	56,307
	Total	71,605	23,351	94,956
Chi-square = 2448.3 p = 0.000 Odds ratio (95% C.I.) = 2.113 (2.050, 2.177)				

In both districts, attendance by subscribers is found to be large, and this is statistically significant. The odds ratios are 2.147 in Lusaka and 1.691 in Kitwe. This is interpreted that an individual free from financial barriers at the time of illness tends to seek health care services 2.147 times more in Lusaka, 1.691 times more in Kitwe, and 2.113 times more in the two districts overall, for the time period studied.

There are several factors that may affect patients' attendance other than financial barriers. Factors such as income, perceived health status, and perceived quality of care are thought of as modifying or shifting the demand curve. Perceived health status and perceived quality of care are not investigated or observable in the LCMS98, but household income per head is. In addition, there is price segmentation between the child age group and adult age group at governmental health facilities, which is the major health care service provider, as described in

Chapter 1.

Table 7.13 shows the stratified cross tabulation in order to control the effect of these factors: income and age group.

Table 7.13 Stratified cross tabulation between attendance and financial barrier

Lusaka	Financial barrier (+)								Financial barrier (-)								
	Child				Adult				Child				Adult				
	Quartile of household income per head				Quartile of household income per head				Quartile of household income per head				Quartile of household income per head				
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	Total
Attendance (+)	1,299	346	699	1,230	2,414	3,889	5,057	4,027	811	284	362	394	1,830	2,011	2,857	2,458	29,968
Attendance (-)	1,454	1,872	1,098	1,675	5,207	6,250	7,703	7,876	1,044	136	991	489	1,687	1,095	1,195	2,327	42,099
Total	2,753	2,218	1,797	2,905	7,621	10,139	12,760	11,903	1855	420	1,353	883	3,517	3,106	4,052	4,785	72,067

Mantel-Haenszel method: Chi-square = 2188.8 p = 0.000 Common odds ratio (95% C.I.) = 2.189 (2.116, 2.263)

Kitwe	Financial barrier (+)								Financial barrier (-)								
	Child				Adult				Child				Adult				
	Quartile of household income per head				Quartile of household income per head				Quartile of household income per head				Quartile of household income per head				
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	Total
Attendance (+)	145	172	1,069	784	480	699	1,351	1,344	0	137	0	332	64	302	307	237	7,423
Attendance (-)	755	1,153	522	700	1,876	2,220	2,983	1,459	169	0	116	224	0	64	397	604	13,242
Total	900	1,325	1,591	1484	2,356	2,919	4,334	2,803	169	137	116	556	64	366	704	841	20,765

Mantel-Haenszel method: Chi-square = 96.5 p = 0.000 Common odds ratio (95% C.I.)= 1.434 (1.327, 1.550)

The common odds ratios for attendance at health facilities, 2.189 in Lusaka, 1.434 in Kitwe, and 2.048 in two districts, are estimated with statistical significance by the Mantel-Haenszel method.

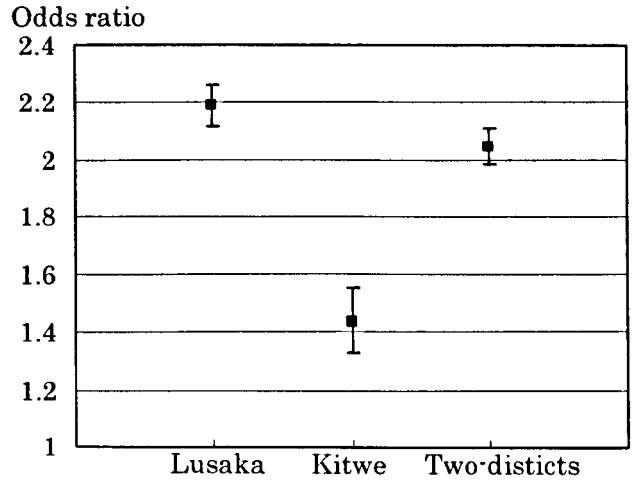

Figure 7.2 Common odds ratio of receiving health care service

In summary, consumers' access to health care services is facilitated by the removal of financial barriers to health care services at the time of illness such as subscription to voluntary prepayments. This result supports the hypothesis derived from the utilisation model, although the result does not come from observation limited to governmental health centres.

7.6 TEST OF THE CHOICE MODEL

In order to test the hypotheses derived from the choice model, consumers' subscription to prepayments and the effects of income and household size on the choice are analysed in this section.

Hypotheses to be tested in this section are: income affects consumers' choice of alternative payment mechanisms; voluntary prepayments are preferred to user fees when consumers' income is high; household size affects consumers' choice of alternative payment mechanisms; and voluntary prepayments are preferred to user fees when household size is small.

The choice model produces other hypotheses than those above. However, they are not tested in this section, since factors such as perceived health status and perceived quality of care are not investigated or observable in the LCMS98.

Observations on the choice of payment mechanism by both patients and households are applicable for the test. Therefore, two analyses are made in turn.

7.6.1 TEST WITH PATIENTS' CHOICE

Regarding the choice by patients, subscription starters, who are differentiated from continuous subscribers among low-cost prepayments payers in section 7.4, contradict the assumption regarding the subscription to prepayments in the hypothesis from the choice model that consumers choose to subscribe to prepayments before falling ill, since they are considered to choose to pay the first premium upon illness and to discontinue the subscription after their illness episode. In this sense, their choice is rather user fees (with a 24-hour wait) than low-cost prepayments. Therefore, their choices are dealt with as user fees in the following test.

Table 7.14 shows the backgrounds of patients by the choice of payment mechanism at the governmental low-cost division taking these arguments into account.

Table 7.14 Backgrounds of patients and choice of payment mechanism at governmental low-cost division

		Household income per head			Household size		
		Mean (K)	S.D.	N	Mean	S.D.	N
Lusaka	User fees (including subscription starter)	68,341	69,681	16,827	4.53	2.46	17,068
	Low-cost prepayments (excluding subscription starter)	39,657	30,892	4,871	1.71	0.45	4,871
	Total	61,902	64,210	21,697	3.90	2.48	21,939
		t = 41.2 p = 0.000			t = 141.5 p = 0.000		
Kitwe	User fees (including subscription starter)	83,299	126,706	4,389	4.23	2.22	4,289
	Low-cost prepayments (excluding subscription starter)	107,500	0	108	2.00	0	108
	Total	83,881	4,497	125,228	4.17	2.22	4,497
		t = -12.7 p = 0.000			t = 66.4 p = 0.000		

With regard to average income, that of user fee payers in Lusaka (K 68,341) is higher than that of low-cost prepayments payers (K 39,657). The income of user fee payers in Kitwe (K 83,299) is lower than that of low-cost prepayments payers (K 107,500).

With regard to the number of children and adults in households who are supposed to pay for health care, that of user fee payers in Lusaka (4.53) is greater than that of low-cost prepayments payers (1.71). For user fee payers in Kitwe, the figure is 4.23 compared with 2.00 among low-cost prepayments payers.

The higher average income among user fee payers in Lusaka contradicts with the expectation from the hypotheses. Other than this, the averages are consistent with expectations.

Logit models introduced in Chapter 4 are estimated in order to investigate the effects of income and household size on the choice of payment mechanism. Table 7.15 shows the estimated slopes, which are marginal effects at the average level of each variable.

Table 7.15 Estimation of logit model: patient's choice of payment mechanism

	Lusaka			Kitwe			Two-districts		
	Slope	(t)	Mean of variable	Slope	(t)	Mean of variable	Slope	(t)	Mean of variable
Income (10^4)	-4.90×10^{-3}	(-1.54)	6.19	2.13×10^{-6}	(0.00)	8.39	-4.26×10^{-3}	(-1.68)	6.57
Household size	-4.19×10^{-2}	(-2.27)*	3.85	-7.68×10^{-3}	(-0.67)	4.17	-3.70×10^{-2}	(-2.63)**	3.90
Age group	1.68×10^{-3}	(0.13)	0.82	1.86×10^{-2}	(0.46)	0.66	2.08×10^{-3}	(0.16)	0.79
District	-	-	-	-	-	-	-3.19×10^{-2}	(-1.77)	0.17
Constant	9.94×10^{-2}			-3.26×10^{-2}			8.65×10^{-2}		
	N= 21,698 ln L = -63.8			N= 4,497 ln L = -3.5			N = 26,194 ln L = -67.8		

* $p < 0.05$, ** $p < 0.01$

The distinction between child and adult is also taken as an explanatory factor for the choice, that is, covariance in addition to income and household size in order to take the effects of price segmentation into account. Logit models for the two districts are also estimated with dummy variable as well.

In Lusaka, the sign of slope for income is negative, which suggests that patients with low income are more likely to choose low-cost prepayment. This is inconsistent with the hypothesis. However, the parameter is not statistically significant. The sign of slope for household size is negative and statistically significant, which means small households are more likely to choose low-cost prepayment, with statistical significance. This is consistent with the hypothesis. The effect of price segmentation between child and age is not statistically significant.

In Kitwe, the sign of slope for income is positive, which suggests that patients with high income are more likely to choose low-cost prepayments, but the parameters are not statistically significant. This sign is consistent with the hypotheses. The sign of slope for household size is negative, which means small households are more likely choose low-cost prepayment. This sign is consistent with the hypotheses. However, the parameter is not statistically significant. The effect of price segmentation between child and age is not statistically significant.

For the two districts together, estimated effects of factors are similar to those in Lusaka. The dummy variable for the difference between the two districts is not statistically significant.

In short, the hypothesis on the effect of household size in Lusaka is supported by the estimation of logit model with statistical significance. The signs of slopes for income and household size in Kitwe are consistent with the hypotheses but statistically insignificant. The sign of slope for income in Lusaka contradicts with the hypothesis but is statistically insignificant.

7.6.2 TEST WITH HOUSEHOLD CHOICE

A similar analysis is conducted for household choice. In this case, the index of subscription status has some problems, as discussed in section 7.4. The assumption regarding the choice of payment mechanism in the hypotheses from the choice model is that households are supposed to pay for health care. Therefore, households that expect a member's employer to pay for health care identified through the index based on social security in the previous section are excluded from the analysis in the following. Households which subscribe to low-cost prepayments or high-cost prepayments are compared with households which pay by user fees.

Table 7.16 shows the backgrounds of households by the choice of payment mechanism.

Table 7.16 Backgrounds of households and choice of payment mechanism

		Household income per head			Household size		
		Mean (K)	S.D	N	Mean	S.D	N
Lusaka	User fee	97,885	237,742	163,435	5.00	2.1810	169,017
	Voluntary prepayment	88,552	227,939	15,595	1.51	0.4998	16,071
	Total	97,072	236,918	179,301	4.70	2.3087	185,088
Kitwe	User fee	70,046	265,473	63,814	5.52	2.4298	63,897
	Voluntary prepayment	109,669	104,455	3,129	1.32	0.4699	3,129
	Total	71,898	260,311	66,943	5.32	2.5343	67,026

With regard to average income, that of user fee payers (K 97,885) is higher than that of prepayments payers (K 88,552) in Lusaka. In Kitwe, that of user fee payers (K 70,046) is lower than that of prepayments payers (K 109,669).

With regard to household size, that is the number of children and adults, that of user fee payers (5.00) is larger than that of low-cost prepayments payers (1.51) in Lusaka. Likewise, household size of user fee payers (5.52) is larger than that of low-cost prepayments payers (1.32) in Kitwe.

The higher average income among user fee payers in Lusaka contradicts with the expectation from the hypotheses. Other than this, the averages are consistent with expectations. These differences are the same as the results from the analysis of the choice by patients.

Logit models are estimated in order to investigate the effects of income and household size on the choice of payment mechanism. Table 7.17 shows the results

of the estimation.

Table 7.17 Estimation of logit model: household's choice of payment mechanism

	Lusaka			Kitwe			Two-districts		
	Slope	(t)	Mean of variable	Slope	(t)	Mean of variable	Slope	(t)	Mean of variable
Income (10^4)	-3.51×10^{-8}	(-0.77)	9.70	1.50×10^{-5}	(0.08)	6.75	-2.35×10^{-6}	(-0.78)	9.02
Household size	-1.39×10^{-3}	(-2.11)*	4.65	-1.57×10^{-2}	(-4.58)**	5.14	-9.42×10^{-4}	(-2.23)*	4.83
District	-	-	-	-	-	-	-2.30×10^{-4}	(-1.72)	0.27
Constant	2.42×10^{-3}			-3.49×10^{-3}			1.64×10^{-3}		
	N= 179,030	ln L = -189.8		N= 66,942	ln L = -57.9		N = 245,972	ln L = -224.8	

* $p < 0.05$, ** $p < 0.01$

The results of this estimation are similar to the results from the analysis of patients' choice in the previous section.

In Lusaka, the sign of slope for income is negative, which suggests that patients with low income are more likely to choose low-cost prepayment. This is inconsistent with the hypothesis. However, the parameter is not statistically significant. The sign of slope for household size is negative, which means small households are more likely choose low-cost prepayment; the parameter is statistically significant. This is consistent with the hypothesis.

In Kitwe, the sign of slope for income is positive, which suggests that patients with high income are more likely to choose low-cost prepayments. The parameter is not statistically significant. This sign is consistent with the hypothesis. The sign of slope for household size is negative, which means small households are more likely choose low-cost prepayments; the parameter is statistically significant. These signs are consistent with the hypothesis.

For the two districts together, estimated effects of factors are similar to those in Lusaka. The dummy variable for the difference between the two districts is not statistically significant.

In short, the hypothesis on the effect of household size in Lusaka and Kitwe is supported by the estimation of logit model with statistical significance. The sign of slope for income in Kitwe is consistent with the hypotheses but statistically insignificant. The sign of slope for income in Lusaka contradicts with the

hypothesis but is statistically insignificant.

7.7 CONSUMERS' UTILISATION OF HEALTH CARE IN TERMS OF INCOME

One possible interpretation of the contradiction in the signs for income factor in Lusaka, which is observed in the choice by both patients and households, is an underlying association between low income and low health status.

According to the choice model, consumers with low health status are more likely to choose voluntary prepayments. Therefore, income and health status affect the choice in opposite directions. Although individual consumers' or households' health status is not observable in the LCMS98, the differences in morbidity across income groups in the population are observable. Table 7.18 shows the morbidity by income groups.

Table 7.18 Morbidity by income stratum

		Income stratum				Total
		Low income			High income	
		1st quartile	2nd quartile	3rd quartile	4th quartile	
Lusaka	% of individuals having illness episodes	8.9	9.0	9.9	9.9	9.4
		n = 1,106,834 Chi-square = 298.5 p = 0.000				
	% of individuals attending health facilities	4.3	3.8	4.6	4.7	4.3
		n = 1,106,835 Chi-square = 337.5 p = 0.000				
Kitwe	% of individuals having illness episodes	5.2	6.6	7.8	7.6	6.8
		n = 450,413 Chi-square = 767.5 p = 0.000				
	% of individuals attending health facilities	1.5	2.7	3.1	3.7	2.8
		n = 450,412 Chi-square = 1059.6 p = 0.000				

Two types of morbidities are shown: morbidity based on self-report, i.e. a proportion of those who have at least one symptom during the last two weeks of the survey, and

morbidity based on clinical attendance, i.e. a proportion of those who seek professional health care to deal with the symptom. There are differences which seem to contradict the association between high income and high morbidity in both districts. However, similar contradiction has been found elsewhere (e.g. Makinen et al., 2000). It is possible to interpret that richer group is more likely to complain symptom and obtain health care when ill, even though there is underlying epidemiological association between low income and low health status. Further analysis, especially on the effect of another unobserved factor, quality of care, will be done in Chapter 9.

7.8 SUMMARY

In summary, the analysis of LCMS98 data set shows that significant volume of health care in order to consider equity is consumed at health centres; that the prediction of utilisation model is empirically demonstrated; and most of the predictions of choice model are empirically demonstrated. Table 7.19 summarizes the results of statistical tests of choice model.

Table 7.19 Summary of statistical tests of Choice Model using LCMS98

TABLE	LOCATION	LEVEL OF CHOICE (INDIVIDUAL/HOUSEHOLD)	MODE OF ANALYSIS	FACTOR	
				INCOME	HOUSEHOLD SIZE
TABLE 7.14	Lusaka	Individual	Univariate	Contradict*	Support*
	Kitwe	Individual	Univariate	Support*	Support*
TABLE 7.15	Lusaka	Individual	Logit model	Contradict	Support*
	Kitwe	Individual	Logit model	Support	Support
	Two-districts	Individual	Logit model	Contradict	Support*
TABLE 7.16	Lusaka	Household	Univariate	Contradict*	Support*
	Kitwe	Household	Univariate	Support*	Support*
TABLE 7.17	Lusaka	Household	Logit model	Contradict	Support*
	Kitwe	Household	Logit model	Support	Support*
	Two-districts	Household	Logit model	Contradict	Support*

* statistical significance

CHAPTER 8

RESULTS 3

RESULTS OF EMPIRICAL INVESTIGATION 2

ANALYSIS OF RECORDS AT HEALTH CENTRES

8.1 INTRODUCTION

This chapter presents the results of the analysis of the second data source, records at health centres.

Two types of records are analysed in this chapter, as specified in Chapter 5. One is the outpatient new attendance registry book at six sampled health centres, which records consultations at health centres, and the other is the individual patient's outpatient book, which is a medical record of each individual, at one of the sampled health centres in Lusaka, Chawama.

Two points are reported in this chapter. Firstly, the maps of outpatients' choice of payment mechanism at health centres are constructed. This is to form the basis for the analysis of hypotheses derived from theoretical models in this chapter and the next chapter. Secondly, the association between outpatients' choice of payment mechanism and their frequency of attendances is examined. This is to test hypotheses derived from theoretical models.

8.2 RECORDS IN THE OUTPATIENTS NEW ATTENDANCE BOOK

The outpatient new attendance registry book at health centres records all consultations of outpatients with a new illness episode according to the governmental guidelines. Since the cost of follow-up consultations is covered by the payment at first consultation for each illness episode, all patients' health behaviour in the face of direct payments is recorded in these books. Among the items recorded in the book, the outpatient's registration number, age, payment method, and date of consultation are used in the following analysis, as specified in Chapter 5.

There are limitations in the availability of records due to the variation in record keeping practices among health centres, as also described in Chapter 5. Contrary to the governmental guidelines, only consultations of outpatients who newly attend a health centre (with their first illness episode) are recorded in the new attendance registry book at large health centres in Lusaka: Chipata and Chawama. Once they are recorded in this book, their subsequent attendances due to separate illness episodes are only recorded in their individual medical record, that is, their outpatient book, at these health centres. In addition, only four months of records are available at Chipata, while a year-round record is available at the other health centres.

Tables 8.1a and 8.1b show the number of new outpatient consultations at health centres, taking these differences in record keeping practices into account.

Table 8.1a Number of consultations by newly registered patients

		Number of consultations	Observation period
Lusaka	Chipata	19,650	4 months
	Chawama	23,021	1 year

Table 8.1b Number of new illness episode consultations

		Number of consultations	Observation period
Lusaka	Kabwata	23,097	1 year
Kitwe	Chimwenwe	19,227	1 year
	Cosetco	974	1 year
	Mwekera	2,949	1 year

In Lusaka, there are 19,650 consultations by newly registered patients during four months of observation at Chipata, and 23,021 consultations during one year of observation at Chawama; there are 23,097 consultations during one year at Kabwata. In Kitwe, there are 19,227 consultations at Chimwenwe, 974 consultations at Cosetco and 2,949 consultations at Mwekera during one year. These records of consultations are to be analysed in the following.

8.3 PATIENT'S CHOICE OF PAYMENT MECHANISM AT HEALTH CENTRES

In this section, the maps of outpatients' choice of payment mechanism at six health centres are constructed in order to form the basis for the analysis of hypotheses derived from theoretical models in this chapter and the next.

Tables 8.2a and 8.2b show the share of directly paid consultations at health centres.

Table 8.2a Share of paid consultations among newly registered patients (%)

		Paid	Exempted	Unknown	Total
Lusaka	Chipata	31.7	66.6	1.7	100.0
	Chawama	57.1	41.9	1.0	100.0

Table 8.2b Share of paid consultations (%)

		Paid	Exempted	Unknown	Total
Lusaka	Kabwata	53.6	42.6	3.7	100.0
Kitwe	Chimwenwe	33.6	64.8	1.7	100.0
	Cosetco	55.5	43.8	0.6	100.0
	Mwekera	34.9	65.1	0.0	100.0

Among the recorded consultations, 31.7% involve direct payment by outpatients at Chipata, 57.1% at Chawama, and 53.6% at Kabwata in Lusaka. 33.6% of consultations involve direct payment by outpatients at Chimwenwe, 55.5% at Cosetco, and 34.9% at Mwekera in Kitwe. Most exemptions from direct payment are due to age, especially infant outpatients under the age of five at all six health centres. Thus, the variation in the proportion of directly paid consultations is considered to mainly reflect the age distribution of the outpatients or catchment population of each health centre.

Tables 8.3a and 8.3b show the share by age group of directly paid outpatient consultations.

Table 8.3a Share of direct-payment consultations of newly registered patients by age group (%)

		Child (6-15)	Adult (16-64)	Unknown	Total
Lusaka	Chipata	11.4	87.4	1.2	100.0
	Chawama	13.0	86.7	0.3	100.0

Table 8.3b Share of paid consultations by age group (%)

		Child	Adult	Unknown	Total
Lusaka	Kabwata	20.3	79.1	0.6	100.0
Kitwe	Chimwenwe	23.8	76.0	0.2	100.0
	Cosetco	14.4	85.6	0.0	100.0
	Mwekera	25.7	74.0	0.3	100.0

Child and adult outpatients amount to 11.4% and 87.4% at Chipata; to 13.0% and 86.7% at Chawama; and to 20.3% and 79.1% at Kabwata in Lusaka, respectively. Child and adult outpatients amount to 23.8% and 76.0% at Chimwenwe; to 14.4% and 76.0% at Cosetco; and to 25.7% and 74.0% at Mwekera in Kitwe, respectively. At all six health centres, more than 70% of directly paid consultations deal with adult outpatients.

Tables 8.4a and 8.4b show the choice of payment mechanism among directly paid consultations.

Table 8.4a Choice of payment mechanism among paying newly registered patients (%)

		User fees	Low-cost prepayments	High-cost prepayments	Discount cards	Total
Lusaka	Chipata	9.2	90.8	0.0	n.a.	100.0
	Chawama	24.5	73.3	0.1	2.1	100.0

Table 8.4b Choice by payment mechanism among paid consultations (%)

		User fees	Low-cost prepayments	High-cost prepayments	Discount cards	Total
Lusaka	Kabwata	12.2	87.6	0.0	0.2	100.0
Kitwe	Chimwenwe	80.8	17.3	0.0	1.9	100.0
	Cosetco	7.8	92.2	0.0	n.a.	100.0
	Mwekera	56.6	17.8	0.2	25.4	100.0
	Mwekera excluding low-cost prepayment	68.9	n.a.	0.2	30.9	100.0

In Lusaka, at Chipata, user fee, low-cost prepayment and high-cost prepayment are the direct payment options available. 9.2% of outpatients chose to pay by user fee, 90.8% by low-cost prepayment; no patients chose high-cost prepayment. At Chawama, in addition to user fee, low-cost prepayment and high-cost prepayment, a discount card is an option for direct payment. 24.5% of outpatients chose to pay by user fee, 73.3% by low-cost prepayment, 0.1% by high-cost prepayment, and 2.1% by discount card. At Kabwata, user fee, low-cost prepayment, high-cost prepayment, and discount card are the available direct payment options, although discount cards were sold only during the first month in the year of the observation. 12.2% of outpatients chose to pay by user fee, 87.6% by low-cost prepayment, none by high-cost prepayment and 0.2% by discount card.

In Kitwe, at Chimwenwe, user fee, low-cost prepayment, high-cost prepayment, and discount card are the options available for direct payment, although discount cards were sold only during the first three months in the year of the observation. 80.8% of outpatients chose to pay by user fee, 17.3% by low-cost prepayment, none by high-cost prepayment, and 1.9% by discount card. At Cosetco, direct payment options are user fee, low-cost prepayment and high-cost prepayment. 7.8% of outpatients chose to pay by user fee, 92.2% by low-cost prepayment, and none by

high-cost prepayment. At Mwekera, direct payment options are user fee, low-cost prepayment, high-cost prepayment, and discount card. 56.6% of outpatients chose to pay by user fee, 17.8% by low-cost prepayment, 0.2% by high-cost prepayment, and 25.4% by discount card. Since low-cost prepayment is only available for pregnant females in Mwekera, and they are required to purchase low-cost prepayment here, low-cost prepayment is not chosen at the outpatients' discretion. Therefore, the proportions of the choice of payment mechanism excluding pregnant females are also shown in Table 8.4b. With this adjustment, 68.9% of outpatients chose to pay by user fee, 0.2% by high-cost prepayment, and 30.9% by discount card.

Figures 8.1a to 8.1f show the maps of outpatients' choice of payment mechanism at the six health centres.

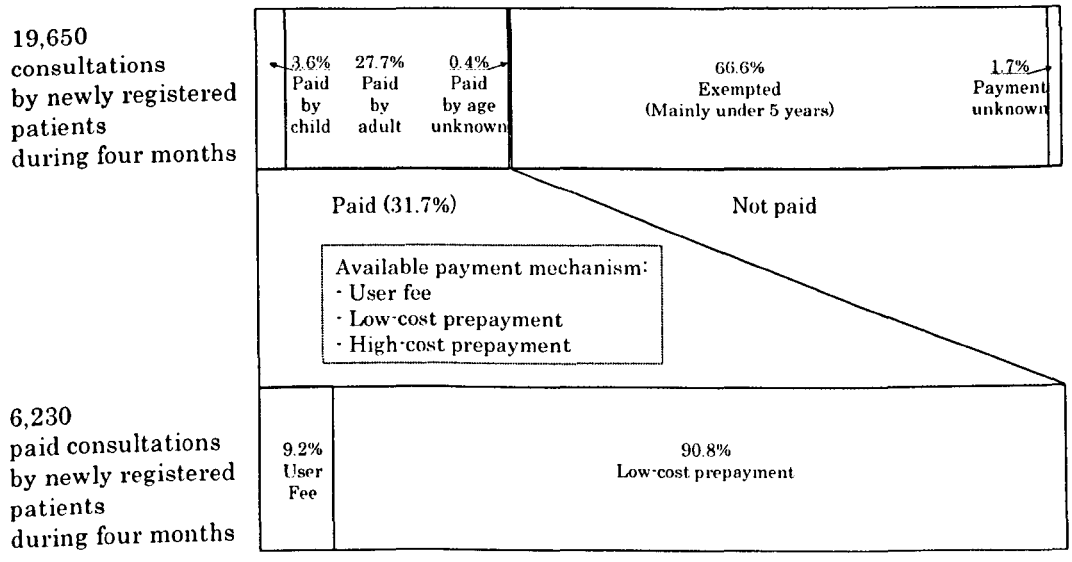

Figure 8.1a Map of the choice of payment mechanism at Chipata

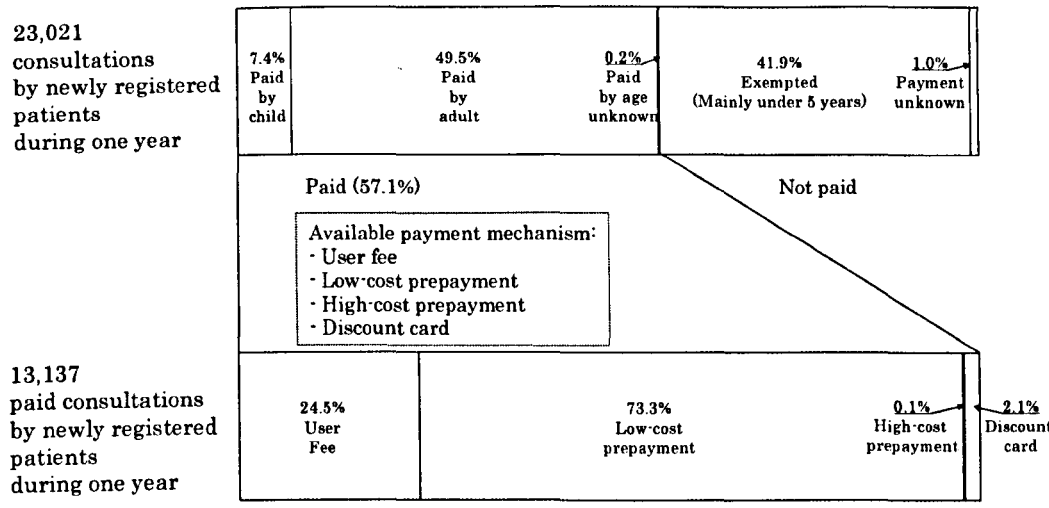

Figure 8.1b Map of the choice of payment mechanism at Chawama

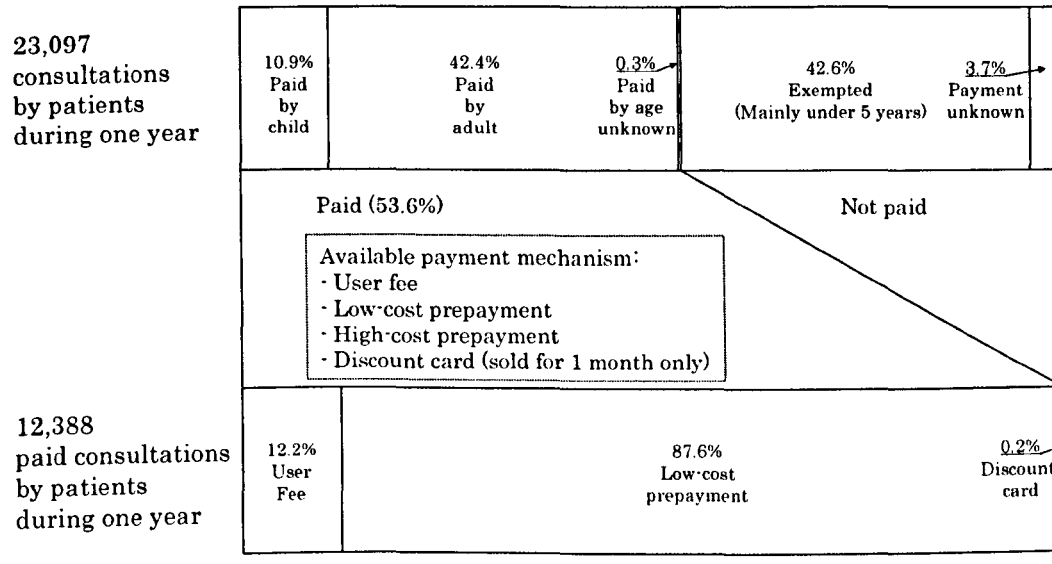

Figure 8.1c Map of the choice of payment mechanism at Kabwata

In Lusaka, low-cost prepayment is chosen by more than 70% of outpatients at the three health centres - Chipata, Chawama, and Kabwata. User fee is the direct payment mechanism of choice in about 9% to 25% of consultations. Discount cards were an available option in the one year of observation at Chawama, but only 2.1% of outpatients chose to pay by them. The shares for high-cost prepayment are negligible. The pattern of the choice of payment mechanism in Lusaka is

considered to be consistent across the three health centres.

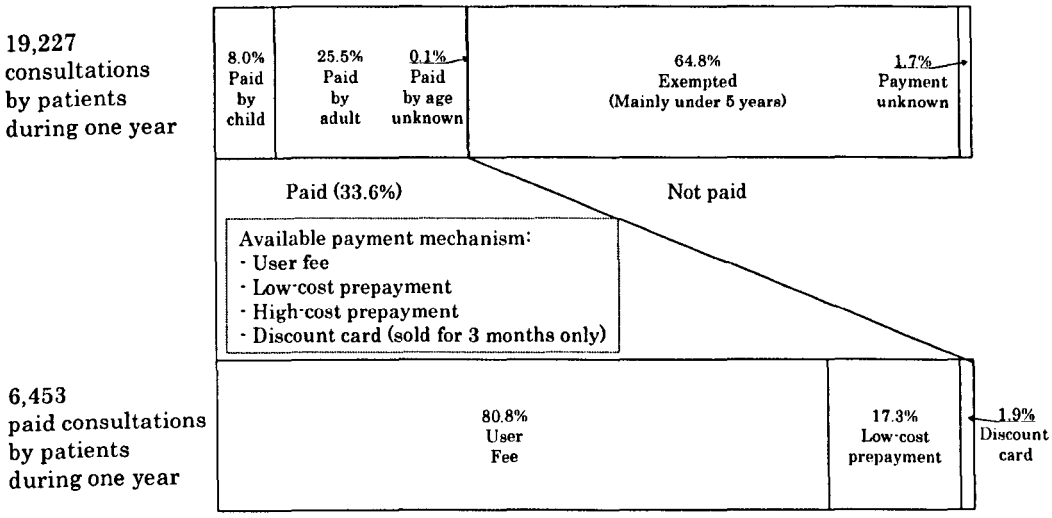

Figure 8.1d Map of the choice of payment mechanism at Chimwenwe

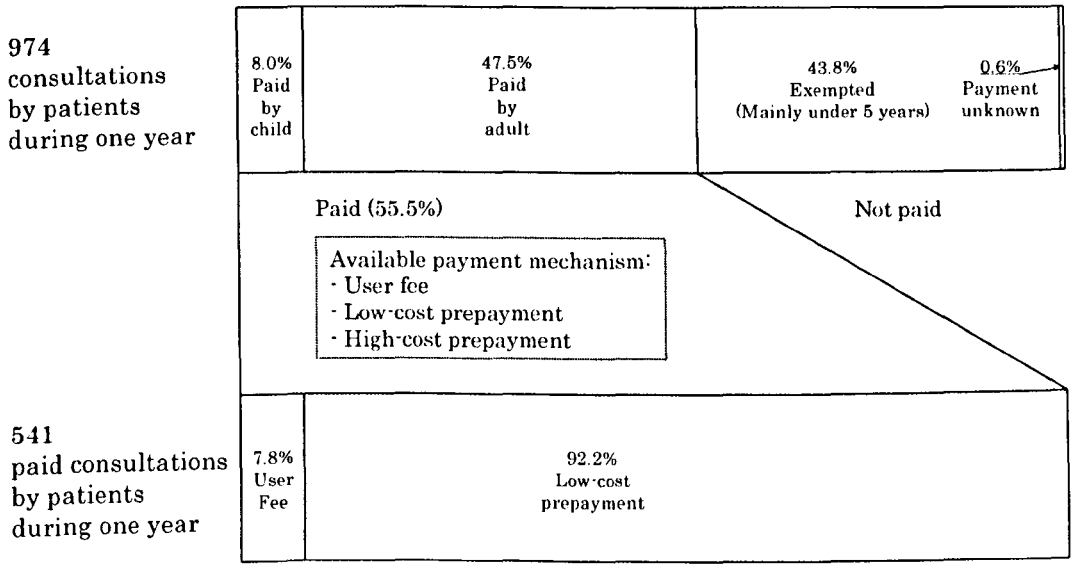

Figure 8.1e Map of the choice of payment mechanism at Cosetco

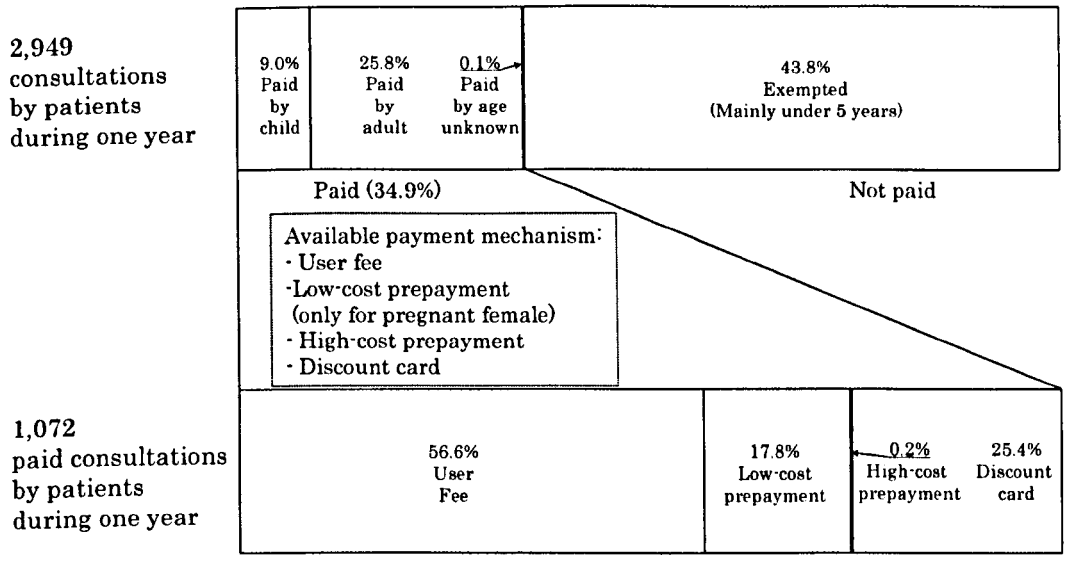

Figure 8.1f Map of the choice of payment mechanism at Mwekera

In Kitwe, user fees are chosen by the majority of outpatients at Chimwenwe. On the contrary, low-cost prepayment is chosen by the majority of outpatients at Cosetco. There is a great variation in payment choice between these two health centres, at which user fee and low-cost prepayment are mainly available for outpatients. At Mwekera, low-cost prepayment is available and compulsory only for pregnant females, and discount cards have been available as a direct payment option during the year of observation. Here, more outpatients chose to pay by user fee than by discount card, although the discount card share is substantial, about 25%. The shares for high-cost prepayment are negligible.

At Chimwenwe in Kitwe, the sale of discount cards was discontinued because of complaints from the catchment population as described in Chapter 5. They sold only discount cards for three months and only low-cost prepayment for nine months during the year of observation. Table 8.5 shows the choice of payment mechanism by newly registered outpatients by these spans.

Table 8.5 Choice of payment mechanism among newly registered patients at Chimwenwe during two periods (%)

Period	User fees	Low-cost prepayments	Discount cards	Total
01-Dec-98 to 31-Jan-99	87.7	n.a.	12.3	100.0
01-Feb-99 to 30-Nov-99	81.9	18.1	n.a.	100.0

n = 5, 290 Chi-square = 13.7 p = 0.000

More outpatients chose to pay by user fee when only discount card was available than when only low-cost prepayment was available, which is a statistically significant difference. This demonstrates the lower preference for discount cards at Chimwenwe as expressed by the complaints.

8.4 CHOICE OF PAYMENT MECHANISM AND FREQUENCY OF ATTENDANCES IN THE OUTPATIENT NEW ATTENDANCE BOOK

In this section, outpatients' choice of payment mechanism and frequency of attendance are analysed in order to test the hypotheses derived from theoretical models, employing the records in outpatient new attendance books.

Since the records at health centres do not contain the background of outpatients, such as income, perceived health status or perceived quality of health care, which are depicted in theoretical models, it is not feasible to test the hypotheses related to these factors. However, outpatients' frequency of attendance is observable by tracking outpatient registration numbers in the outpatient new attendance registry book at the four health centres which record all new episode consultations. And an indirect test of the utilisation model and the choice model is feasible using this

observation as argued below.

The hypothesis to be tested in this section is: outpatients' frequency of attendance differs according to the choice of payment mechanism. Outpatients who choose to pay by low-cost prepayment are likely to attend health centres more frequently than those who choose to pay by discount card, and those who choose to pay by discount card are likely to attend more frequently than those who choose to pay by user fee.

This hypothesis is directly predicted neither from the utilisation model nor the choice model, but is derived from both models.

The utilisation model predicts more frequent attendances by ill individuals who have already chosen discount card or low-cost prepayment before falling ill, than who choose to pay by user fee, since each individual faces different financial barriers to health care services ceteris paribus. As argued in section 7.5 in the previous chapter, a comparison between ill individuals who attend health centres and those who refrain from seeking health care services is needed in order to do a precise test of this hypothesis. Therefore, the observation of the frequency of attendances from the records at health centres is not appropriate for the precise test of this hypothesis, since no information about ill individuals who refrain from seeking health care services is available. Yet, from observing individuals' attendances in a certain period, it is likely that individuals who choose to pay by low-cost prepayment will attend health centres more frequently than those who choose to pay with discount card, and those who choose to pay by discount card are

likely to attend more frequently than those who choose to pay by user fee, since individuals face different financial barriers each time they fall ill. Therefore, the hypothesis to be tested in this section is considered to be a hypothesis derived from the utilisation model.

On the other hand, the choice model predicts that individuals who have low perceived health status are more likely to choose discount card or low-cost prepayment, expecting more frequent attendances at health centres due to their illness episodes. Therefore, if observing individuals' attendances in a certain period, it is likely that individuals who choose to pay by low-cost prepayment will attend health centres more frequently than those who choose to pay by discount card, and those who choose to pay by discount card will likely attend more frequently than those who choose to pay by user fee, since individuals face different financial barriers each time they fall ill. Therefore, the hypothesis to be tested in this section is considered to be a hypothesis derived from the choice model as well.

In short, both the utilisation model and the choice model predict the association between the choice of payment mechanism and the frequency of attendance. The difference in the prediction is the direction of causal relationship between the choice of payment mechanism and the frequency of attendance. In the utilisation model, the choice causes the difference in attendance. On the contrary, in the choice model, the difference in attendance, which depends on the difference in perceived health status, causes the choice.

In the analysis of the choice of payment mechanism and the frequency of attendance

observed in the records at health centres, these two types of differences predicted by the two models cannot be separated. In this sense, the test in this section is a precise test of neither the utilisation model nor the choice model. However, both models predict the same association between the choice of payment mechanism and the frequency of attendance. Therefore, it is reasonable to consider that positive results from the test of the derived hypothesis support both models, although the support is indirect.

Table 8.6 shows the distribution of outpatients' attendances by number during one year of observation at four health centres.

Table 8.6 Number of consultations by registered patients during one year (%)

		1	2	3	4	5 and more	Total
Lusaka	Kabwata	89.4	8.7	1.5	0.3	0.1	100.0
Kitwe	Chimwenwe	88.3	9.7	1.7	0.2	0.1	100.0
	Cosetco	86.5	9.6	3.1	0.9	0.0	100.0
	Mwekera excluding low-cost prepayments	78.7	12.6	4.7	2.0	2.0	100.0

At Mwekera in Kitwe, low-cost prepayment, which is available and compulsory only for pregnant females, is excluded. More than 10% of outpatients made multiple visits at the health centre in the year.

Outpatients are able to change their choice of payment mechanism each time they attend health centres, although it is prohibited to discontinue low-cost prepayment according to the regulations. Table 8.7 shows the change in the choice of payment mechanism among outpatients who attended health centres more than twice a year.

Table 8.7 Change of payment mechanism among patients with more than one consultation (%)

		Unchanged					Changed/final choice					Total
		User fees	Low-cost prepayments	High-cost prepayments	Discount cards	Total	User fees	Low-cost prepayments	High-cost prepayments	Discount cards	Total	
Lusaka	Kabwata	1.4	89.5	0.0	0.0	90.9	0.8	8.3	0.0	0.1	9.1	100.0
Kitwe	Chimwenwe	65.5	11.3	0.0	1.6	78.4	6.8	14.7	0.0	0.0	21.6	100.0
	Cosetco	0.0	93.5	0.0	n.a.	93.5	1.6	4.8	0.0	n.a.	6.5	100.0
	Mwekera excluding low-cost prepayments	52.0	n.a	0.0	30.7	82.7	8.7	n.a.	0.8	7.9	27.3	100.0

The majority of these outpatients, more than 80%, kept the same choice of payment mechanism through all their attendances. The rest of them changed their choice. It therefore appears that the choice of payment mechanism by outpatients is stable. Among outpatients who changed their payment mechanism, more changed to low-cost prepayments from the other options at Kabwata in Lusaka, and Chimwenwe and Cosetco in Kitwe. At Mwekera in Kitwe, more patients changed to user fees from discount cards.

Table 8.8a shows the average number of consultations for one year by the choice of payment mechanism.

Table 8.8a Average number of consultations by choice of payment mechanism

			Constant choice only			Final choice		
			Mean	S.D.	N	Mean	S.D.	N
Lusaka	Kabwata	User fees	1.01	0.11	1,410	1.02	0.13	1,419
		Discount cards	1.00	0.00	20	1.10	0.44	21
		Low-cost prepayments	1.13	0.42	9,606	1.15	0.44	9,704
			F = 60.4	p = 0.000		F = 60.0	p = 0.000	
Kitwe	Chimwenwe	User fees	1.11	0.38	4,589	1.12	0.40	4,635
		Discount cards	1.12	0.38	109	1.12	0.38	109
		Low-cost prepayments	1.10	0.38	900	1.23	0.54	999
			F = 0.22	p = 0.799		F = 23.0	p = 0.000	
	Cosetco	User fees	1.00	0.00	38	1.03	0.16	39
		Low-cost prepayments	1.19	0.52	416	1.20	0.53	419
			t = -7.38	p = 0.000		t =-4.72	p = 0.000	
	Mwekera excluding	User fees	1.22	0.58	436	1.29	0.74	453
	low-cost prepayments	Discount cards	1.60	1.30	138	1.75	1.44	150
			t = -3.33	p = 0.001		t = -3.74	p = 0.000	

The average number of attendances is divided into two categories: outpatients who do not change their choice of payment mechanism (constant choice), and all outpatients according to final choice. Observations according to the final choice are added because outpatients are considered to make a more informed choice about payment mechanisms after having several attendances, although they faced variable financial barriers upon previous attendances. In the observations of outpatients' final choice of payment mechanism, the differences in average numbers of attendances are consistent with the hypothesis at all four health centres with statistical significance. In the observation of outpatients with constant choice only, the differences in average numbers of attendances are consistent with the hypothesis at Cosetco and Mwekera in Kitwe with statistical significance. The differences are not consistent with the hypothesis at Chimwenwe in Kitwe, but the difference is statistically insignificant. The smallest average for the discount card among the three choices of payment mechanism at Kabwata in Lusaka is not consistent with the hypothesis, with statistical significance by one-way analysis of variance, but multiple comparisons by the Scheffe method prove that differences between the average among discount card payers and user fee payers, and between discount card payers and low-cost prepayment payers, are not statistically significant, and the difference between user fee payers and low-cost prepayment payers is statistically significant, as shown in Table 8.8b.

Table 8.8b Multiple comparisons of averages observing constant choice only at Kabwata by Scheffe method

		S.E.	p
User fees	Discount cards	0.0089	0.992
User fees	Low-cost prepayments	0.0011	0.000
Discount cards	Low-cost prepayments	0.0087	0.316

These results support the hypothesis.

8.5 RECORDS IN INDIVIDUAL'S OUTPATIENT BOOK

The individual's outpatient book is a medical record that records clinical information about an individual's illness episodes, such as complaints, symptoms, diagnosis, and treatment. An outpatient book is prepared for a newly registered outpatient at a health centre, who attends the health centre for the first time, and is stored in the registry after the outpatient has left the health centre. Every time the outpatient attends the health centre, his/her outpatient book is taken out and information on his/her new illness episode is written down.

The records of attendances in outpatient books are analysed in the following section.

8.6 CHOICE OF PAYMENT MECHANISM AND FREQUENCY OF ATTENDANCE IN INDIVIDUAL OUTPATIENT BOOK

In this section, outpatients' choice of payment mechanism and frequency of attendance are analysed in order to test the hypotheses derived from theoretical

models, employing the records in individuals' outpatient books.

Since it is not possible to track outpatients' attendances during the one year of observation at large health centres in Lusaka, individuals' outpatient books are investigated to examine the association between the choice of payment mechanism and the frequency of attendance at Chawama, one of the large health centres, where a comparison among three payment mechanisms is feasible, as described in Chapter 5.

According to the outpatient new attendance registry, 70 newly registered outpatients chose to pay by discount card (the least popular choice of payment mechanism) during the first four months of the observation, from October 1998 to January 1999. In order to make the comparison between the three payment mechanisms, 73 newly registered outpatients choosing to pay by user fee, and 70 by low-cost prepayment, are randomly sampled. And these 213 individuals' outpatient books are investigated to see the number of attendances in a full year for each individual after their registration, as described in Chapter 5.

Table 8.9 gives the average number of consultation during one year by payment mechanism at Chawama in Lusaka.

Table 8.9 Average number of consultations by choice of payment mechanism at Chawama

	Mean	S.D	N	No. of samples
User fees	1.07	0.26	29	73
Discount cards	1.34	0.68	35	70
Low-cost prepayments	1.40	1.33	30	70
F = 1.23 p = 0.298				

About half of sampled outpatients' outpatient books were available for examination, and the rest were missing from the registry. The differences in average numbers of attendances are consistent with the hypothesis, but this is not statistically significant with one-way analysis of variance.

8.7 SUMMARY

In summary, the analysis of records in the outpatients new attendance book and individual's outpatient book shows that the association between the frequency of attendance and the choice of payment mechanism indirectly support the prediction of utilisation model and choice model.

CHAPTER 9

RESULTS 4

RESULTS OF EMPIRICAL INVESTIGATION 3

ANALYSIS OF OUTPATIENT QUESTIONNAIRE SURVEY

9.1 INTRODUCTION

This chapter presents the results of the analysis of the third data source, outpatient questionnaire survey.

After a brief introduction of the outpatient questionnaire survey, three points are reported in this chapter. Firstly, outpatients' choices of payment mechanism at sampled health centres are examined. This is to form the basis for the analysis of the hypotheses derived from the choice model in this chapter. Secondly, scales measuring outpatients' perception of the quality of health care services provided at health centres are examined. These are to form the basis for the test of the choice model in the following section. Thirdly, the hypotheses derived from the choice model are tested. This is to show the effects of various factors on consumers' choice of payment mechanism. Specifically, the effects of factors such as perceived quality of care and expected number of attendances, of which information is lacking in the first and second data sources, are tested.

As discussed in the previous chapters, it is not possible to test the utilisation model with information only on outpatients actually attending health centres. Therefore, a test of the utilisation model is not carried out in this chapter.

9.2 OUTPATIENT QUESTIONNAIRE SURVEY

An outpatient questionnaire survey was carried out at six sampled health centres in two districts,in October 1999, which was in dry season, and in December 1999, which was in rainy season, following the protocol described in Chapter 5. At each health centre in each season, the survey is scheduled to obtain the calculated sample size, about 50 respondents. It took one day at health centres in Lusaka (Chipata, Kabwata, and Chawama), two days at a large health centre in Kitwe (Chimwenwe), and 10 days at small health centres in Kitwe (Cosetco and Mwekera).

All outpatients seen during consultation hours of the survey days who were subject to direct payments were asked to answer the questionnaire during the waiting time for their consultations. Outpatients who were either in too severe a condition for answering the questions or who refused to answer were not included. The numbers of non-respondents were also recorded in order to calculate response rates.

Table 9.1 shows the numbers of outpatients surveyed, the numbers of respondents by age group and by season, and the response rates at health centres.

Table 9.1 Number of outpatients surveyed

		Number of paying outpatients	Number of responding outpatients					Response Rate (%)
			Dry season		Rainy season		Total	
			Adults	Children	Adults	Children		
Lusaka	Chipata	194	88	5	67	5	165	85.1
	Kabwata	125	65	9	42	5	121	96.8
	Chawama	169	62	7	66	4	139	82.2
Kitwe	Chimwenwe	120	49	14	49	3	115	95.8
	Cosetco	109	56	1	51	1	109	100.0
	Mwekera	104	50	1	49	4	104	100.0

In Lusaka, at Chipata, 165 outpatients completed the questionnaire out of 194 outpatients who were supposed to pay, across both dry and rainy seasons; at Kabwata, 121 outpatients responded out of 125; and at Chawama, 139 outpatients responded out of 169. In Kitwe, at Chimwenwe, 115 outpatients responded out of 120; at Cosetco all 109 outpatients who were supposed to pay responded; and at Mwekera, all 104 outpatients responded. In total, at the six health centres, 753 patients responded out of 821; the overall response rate was 91.7%. This response rate is considered to be reasonably high for the tests of the choice model in this chapter.

As discussed in Chapter 5, the seasonality effect of higher morbidity in the rainy season than in the dry season in the field, which may affect one of the factors in testing the model (expected number of attendances), may cause a bias. Therefore, in order to minimise this bias, the responses from outpatients both in the dry season and the rainy season at each health centre are put together and analysed together, so that the results to be shown are concerning consumers' average behaviour in a year, which enables discussion on the equity consequences of alternative payment

mechanisms.

9.3 CHOICE OF PAYMENT MECHANISM

In this section, the choice of payment mechanism by outpatients is illustrated to form the basis for the test of hypotheses in the following sections.

Table 9.2 shows the percentages for the different payment mechanisms chosen by outpatients at health centres.

Table 9.2 Share of payment mechanisms (%)

		User fees	Low-cost prepayments	Discount cards	Unable to pay	Total
Lusaka	Chipata	10.9	85.5	n.a.	3.6	100.0
	Kabwata	7.4	90.1	n.a.	2.5	100.0
	Chawama	9.4	89.9	0.0	0.7	100.0
Kitwe	Chimwenwe	70.4	26.1	n.a.	3.5	100.0
	Cosetco	31.2	67.9	n.a.	0.9	100.0
	Mwekera	78.8	4.8	14.4	1.9	100.0
	Mwekera excluding low-cost prepayments	82.8	n.a.	15.1	2.0	100.0

In Lusaka, at Chipata, user fee and low-cost prepayment are available options for direct payment. 10.9% of outpatients chose to pay by user fee and 85.5% by low-cost prepayment. 3.6% of outpatients were exempted from direct payment because they were judged as unable to pay. At Kabwata, user fee and low-cost prepayment are available options for direct payment. 7.4% of outpatients chose to pay by user fee and 90.1% by low-cost prepayment. 2.5% of outpatients were exempted from direct payment because they were judged as unable to pay. At

Chawama, in addition to user fee and low-cost prepayment, discount card is an available option for direct payment. 9.4% of outpatients chose to pay by user fee and 89.9% by low-cost prepayment. No outpatients chose the discount card. 0.7% of outpatients were exempted from direct payment because they were judged as unable to pay.

In Kitwe, at Chimwenwe, user fee and low-cost prepayment are available options for direct payment. 70.4% of outpatients chose to pay by user fee and 26.1% by low-cost prepayment. 3.5% of outpatients were exempted from direct payment because they were judged as unable to pay. At Cosetco, user fee and low-cost prepayment are available options for direct payment. 31.2% of outpatients chose to pay by user fee and 67.9% by low-cost prepayment. 0.9% of outpatients were exempted from direct payment because they were judged as unable to pay. At Mwekera, user fee and discount card are available options for direct payment. In addition, low-cost prepayment is compulsory for pregnant cases. Among all payable outpatients including pregnant cases, 78.8% of outpatients chose to pay by user fee and 14.4% by discount card. 4.8%, all pregnant cases, paid by low-cost prepayment. 1.9% of outpatients were exempted from direct payment because they were judged as unable to pay. Since low-cost prepayment is compulsory for pregnant cases, female outpatients who are pregnant do not face a choice of payment mechanism. Therefore, the shares of payment mechanism excluding low-cost prepayment at Mwekera are also shown in Table 9.2. 82.8% of outpatients chose to pay by user fee, and 15.1% by discount card. 2.0% of outpatients were exempted from direct payment because they were judged as unable to pay.

These observed choices are consistent with the observation in the records shown in Tables 8.4a and 8.4b in the previous chapter. In Lusaka, the majority of outpatients, more than 85%, choose to pay by low-cost prepayment at the three health centres. Discount card, which is available in Chawama, is the least preferred choice among three options available; no choice of discount card was observed in this outpatient questionnaire survey. In Kitwe, the majority of outpatients choose to pay by user fees at Chimwenwe. On the contrary, the majority choose to pay by low-cost prepayment at Cosetco. The discount card available at Mwekera is a less popular choice than user fees, but a substantial proportion of outpatients choose to pay by discount card.

Three points in these results should be considered in order to test the hypotheses. Firstly, there are some outpatients who are exempted from direct payment since they are judged as unable to pay. They are excluded from the analysis for the test, since they do not face the choice of payment mechanism. Secondly, the choice of low-cost prepayment at Mwekera is compulsory for pregnant cases, and is not available for other outpatients. Outpatients who pay with low-cost prepayment are excluded from the analysis for the test, since low-cost prepayment is not chosen by them. Thirdly, no choice of discount card is observed at Chawama. This results from the low popularity of the discount card, that very few consumers choosing to pay by discount card attended the Chawama health centre on the survey day. This is a limitation of a cross-sectional survey, which observes consumers' behaviour on limited days only and therefore has difficulty in catching rare events. In order to obtain responses that enable the analysis of the choice of discount card, the period of the outpatient questionnaire survey were extended. However, as

shown in Figure 9.1, the sales of discount cards have dropped continuously from the beginning of the trial to the month of the outpatient survey in the dry season. No discount card was sold in October 1999.

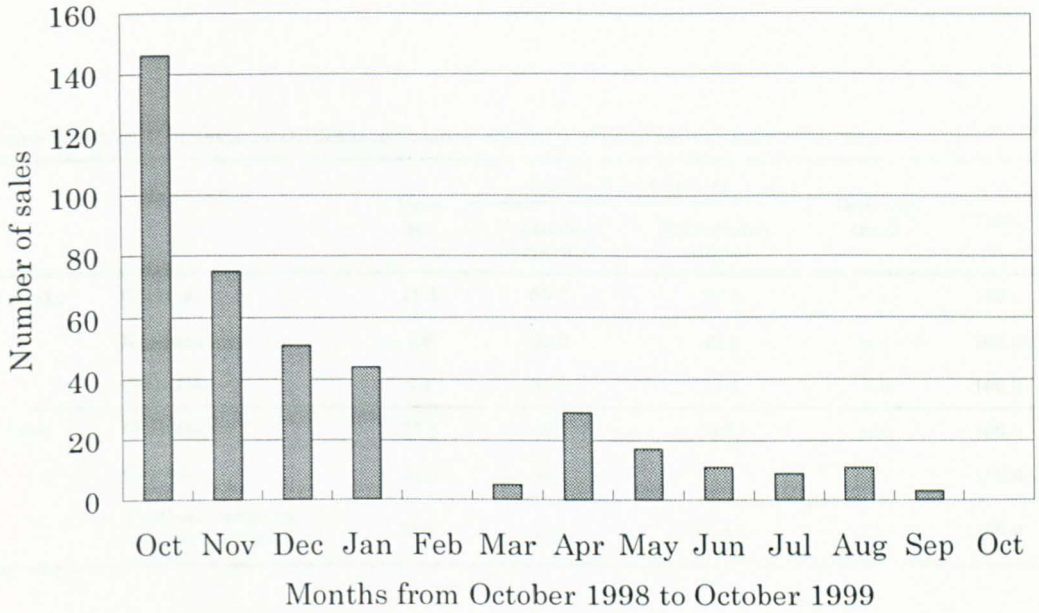

Figure 9.1 Sales of discount cards at Chawama

Taking this decreasing trend into account, the choice of discount cards for direct payment was available but almost neglected by outpatients at the time of the survey. Therefore, the choice between user fee and low-cost prepayment is considered as a real choice faced by outpatients in Chawama. For the test of the hypotheses in this chapter, the choice only between user fee and low-cost prepayment is analysed, and the reasons for the discount card's diminishing popularity will be discussed in the next chapter. The test related to the choice of discount card in this chapter is done with the data from Mwekera in Kitwe.

Among outpatients who choose to pay by low-cost prepayment, the distinction between continuous subscribers and subscription starters is explored in the questionnaire. Table 9.3 shows the share of payment mechanisms chosen by outpatients, taking the distinction between continuous subscribers and subscription starters into account, and excluding patients exempted due to inability to pay.

Table 9.3 Share of payment mechanisms considering continuity of prepayment subscription (%)

		User fees	Low-cost prepayments		Discount cards	Total
			Continuous subscriber	Subscription starter		
Lusaka	Chipata	11.3	50.3	38.4	n.a.	100.0
	Kabwata	7.6	50.0	42.4	n.a.	100.0
	Chawama	9.4	31.2	59.4	0.0	100.0
Kitwe	Chimwenwe	73.0	26.1	0.9	n.a.	100.0
	Cosetco	31.5	63.9	4.6	n.a.	100.0
	Mwekera excluding low-cost prepayments	84.5	n.a.	n.a.	15.5	100.0

In Lusaka, at Chawama, 11.3% of outpatients who pay by direct payment choose to pay by user fee, 50.3% by continuous subscription to low-cost prepayment, and 38.4% by newly subscribed low-cost prepayment. At Kabwata, 7.6% of outpatients who pay by direct payment choose to pay by user fee, 50.0% by continuously subscribed low-cost prepayment, and 42.4% by newly subscribed low-cost prepayment. At Chawama, 9.4% of outpatients who pay by direct payment choose to pay by user fee, 31.2% by continuously subscribed low-cost prepayment, and 59.4% by newly subscribed low-cost prepayment.

In Kitwe, at Chimwenwe, 73.0% of outpatients who pay by direct payment choose to pay by user fee, 26.1% by continuously subscribed low-cost prepayment, and 0.9%

by newly subscribed low-cost prepayment. At Cosetco, 31.5% of outpatients who pay by direct payment choose to pay by user fee, 63.9% by continuously subscribed low-cost prepayment, and 4.6% by newly subscribed low-cost prepayment. At Mwekera, 84.5% of outpatients who pay by direct payment choose to pay by user fee, and 15.5% by discount card.

The large proportions of subscription starters at the three health centres in Lusaka suggest that low-cost prepayment is regarded by many here as a low price user fee with a 24-hour waiting time. On the contrary, the small proportions of subscription starters at Chimwenwe and at Cosetco suggest that such inappropriate use of low-cost prepayment is negligible at these health centres.

Since low-cost prepayment is supposed to be renewed after twelve months of continuous subscription, the average number of months of continuous subscription is expected to be six, assuming the randomness of the start of subscription by outpatients.

Table 9.4 shows the average number of months of continuous subscription to low-cost prepayment.

Table 9.4 Average months of continuous subscription of low-cost prepayment

		Mean	S.D.	N
Lusaka	Chipata	4.29	3.40	80
	Kabwata	6.42	4.31	59
	Chawama	5.19	4.03	42
Kitwe	Chimwenwe	6.66	3.60	29
	Cosetco	7.64	3.65	69

In Lusaka, at Chipata, the average number of months of low-cost prepayment subscription by continuous subscribers is 4.29. At Kabwata, the average is 6.42 months. At Chawama, it is 5.19. In Kitwe, at Chimwenwe, the average number of months is 6.66. At Cosetco, it is 7.64. These observed averages are considered to suggest that outpatients classified as continuous subscribers in this survey actually pay a monthly premium up to twelve months.

9.4 SCALES OF PERCEIVED QUALITY OF CARE

In this section, the responses to questions on perceived quality of care are analysed before hypothesis is tested in the following sections.

Quality of care in health care often refers to consumers' perceptions of provider-patient relationship in terms of the outcome effects of health care on health status (Folland et al., 2001). It has a multidimensional nature, for example, Donabedian (1980) defined quality of care along three stages of health care: structure, process, and outcome. In this study, drug availability (one of the most commonly discussed aspects of quality of care in the context of health financing policy in developing countries) is explicitly picked up in the theoretical modelling in Chapter 6, and the other aspects of perceived quality of care are examined separately in the following analysis.

Six dimensions of perceived quality of care identified in a previous study in the field (Atkinson et al., 1996) are included in the questionnaire. These dimensions are: drug availability, structural aspects, staff behaviour, organisational aspects,

technical care provided, and convenience. Outpatients' grading of these six dimensions is asked using practical, simple questions, which allow four levels of grading by the respondents. (The questionnaire is shown in Appendix 3.) In the examination, points, on an ordinal scale, are assigned to each grading category in the responses to each question, and rank correlations among the six dimensions are examined.

Table 9.5 shows a rank correlation matrix of the six dimensions of perceived quality of care.

Table 9.5 Rank correlation matrix among 6 dimensions of perceived quality of care

	D1	D2	D3	D4	D5	D6
Drug availability (D1)	1.0000					
Structural aspects (D2)	0.2450	1.0000				
Staff behaviour (D3)	0.2861	0.0759	1.0000			
Organisational aspects (D4)	0.2039	0.1266	0.1560	1.0000		
Technical care provided (D5)	0.1108	0.1275	0.4335	-0.0121	1.0000	
Convenience (D6)	0.1075	0.0039	0.1468	0.1284	-0.0283	1.0000

All correlation coefficients are less than 0.5, which suggests the six dimensions are independent rather than internally consistent. Therefore, each dimension needs to be treated separately.

9.5 TEST OF THE CHOICE MODEL

In this section, in order to test the hypotheses derived from the choice model, outpatients' choice of payment mechanism, and the significance of income, expected

number of attendances, household size, perceived quality of care and household on the choice, are analysed.

The hypotheses to be tested in this section are as described below. Income affects a consumer's choice of alternative payment mechanisms. The preference in terms of decreasing income is: voluntary prepayment or discount card are preferred less than user fee. Household size affects a consumer's choice of alternative payment mechanisms. The preference in terms of decreasing size of household is: voluntary prepayment is preferred more than user fee, and discount card is preferred less than user fee. The expected number of attendances affects a consumer's choice of alternative payment mechanisms. The preference in terms of decreasing expected number of attendances is: voluntary prepayment or discount card are preferred less than user fee. Perceived quality of care affects a consumer's choice of alternative payment mechanisms. The preference in terms of decreasing level of perceived quality of care is: voluntary prepayment or discount card are preferred less than user fee.

The choice model produces hypotheses comparing voluntary prepayment and discount cards in addition to the above. Yet they are not tested in this section, since consumers' choice of payment mechanism between voluntary prepayment and discount cards could not be observed in the field at the time of this outpatient questionnaire survey, as discussed in the previous section. At the time of this survey, after one year of discount card trial, a choice between discount card and voluntary prepayment was not offered to consumers except at Chawama in Lusaka, and the choice of discount card over voluntary prepayment has become almost

negligible even there.

The observations of outpatients' choice of voluntary prepayment have a problem, which contradicts with one of the fundamental assumptions in the choice model. As shown in Table 9.3 and argued in the previous section, subscription starters of low-cost prepayment in Lusaka are thought to choose low-cost prepayment as a lower user fee with a 24-hour delay. They are considered to refrain from continuous payment of premiums after their current illness episode. Therefore, in the following test of the choice model, the choice by subscription starters of low-cost prepayment is regarded as a choice of user fee. However, the proportion of subscription starters of low-cost prepayment in Kitwe is small enough to consider that they happen to start or renew the subscription of low-cost prepayment upon their current illness episode, and they are considered to become continuous subscribers. Therefore, all observed choices of low-cost prepayment in Kitwe are analysed as they are.

9.5.1 UNIVARIATE ANALYSIS OF OUTPATIENT'S CHOICE PAYMENT MECHANISM

Tables 9.6 and 9.7 show the background of outpatients by choice of payment mechanism. Table 9.6 shows average household income per head by choice of payment mechanism.

Table 9.6 Average household income per head by payment mechanism (K)

			Mean	S.D.	N
Lusaka	Chipata	User fees	33,483	48,371	79
		Low-cost prepayments	32,090	42,486	80
		All	32,782	45,366	159
t = 0.19 p = 0.847					
	Kabwata	User fees	75,778	109,737	59
		Low-cost prepayments	81,533	71,261	59
		All	78,656	92,170	118
t = -0.34 p = 0.736					
	Chawama	User fees	71,998	121,777	95
		Low-cost prepayments	40,381	37,317	43
		All	62,147	104,010	138
t = 2.30 p = 0.023					
Kitwe	Chimwenwe	User fees	62,559	96,157	81
		Low-cost prepayments	48,866	58,769	30
		All	58,858	87,592	111
t = 0.73 p = 0.467					
	Cosetco	User fees	27,225	38,189	34
		Low-cost prepayments	59,511	80,983	74
		All	49.347	71,771	108
t = -2.82 p = 0.006					
	Mwekera	User fees	56,971	91,217	82
		Discount cards	67,292	86,672	15
		All	58,567	90,167	97
t = -0.41 p = 0.686					

In Lusaka, at Chipata, the average household income per head among outpatients who choose to pay by user fee is K 33,483, and the average among those who pay by low-cost prepayment is K 32,090. At Kabwata, the average among outpatients who choose to pay by user fee is K 75,778, and that among those who pay by low-cost prepayment is K 81,533. At Chawama, the average among outpatients who pay by user fee is K 71,998, and among those choosing to pay by low-cost prepayment it is K 40,381.

In Kitwe, at Chimwenwe, the average household income per head among outpatients who choose to pay by user fee is K 62,559, and the average among those who choose to pay by low-cost prepayment is K 48,866. At Cosetco, the average among outpatients who choose to pay by user fee is K 27,225, and among those who pay by low-cost prepayment it is K 59,511. At Mwekera, the average among outpatients who choose to pay by user fee is K 56,971, and among those choosing to pay by discount cards it is K 67,292.

According to the prediction of the choice model, higher averages among outpatients who choose to pay by low-cost prepayment or discount card than among outpatients who choose to pay by user fee are expected. The expected higher averages among those who pay by low-cost prepayment or discount card are observed at three health centres: Kabwata, Cosetco, and Mwekera. The difference in the average at Cosetco is statistically significant with a t-test for two independent samples. At the other three health centres, Chipata, Chawama, and Chimwenwe, higher averages among those who pay by user fee are observed, which contradicts with the prediction of the choice model. The difference in the average at Chawama is statistically significant with a t-test. These contradictions can be explained by an interpretation of the choice model whereby the effects of the factors other than income, such as expected number of attendances, perceived quality of care or household size, are strong enough to conceal the effects of income. This interpretation will be tested after the examination of outpatients' backgrounds, employing the estimation of logit model incorporating these factors simultaneously.

Table 9.7 shows the average number of expected attendances by choice of payment

mechanism.

Table 9.7 Average of expected attendances by payment mechanism

			Mean	S.D.	N
Lusaka	Chipata	User fees	7.2	14.2	75
		Low-cost prepayments	18.1	21.1	79
		All	12.8	18.8	154
t = -3.77 p = 0.000					
	Kabwata	User fees	7.6	12.4	57
		Low-cost prepayments	10.6	15.1	59
		All	9.1	13.8	116
t = -1.19 p = 0.239					
	Chawama	User fees	6.0	12.3	91
		Low-cost prepayments	19.1	22.0	43
		All	10.2	17.1	134
t = -3.65 p = 0.001					
Kitwe	Chimwenwe	User fees	6.3	10.6	81
		Low-cost prepayments	12.1	12.9	30
		All	7.9	11.5	111
t = -2.40 p = 0.018					
	Cosetco	User fees	6.0	9.2	34
		Low-cost prepayments	11.4	14.5	74
		All	9.7	13.3	108
t = -2.36 p = 0.020					
	Mwekera	User fees	9.8	13.5	82
		Discount cards	9.7	8.4	15
		All	9.8	12.8	97
t = 0.02 p = 0.984					

In Lusaka, at Chipata, the average number of expected attendances among outpatients who choose to pay by user fee is 7.2, and the average among those who pay by low-cost prepayment is 18.1. At Kabwata, the average among outpatients who choose to pay by user fee is 7.6, and among those choosing to pay by low-cost prepayment, it is 10.6. At Chawama, the average among outpatients choosing to pay by user fee is 6.0, and among those who pay by low-cost prepayment, it is 19.1.

In Kitwe, at Chimwenwe, the average number of expected attendances among outpatients who choose to pay by user fee is 6.3, and the average among those who choose low-cost prepayment is 12.1. At Cosetco, the average among outpatients choosing to pay by user fee is 6.0, and among outpatients who choose to pay by low-cost prepayment, it is 11.4. At Mwekera, the average among outpatients choosing to pay by user fee is 9.8, and among outpatients choosing discount cards, it is 9.7.

According to the prediction of the choice model, higher averages among outpatients who choose payment by low-cost prepayment or discount card than among outpatients who choose to pay by user fee are expected. The expected higher averages among those choosing low-cost prepayment or discount card are observed at all five health centres where low-cost prepayment is available: Chipata, Kabwata, Chawama, Chimwenwe, and Cosetco. The differences in the average at Chipata, Chawama, Chimwenwe, and Cosetco are statistically significant with a t-test for two independent samples. At Mwekera, where a discount card is available, there is a higher average among those choosing payment by user fee, which contradicts with the prediction of the choice model. These findings are considered to support the predicted effect of expected number of attendances on the choice of low-cost prepayment. Yet, the difference in the average at Mwekera is not statistically significant with a t-test. These contradictions can be explained by an interpretation of the choice model whereby the effects of the factors other than expected number of attendances, such as income, perceived quality of care or household size, are strong enough to conceal the effects of the expected number of attendances. This interpretation will be tested later through the estimation of

logit model incorporating these factors simultaneously.

Table 9.8 shows the average points of perceived quality of care scales in six dimensions by the choice of payment mechanism.

Table 9.8 Average of perceived quality of care scale by dimension by payment mechanism

			Drug availability (D1)		Structural aspects (D2)		Staff behaviour (D3)	
			Mean	S.D.	Mean	S.D.	Mean	S.D.
Lusaka	Chipata	User fees	2.13	1.08	2.32	0.71	2.89	0.95
		Low-cost prepayments	1.80	0.97	2.29	0.83	2.93	0.94
		All	1.96	1.04	2.30	0.77	2.91	0.94
			t = 2.005	p = 0.047	t = 0.237	p = 0.813	t = -0.260	p = 0.795
	Kabwata	User fees	2.15	1.01	1.85	0.74	3.05	0.78
		Low-cost prepayments	1.85	0.93	1.88	0.77	2.90	1.00
		All	2.00	0.98	1.86	0.75	2.97	0.89
			t = 1.707	p = 0.090	t = -0.224	p = 0.807	t = 0.929	p = 0.355
	Chawama	User fees	2.18	0.90	2.46	0.76	2.86	0.87
		Low-cost prepayments	1.58	0.59	1.98	0.80	2.65	1.11
		All	1.99	0.86	2.31	0.80	2.80	0.95
			t = 3.987	p = 0.000	t = 0.3438	p = 0.001	t = 1.108	p = 0.272
Kitwe	Chimwenwe	User fees	1.78	0.84	2.09	0.48	2.77	0.53
		Low-cost prepayments	1.77	0.68	2.00	0.26	2.80	0.48
		All	1.77	0.79	2.06	0.43	2.77	0.52
			t = 0.065	p = 0.948	t = 1.206	p = 0.231	t = -0.312	p = 0.756
	Cosetco	User fees	2.79	0.77	1.91	0.62	2.91	0.38
		Low-cost prepayments	2.69	0.91	1.86	0.58	3.09	0.60
		All	2.72	0.86	1.88	0.59	3.04	0.55
			t = 0.585	p = 0.560	t = 0.381	p = 0.704	t = -1.917	p = 0.058
	Mwekera	User fees	2.39	0.84	1.93	0.70	3.33	0.67
		Discount cards	2.67	1.05	1.93	0.70	3.20	0.68
		All	2.43	0.88	1.93	0.70	3.31	0.67
			t = -1.124	p = 0.264	t = -0.033	p = 0.974	t = 0.688	p = 0.493

Table 9.8 Average of perceived quality of care scale by dimension by payment mechanism - continued

			Organisational aspects (D4)		Technical care provided (D5)		Convenience (D6)		N
			Mean	S.D.	Mean	S.D.	Mean	S.D.	
Lusaka	Chipata	User fees	2.33	0.84	3.43	0.59	2.32	0.98	79
		Low-cost prepayments	2.35	0.80	3.53	0.66	2.35	1.13	80
		All	2.34	0.82	3.48	0.63	2.33	1.05	159
			t = -0.161	p = 0.873	t = -0.955	p = 0.341	t = -0.200	p = 0.842	
	Kabwata	User fees	2.29	0.85	3.15	0.64	2.61	0.81	59
		Low-cost prepayments	2.14	0.90	3.19	0.86	2.90	0.89	59
		All	2.21	0.88	3.17	0.76	2.75	0.86	118
			t = 0.946	p = 0.346	t = -0.243	p = 0.808	t = -1.845	p = 0.068	
	Chawama	User fees	2.24	0.77	3.16	0.64	2.61	0.82	95
		Low-cost prepayments	1.98	0.96	3.35	0.92	2.42	1.10	43
		All	2.16	0.84	3.22	0.74	2.55	0.91	138
			t = 1.592	p = 0.116	t = - 1.229	p = 0.224	t = 1.027	p = 0.308	
Kitwe	Chimwenwe	User fees	2.47	0.57	2.91	0.36	2.80	0.58	81
		Low-cost prepayments	2.43	0.50	2.87	0.43	2.80	0.76	30
		All	2.46	0.55	2.90	0.38	2.80	0.63	111
			t = 0.302	p = 0.703	t = 0.575	p = 0.556	t = 0.018	p = 0.985	
	Cosetco	User fees	2.53	0.66	3.00	0.25	2.71	0.84	34
		Low-cost prepayments	2.49	0.75	3.08	0.43	3.07	0.93	74
		All	2.50	0.72	3.06	0.38	2.95	0.91	108
			t = 0.288	p = 0.774	t = -1.239	p = 0.218	t = -1.941	p = 0.055	
	Mwekera	User fees	2.38	0.71	3.30	0.51	2.93	1.00	82
		Discount cards	2.60	0.63	3.20	0.78	3.60	0.51	15
		All	2.41	0.70	3.29	0.56	3.03	0.97	97
			t = -1.125	p = 0.263	t = 0.667	p = 0.506	t = -2.532	p = 0.013	

In Lusaka, at Chipata, the average points of the drug availability scale (D1) and structural aspects scale (D2) among outpatients who choose to pay by user fee are larger than the average points among outpatients choosing to pay by low-cost prepayment. And, the average points of the staff behaviour scale (D3), organisational aspects scale (D4), technical care provided scale (D5), and convenience scale (D6) among outpatients who choose to pay by user fee are smaller than the average points among outpatients choosing to pay by low-cost prepayment.

The difference in D1 alone is statistically significant in a t-test for two independent samples. At Kabwata, the average points of scales D1, D3 and D4 among outpatients who choose to pay by user fee are larger than the average points among those choosing to pay by low-cost prepayment. And, the average points of scales D2, D5, and D6 among outpatients choosing to pay by user fee are smaller than the average points among outpatients who choose low-cost prepayment. The difference in D1 alone is statistically significant in a t-test. At Chawama, the average points of D1, D2, D3, D4, and D6 among outpatients who choose to pay by user fee are larger than the average points among those choosing low-cost prepayment. And, the average point of D5 among outpatients choosing to pay by user fee is smaller than the average point among those choosing to pay by low-cost prepayment. The difference in D1 alone is statistically significant in a t-test.

In Kitwe, at Chimwenwe, the average points of D1, D2, D4 and D5 among outpatients choosing to pay by user fee are larger than the average points among those choosing low-cost prepayment. And, the average point of D2 among outpatients choosing payment by user fee is smaller than the average point among outpatients choosing payment by low-cost prepayment. The average points of D6 are almost the same. There is no statistically significant difference in all six dimensions. At Cosetco, the average points of D1, D2, and D4 among outpatients choosing payment by user fee are larger than the average points among outpatients choosing low-cost prepayment. And, the average points of D3, D5, and D6 among outpatients choosing payment by user fee are smaller than the average points among outpatients who choose low-cost prepayment. There is no statistically significant difference in all six dimensions. At Mwekera, the average points of D3

and D5 among outpatients who choose payment by user fee are larger than the average points among those who choose to pay by discount card. And, the average points of D1, D4, and D6 among outpatients choosing payment by user fee are smaller than the average points among those who choose to pay by discount card. The average points of D2 are almost the same. The difference in D6 alone is statistically significant in a t-test.

According to the prediction of the choice model, average numbers of points are expected to be higher in all six dimensions among outpatients who choose to pay by low-cost prepayment or discount card than among outpatients who choose to pay by user fee. Among the statistically significant differences, the expected higher average points among those choosing a discount card is only observed in D6 at Mwekera. Instead, lower average points among those who choose low-cost prepayment are observed in D1 at all three health centres in Lusaka. These contradict the prediction.

Taking the statistically insignificant differences into account, the average points in D1 among outpatients who choose to pay by user fee are larger than the average points among outpatients choosing to pay by low-cost prepayment, regardless of the size of health centres, in both districts. Yet, at Mwekera, the average points in D1 among outpatients who choose to pay by user fee are larger than the average points among outpatients choosing payment by discount card. There is no remarkable regularity in the observed differences in D2, D3, D4, D5, and D6 at all health centres.

Although the observed contradiction in regards to D1 between user fee and low-cost prepayment can be explained by an interpretation of the choice model, whereby the effects of the factors other than perceived quality of care (such as income, expected number of attendances, or household size) are strong enough to conceal the effects of perceived quality of care, consistent contradictions are considered to suggest that the predicted effect of perceived quality of care on the choice of low-cost prepayment is rejected. This interpretation will be tested later through the estimation of logit model incorporating these factors simultaneously.

Table 9.9 shows averages of household size by choice of payment mechanism.

Table 9.9 Average of household size by payment mechanism

			Mean	S.D.	N
Lusaka	Chipata	User fees	3.3	1.8	79
		Low-cost prepayments	3.1	1.8	80
		All	3.2	1.8	159
t = 0.54 p = 0.591					
	Kabwata	User fees	4.0	2.3	59
		Low-cost prepayments	3.3	1.9	59
		All	3.6	2.1	118
t = 1.93 p = 0.056					
	Chawama	User fees	2.9	1.6	95
		Low-cost prepayments	3.1	1.9	43
		All	3.0	1.7	138
t = -0.44 p = 0.664					
Kitwe	Chimwenwe	User fees	3.1	1.6	81
		Low-cost prepayments	3.5	2.0	30
		All	3.2	1.8	111
t = -1.01 p = 0.315					
	Cosetco	User fees	2.7	1.3	34
		Low-cost prepayments	2.5	1.5	74
		All	2.6	1.4	108
t = 0.61 p = 0.544					
	Mwekera	User fees	2.8	1.3	82
		Discount cards	3.5	1.9	15
		All	2.9	1.5	97
t = -1.50 p = 0.151					

In Lusaka, at Chipata, the average household size among outpatients who choose to pay by user fee is 3.3, and that among those who choose low-cost prepayment is 3.1. At Kabwata, the average among outpatients who choose payment by user fee is 4.0, and that among those who choose low-cost prepayment is 3.3. At Chawama, the average among outpatients who choose to pay by user fee is 2.9, and that among those who choose low-cost prepayment is 3.1.

In Kitwe, at Chimwenwe, the average household size among outpatients choosing to

pay by user fee is 3.1, and that among those who choose low-cost prepayment is 3.5. At Cosetco, the average among outpatients choosing to pay by user fee is 2.7, and that among those who choose low-cost prepayment is 2.5. At Mwekera, the average among outpatients choosing to pay by user fee is 2.8, and that among those who choose discount cards is 3.5.

According to the prediction of the choice model, lower averages among outpatients who choose to pay by low-cost prepayment than among those who choose to pay by user fee are expected. The expected lower averages among those choosing low-cost prepayment are observed at three health centres where this method is available: Chipata, Kabwata, and Cosetco. Yet, the differences in the average at these three health centres are not statistically significant with a t-test for two independent samples. At the other two health centres where low-cost prepayment is available, Chawama and Chimwenwe, lower averages among those paying by user fee are observed, which contradicts with the prediction of the choice model. Yet, the differences in the average at these two health centres are not statistically significant with a t-test. According to the prediction of the choice model, higher averages among outpatients who choose to pay by discount card than among outpatients choosing to pay by user fee are expected. The expected higher average among those who pay by discount card is observed in Mwekera. Yet, the difference in the average is not statistically significant.

The contradictions at Chawama and Chimwenwe can be explained by an interpretation of the choice model whereby the effects of the factors other than household size, such as income, expected number of attendances or perceived

quality of care, are strong enough to conceal the effects of household size. This interpretation will be tested later through the estimation of logit model incorporating these factors simultaneously.

9.5.2 SIMULTANEOUS ESTIMATION OF LOGIT MODEL FOR THE CHOICE OF PAYMENT MECHANISM

Tables 9.10a and 9.10b show the results of the estimation of logit model for the effects of factors such as income, expected numbers of attendances, perceived quality of care and household size on the choice of payment mechanism between user fee and low-cost prepayment in each district. As a variable of covariance representing perceived quality of care, six scales – perceived drug availability, structural aspects, staff behaviour, organisational aspects, technical care provided and convenience – are employed separately and all at the same time. Since child outpatients, aged from 6 to 15, and adult patients, aged from 16 to 64, face different fee levels, a dummy variable representing the age group of outpatients is incorporated in each model.

Table 9.10a shows the results in Lusaka.

Table 9.10a Estimation of logit model in Lusaka: outpatient's choice of payment mechanism

	Lusaka model D1		Lusaka model D2		Lusaka model D3		Lusaka model D4	
	Slope	(t)	Slope	(t)	Slope	(t)	Slope	(t)
Income (10^4)	-6.53×10^{-3}	(-1.65)	-6.48×10^{-3}	(-1.68)	-6.66×10^{-3}	(-1.74)	-6.64×10^{-3}	(-1.73)
Expecting attendance	7.62×10^{-3}	(4.47)**	7.78×10^{-3}	(4.62)**	7.73×10^{-3}	(4.58)**	7.77×10^{-3}	(4.62)**
Drug availability (D1)	-1.05×10^{-1}	(-3.65)**						
Structural aspects (D2)			-4.38×10^{-2}	(-1.23)				
Staff behaviour (D3)					-4.38×10^{-4}	(-0.02)		
Organisational aspects (D4)							-2.68×10^{-2}	(-0.86)
Technical care provided (D5)								
Convenience (D6)								
Household size	-2.75×10^{-2}	(-1.82)	-2.68×10^{-2}	(-1.81)	-2.76×10^{-2}	(-1.87)	-2.76×10^{-2}	(-1.86)
Age group	2.93×10^{-1}	(4.09)**	2.95×10^{-1}	(4.12)**	2.90×10^{-1}	(3.99)**	2.90×10^{-1}	(4.00)**
Health centre size	-1.68×10^{-1}	(-2.71)**	-1.43×10^{-1}	(-2.29)*	-1.61×10^{-1}	(-2.66)**	-1.60×10^{-1}	(-2.65)**
Season	-9.40×10^{-2}	(-1.72)	-7.92×10^{-2}	(-1.41)	-9.85×10^{-2}	(-1.83)	-9.20×10^{-2}	(-1.69)
Constant	3.07×10^{-2}		-1.09×10^{-1}		-1.69×10^{-1}		-1.14×10^{-1}	
N = 404	ln L = -245.4		ln L = -251.7		ln L = -252.4		ln L = -252.1	

* $p < 0.05$, ** $p < 0.01$

Table 9.10a Estimation of logit model in Lusaka: outpatient's choice of payment mechanism - continued

	Lusaka model D5		Lusaka model D6		Lusaka model All		
	Slope	(t)	Slope	(t)	Slope	(t)	Mean of variable
Income (10^4)	-6.16×10^{-3}	(-1.60)	-6.66×10^{-3}	(-1.74)	-5.76×10^{-3}	(-1.42)	5.65
Expecting attendance	8.08×10^{-3}	(4.72)**	7.73×10^{-3}	(4.60)**	7.96×10^{-3}	(4.57)**	10.88
Drug availability (D1)					-1.16×10^{-1}	(-3.52)**	1.98
Structural aspects (D2)					$2.72.\times10^{-3}$	(-0.07)	2.17
Staff behaviour (D3)					-8.53×10^{-3}	(-0.25)	2.90
Organisational aspects (D4)					-5.55×10^{-4}	(-0.02)	2.25
Technical care provided (D5)	8.78×10^{-2}	(2.28)*			1.15×10^{-1}	(2.55)*	3.32
Convenience (D6)			1.88×10^{-2}	(0.07)	1.45×10^{-2}	(0.51)	2.53
Household size	-2.48×10^{-2}	(-1.67)	2.90×10^{-2}	(3.99)	-2.39×10^{-2}	(-1.56)	3.26
Age group	2.99×10^{-1}	(4.23)**	2.90×10^{-1}	(3.99)**	3.05×10^{-1}	(4.41)**	0.92
Health centre size	-1.77×10^{-1}	(-2.90)**	-1.60×10^{-1}	(-2.62)**	-1.86×10^{-1}	(-2.82)**	0.71
Season	-1.07×10^{-1}	(-1.98)*	-9.87×10^{-2}	(-1.84)	-1.07×10^{-1}	(-1.84)	0.45
Constant	-4.75×10^{-1}		-1.76×10^{-1}		-3.64×10^{-1}		
	ln L = -249.8		ln L = -252.4		ln L = -241.3		

The slopes for income are consistently negative in all the seven models. This means outpatients with low income are more likely to choose to pay by low-cost prepayment ceteris paribus. This contradicts with the prediction of the choice model, but these parameters are not statistically significant. The slopes for expected number of attendances are positive, with statistical significance by t-tests, consistently in all the seven models. This means outpatients expecting frequent attendances are more likely to choose to pay by low-cost prepayment. These findings support the prediction of the choice model. With regard to the slopes for the perceived quality of care scales, the slope of the drug availability scale (D1) is negative, with statistical significance, and that of technical care provided (D5) is positive, with statistical significance. The former means outpatients with low perceived quality of care are more likely to choose to pay by low-cost prepayment. This contradicts with the prediction of the choice model. On the contrary, the latter means outpatients with high perceived quality of care are more likely to choose to pay by low-cost prepayment. This supports the prediction of the choice model. Put D1 and D5 aside, the slopes of D2, D3 and D4 are negative, and D6 is positive, in the separate models. The slope of D2 in the all-in-one model is positive, however. But these are statistically insignificant and considered to have little implication. The slopes for household size are negative. This means outpatients with small household size are more likely to choose to pay by low-cost prepayment. This supports the prediction of the choice model, but these parameters are not statistically significant.

With regard to controlling variables, which are not incorporated in the theoretical models, the slopes for the dummy variable representing age group suggest stronger

preference for low-cost prepayment among adult outpatients than among child outpatients, with statistical significance. The slopes for the dummy variable representing health centre size suggest stronger preference for low-cost prepayment at small health centres than at large health centres, with statistical significance. The slopes for the dummy variable representing season are statistically insignificant except for model D5. These findings suggest that the age group of outpatients and health centre size may have implications beyond the theoretical models.

Table 9.10b shows the results in Kitwe.

Table 9.10b Estimation of logit model in Kitwe: outpatient's choice of payment mechanism

	Kitwe model D1		Kitwe model D2		Kitwe model D3		Kitwe model D4	
	Slope	(t)	Slope	(t)	Slope	(t)	Slope	(t)
Income (10^4)	4.26×10^{-3}	(0.85)	4.45×10^{-3}	(0.88)	4.62×10^{-3}	(0.92)	4.22×10^{-3}	(0.84)
Expecting attendance	9.62×10^{-3}	(2.55)*	9.86×10^{-3}	(2.59)**	9.72×10^{-3}	(2.59)**	9.56×10^{-3}	(2.56)*
Drug availability (D1)	5.68×10^{-3}	(0.12)						
Structural aspects (D2)			3.59×10^{-2}	(0.46)				
Staff behaviour (D3)					1.16×10^{-1}	(1.39)		
Organisational aspects (D4)							1.64×10^{-3}	(0.03)
Technical care provided (D5)								
Convenience (D6)								
Household size	1.34×10^{-2}	(0.52)	1.37×10^{-2}	(0.53)	1.51×10^{-2}	(0.58)	1.35×10^{-2}	(0.52)
Age group	4.19×10^{-1}	(4.54)**	4.23×10^{-1}	(4.69)**	4.05×10^{-1}	(3.99)**	4.19×10^{-1}	(4.55)**
Health centre size	-4.23×10^{-1}	(-5.36)**	-4.33×10^{-1}	(-6.17)**	-4.11×10^{-1}	(-5.76)**	-4.27×10^{-1}	(-6.17)**
Season	-2.10×10^{-1}	(-2.70)**	-2.15×10^{-1}	(-2.75)**	-1.98×10^{-1}	(-2.53)*	-2.09×10^{-1}	(-2.70)**
Constant	-4.29×10^{-1}		-4.94×10^{-1}		-7.39×10^{-1}		-4.18×10^{-1}	
N = 215	ln L = -116.0		ln L = -115.9		ln L = -115.0		ln L = -116.0	

* $p < 0.05$, ** $p < 0.01$

Table 9.10b Estimation of logit model in Kitwe: outpatient's choice of payment mechanism - continued

	Kitwe model D5		Kitwe model D6		Kitwe model All		
	Slope	(t)	Slope	(t)	Slope	(t)	Mean of variable
Income (10^4)	4.25×10^{-3}	(0.85)	2.76×10^{-3}	(0.53)	3.48×10^{-3}	(0.66)	5.52
Expecting attendance	9.54×10^{-3}	(2.56)*	9.82×10^{-3}	(2.59)**	1.01×10^{-2}	(2.58)**	8.92
Drug availability (D1)					-9.13×10^{-3}	(-0.18)	2.25
Structural aspects (D2)					3.27×10^{-2}	(0.39)	1.96
Staff behaviour (D3)					1.09×10^{-1}	(1.22)	2.92
Organisational aspects (D4)					-1.75×10^{-2}	(-0.26)	2.48
Technical care provided (D5)	2.05×10^{-2}	(0.19)			-2.12×10^{-2}	(-0.19)	2.98
Convenience (D6)			9.37×10^{-2}	(1.78)	8.38×10^{-2}	(1.54)	2.88
Household size	1.32×10^{-2}	(0.51)	7.53×10^{-3}	(0.28)	9.35×10^{-3}	(0.35)	2.89
Age group	4.20×10^{-1}	(4.57)**	4.32×10^{-1}	(5.05)**	4.20×10^{-1}	(4.43)**	0.93
Health centre size	-4.24×10^{-1}	(-6.00)**	-4.12×10^{-1}	(-5.83)**	-4.14×10^{-1}	(-4.96)**	0.50
Season	-2.09×10^{-1}	(-2.70)**	-2.11×10^{-1}	(-2.70)**	-2.06×10^{-1}	(-2.58)**	0.48
Constant	-4.77×10^{-1}		-7.03×10^{-1}		-9.06×10^{-1}		
	ln L = -116.0		ln L = -114.4		ln L = -113.6		

The slopes for income are consistently positive in all the seven models. These results are contrary to the results in Lusaka. This means outpatients with high income are more likely to choose to pay by low-cost prepayment ceteris paribus, and supports the prediction of the choice model, but these parameters are not statistically significant. The slopes for expected number of attendances are positive, with statistical significance by t-tests, consistently in all the seven models. These results are similar to the results in Lusaka. This means outpatients expecting frequent attendances are more likely to choose to pay by low-cost prepayment. These findings support the prediction of the choice model. With regard to the slopes for the perceived quality of care scales, the slopes for all scales from D1 to D6 are positive in the separate models, but the slopes of D1, D4, and D5 are negative in the all-in-one model. These results can be interpreted to mean that perceived quality of care has little effect on the choice, since all the slopes in the seven models are statistically insignificant. The slopes for household size are positive. These results are contrary to the results in Lusaka. This means outpatients with small household size are less likely to choose to pay by low-cost prepayment. This contradicts with the prediction of the choice model, but these parameters are not statistically significant.

With regard to controlling variables, which are not incorporated in the theoretical models, the slopes for the dummy variable representing age group suggest stronger preference for low-cost prepayment among adult outpatients than among child outpatients, with statistical significance. These results are similar to the results in Lusaka. The slopes for the dummy variable representing health centre size suggest stronger preference for low-cost prepayment at small health centres than at

large health centres, with statistical significance. These results are similar to the results in Lusaka as well. These findings suggest that outpatient age group and health centre size may have implications beyond the theoretical models. The slopes for the dummy variable representing season are statistically significant. These results are contrary to the results in Lusaka. This finding suggests there is seasonality of choice in Kitwe as expected, which is controlled using a dummy variable in this statistical estimation.

Table 9.10c shows the results of the estimation of logit model for the effects of factors on the choice of payment mechanism between user fee and low-cost prepayment in the two districts together.

Table 9.10c Estimation of logit model in two-districts: outpatient's choice of payment mechanism

	Two-districts model D1		Two-districts model D2		Two-districts model D3		Two-districts model D4	
	Slope	(t)	Slope	(t)	Slope	(t)	Slope	(t)
Income (10^4)	-4.88×10^{-3}	(-1.62)	-4.45×10^{-3}	(-1.53)	-4.52×10^{-3}	(-1.55)	-4.41×10^{-3}	(-1.51)
Expecting attendance	8.01×10^{-3}	(5.26)**	8.18×10^{-3}	(5.39)**	8.31×10^{-3}	(5.43)**	8.22×10^{-3}	(5.42)**
Drug availability (D1)	-5.94×10^{-2}	(-2.52)*						
Structural aspects (D2)			-2.47×10^{-2}	(-0.77)				
Staff behaviour (D3)					1.66×10^{-2}	(0.62)		
Organisational aspects (D4)							-1.98×10^{-2}	(-0.71)
Technical care provided (D5)								
Convenience (D6)								
Household size	-2.48×10^{-2}	(-1.94)	-2.37×10^{-2}	(-1.87)	-2.38×10^{-2}	(-1.88)	-2.40×10^{-2}	(-1.90)
Age group	3.50×10^{-1}	(6.58)**	3.45×10^{-1}	(6.36)**	3.43×10^{-1}	(6.30)**	3.42×10^{-1}	(6.25)**
District	-5.76×10^{-3}	(-0.12)	-2.13×10^{-2}	(-0.45)	-1.74×10^{-2}	(-0.37)	-1.34×10^{-2}	(-0.28)
Health centre size	-2.73×10^{-1}	(-6.01)**	-2.40×10^{-1}	(-5.28)**	-2.46×10^{-1}	(-5.51)**	-2.48×10^{-1}	(-5.57)**
Season	-1.25×10^{-1}	(-2.84)**	-1.18×10^{-1}	(-2.63)**	-1.26×10^{-1}	(-2.89)**	-1.23×10^{-1}	(-2.79)**
Constant	-7.72×10^{-1}		-1.66×10^{-1}		-2.58×10^{-1}		-1.62×10^{-1}	
N = 619	ln L = -372.5		ln L = -375.5		ln L = -375.6		ln L = -375.5	

* $p < 0.05$, ** $p < 0.01$

Table 9.10c Estimation of logit model in two-districts: outpatient's choice of payment mechanism - continued

	Two-districts model D5		Two-districts model D6		Two-districts model All		
	Slope	(t)	Slope	(t)	Slope	(t)	Mean of variable
Income (10^4)	-3.84×10^{-3}	(-1.32)	-4.58×10^{-3}	(-1.56)	-4.37×10^{-3}	(-1.43)	5.60
Expecting attendance	8.50×10^{-3}	(5.51)**	8.22×10^{-3}	(5.42)**	8.33×10^{-3}	(5.35)**	10.20
Drug availability (D1)					-7.00×10^{-2}	(-2.65)**	2.07
Structural aspects (D2)					-3.10×10^{-3}	(-0.09)	2.10
Staff behaviour (D3)					-3.69×10^{-3}	(-0.12)	2.91
Organisational aspects (D4)					-6.56×10^{-3}	(-0.22)	2.33
Technical care provided (D5)	9.68×10^{-2}	(2.68)**			1.15×10^{-1}	(2.82)**	3.20
Convenience (D6)			2.47×10^{-2}	(1.03)	3.24×10^{-2}	(1.31)	2.65
Household size	-2.10×10^{-2}	(-1.65)	-2.42×10^{-2}	(-1.92)	-2.24×10^{-2}	(-1.73)	3.13
Age group	3.48×10^{-1}	(6.49)**	3.46×10^{-1}	(6.39)**	3.60×10^{-1}	(7.00)**	0.92
District	1.53×10^{-2}	(0.31)	-2.47×10^{-2}	(-0.52)	-2.69×10^{-2}	(0.53)	0.35
Health centre size	-2.55×10^{-1}	(-5.70)**	-2.42×10^{-1}	(-5.39)**	-2.78×10^{-1}	(-5.74)**	0.64
Season	-1.33×10^{-1}	(-3.02)**	-1.27×10^{-1}	(-2.90)**	-1.31×10^{-1}	(-2.86)**	0.46
Constant	-5.44×10^{-1}		-2.76×10^{-1}		-5.14×10^{-1}		
	ln L = -372.1		ln L = -375.3		ln L = -366.9		

The slopes for income are consistently negative in all the seven models. These results are similar to the results in Lusaka and contrary to the results in Kitwe. This means outpatients with low income are more likely to choose to pay by low-cost prepayment ceteris paribus, and contradicts with the prediction of the choice model, but these parameters are not statistically significant. The slopes for expected number of attendances are positive, with statistical significance by t-tests, consistently in all the seven models. These results are similar to the results both in Lusaka and in Kitwe. This means outpatients expecting frequent attendances are more likely to choose to pay by low-cost prepayment. These findings support the prediction of the choice model. With regard to the slopes for perceived quality of care scales, the slope for drug availability (D1) is negative, with statistical significance, and that of technical care provided (D5) is positive, with statistical significance. These results are similar to the results in Lusaka. The former means that outpatients with low perceived quality of care are more likely to choose to pay by low-cost prepayment, which contradicts with the prediction of the choice model. On the contrary, the latter means outpatients with high perceived quality of care are more likely to choose to pay by low-cost prepayment, which supports the prediction of the choice model. Aside from D1 and D5, the slopes of D2 and D4 are negative, and D3 and D6 are positive, in the separate models. The slope of D3 in the all-in-one model is negative, however. But these results are statistically insignificant and considered to have little implication. The slopes for household size are positive. This means outpatients with large household size are more likely to choose to pay by low-cost prepayment. This contradicts with the prediction of the choice model, but the parameters are not statistically significant.

With regard to controlling variables, which are not incorporated in the theoretical models, the slopes for the dummy variable representing age group suggest stronger preference for low-cost prepayment among adult outpatients than among child outpatients, with statistical significance. These results are similar to the results in both Lusaka and Kitwe. The slopes for the dummy variable representing health centre size suggest stronger preference for low-cost prepayment at small health centres than at large health centres, with statistical significance. These results are similar to the results in both Lusaka and Kitwe as well. These findings suggest that outpatient age group and health centre size may have implications beyond the theoretical models. The slopes for the dummy variable representing season are statistically significant. These results are contrary to the results in Lusaka, and similar to those in Kitwe. This finding suggests there is seasonality of choice in the two districts as expected, which is controlled using a dummy variable in this statistical estimation.

Table 9.11 shows the results of the estimation of logit model for the effects of factors such as income, expected numbers of attendances, perceived quality of care and household size on the choice of payment mechanism between user fee and discount card at Mwekera in Kitwe.

Table 9.11 Estimation of logit model for discount card: outpatient's choice of payment mechanism

	Discount card model D1		Discount card model D2		Discount card model D3		Discount card model D4	
	Slope	(t)	Slope	(t)	Slope	(t)	Slope	(t)
Income (10^4)	2.73×10^{-3}	(0.80)	2.81×10^{-3}	(0.80)	3.41×10^{-3}	(0.96)	1.79×10^{-3}	(0.51)
Expecting attendance	3.46×10^{-4}	(0.13)	2.71×10^{-4}	(0.10)	4.93×10^{-4}	(0.18)	-1.30×10^{-4}	(-0.05)
Drug availability (D1)	5.60×10^{-2}	(1.39)						
Structural aspects (D2)			-1.31×10^{-2}	(-0.24)				
Staff behaviour (D3)					-4.04×10^{-2}	(-0.70)		
Organisational aspects (D4)							6.62×10^{-2}	(1.27)
Technical care provided (D5)								
Convenience (D6)								
Household size	4.52×10^{-2}	(2.01)*	4.73×10^{-2}	(2.10)*	4.86×10^{-2}	(2.16)*	4.65×10^{-2}	(2.07)*
Age group	3.29×10^{-2}	(0.28)	9.13×10^{-3}	(0.06)	2.05×10^{-2}	(0.15)	4.20×10^{-3}	(0.37)
Season	8.96×10^{-2}	(1.18)	6.03×10^{-2}	(0.82)	3.09×10^{-2}	(0.38)	7.58×10^{-2}	(1.06)
Constant	-5.84×10^{-1}		-3.89×10^{-1}		-2.86×10^{-1}		-6.05×10^{-1}	
N = 97	ln L = -38.5		ln L = -39.4		ln L = -39.2		ln L = -38.6	

* $p < 0.05$, ** $p < 0.01$

Table 9.11 Estimation of logit model for discount card: outpatient's choice of payment mechanism - continued

	Discount card model D5		Discount card model D6		Discount card model All		
	Slope	(t)	Slope	(t)	Slope	(t)	Mean of variable
Income (10^4)	2.96×10^{-3}	(0.86)	6.45×10^{-4}	(0.22)	1.19×10^{-3}	(0.03)	5.86
Expecting attendance	-6.93×10^{-4}	(0.25)	-8.07×10^{-4}	(-0.38)	-9.60×10^{-3}	(-0.38)	9.79
Drug availability (D1)					5.70×10^{-1}	(1.38)	2.43
Structural aspects (D2)					-2.86×10^{-1}	(-0.53)	1.92
Staff behaviour (D3)					-5.38×10^{-1}	(-0.92)	3.30
Organisational aspects (D4)					5.24×10^{-1}	(0.95)	2.41
Technical care provided (D5)	-4.76×10^{-2}	(-0.65)			-2.64×10^{-1}	(-0.37)	3.29
Convenience (D6)			1.09×10^{-1}	(2.97)**	1.34	(2.30)*	3.03
Household size	4.87×10^{-2}	(2.17)*	3.53×10^{-2}	(1.85)	3.92×10^{-1}	(1.77)	2.89
Age group	7.91×10^{-3}	(0.05)	2.27×10^{-2}	(0.23)	2.80×10^{-1}	(0.19)	0.95
Season	3.25×10^{-1}	(0.41)	5.23×10^{-2}	(0.91)	7.38×10^{-1}	(0.88)	0.52
Constant	-2.50×10^{-1}		-6.77×10^{-1}		-7.59×10^{-1}		
	ln L = -39.2		ln L = -35.6		ln L = -33.3		

The slopes for income are consistently positive in all the seven models. This means that outpatients with high income are more likely to choose to pay by discount card ceteris paribus. This supports the prediction of the choice model, but these parameters are not statistically significant. The slopes for expected number of attendances are positive and negative in the seven models, but these parameters are not statistically significant. This means that expected number of attendances has little effect on payment choice. With regard to the slopes for the perceived quality of care scales, the slope of D6 is positive, with statistical significance. This means that outpatients with high perceived quality of care are more likely to choose to pay by discount card. This result supports the prediction of the choice model. Other than D6, the slopes of D2, D3 and D5 are negative, and D1 and D4 are positive, in the separate models. These are statistically insignificant and considered to have little implication. The slopes for household size are consistently positive in all the seven models. Statistical significances are found in a few separate models. This means that outpatients with large household size are more likely to choose to pay by discount card. This supports the prediction of the choice model.

With regard to controlling variables, no statistical significance is found in all the seven models.

9.6 SUMMARY

Table 9.12a and Table 9.12b show the summary of tests of the choice model using outpatient questionnaire survey.

Table 9.12a Summary of statistical tests of Choice Model using outpatient questionnaire survey

TABLE	LOCATION	CHOICE	MODE OF ANALYSIS	FACTOR		
				INCOME	HEALTH STATUS	HOUSEHOLD SIZE
TABLE 9.6 – TABLE 9.9	Chipata	Prepayment/user fee	Univariate	Contradict	Support*	Support
	Kabwata	Prepayment/user fee	Univariate	Support	Support	Support
	Chawama	Prepayment/user fee	Univariate	Contradict*	Support*	Contradict
	Chimwemwe	Prepayment/user fee	Univariate	Contradict	Support*	Contradict
	Cosetco	Prepayment/user fee	Univariate	Support*	Support*	Support
	Mwekera	Discount card/user fee	Univariate	Support	Contradict	Support
TABLE 9.10	Lusaka	Prepayment/user fee	Logit model	Contradict	Support*	Support
	Kitwe	Prepayment/user fee	Logit model	Support	Support*	Contradict
	Two-district	Prepayment/user fee	Logit model	Contradict	Support*	Contradict
TABLE 9.11	Mwekera	Discount card/user fee	Logit model	Support	Unclear	Support

* statistical significance

Table 9.12b Summary of statistical tests of Choice Model using outpatient questionnaire survey

TABLE	LOCATION	CHOICE	MODE OF ANALYSIS	FACTOR					
				QUALITY OF CARE					
				DRUG AVAILABILITY (D1)	STRUCTURAL ASPECTS (D2)	STAFF BEHAVIOUR (D3)	ORGANI-SATIONAL ASPECTS (D4)	TECHNICAL CARE PROVIDED (D5)	CONVE-NIENCE (D6)
TABLE9.8	Chipata	Prepayment/user fee	Univariate	Contradict*	Contradict	Support	Support	Support	Support
	Kabwata	Prepayment/user fee	Univariate	Contradict	Support	Contradict	Contradict	Support	Support
	Chawama	Prepayment/user fee	Univariate	Contradict*	Contradict*	Contradict	Contradict	Support	Contradict
	Chimwemwe	Prepayment/user fee	Univariate	Contradict	Contradict	Support	Contradict	Contradict	Unclear
	Cosetco	Prepayment/user fee	Univariate	Contradict	Contradict	Support	Contradict	Support	Support
	Mwekera	Discount card/user fee	Univariate	Support	Unclear	Contradict	Support	Contradict	Support*
TABLE 9.10	Lusaka	Individual	Logit model each dimension	Contradict	Contradict	Contradict	Contradict	Support*	Support
	Lusaka	Individual	Logit model all dimensions	Contradict*	Support	Contradict	Contradict	Support*	Support
	Kitwe	Individual	Logit model each dimension	Support	Support	Support	Support	Support	Support
	Kitwe	Individual	Logit model all dimensions	Contradict	Support	Support	Contradict	Contradict	Support
	Two-district	Individual	Logit model each dimension	Contradict*	Contradict	Support	Contradict	Support*	Support
	Two-district	Individual	Logit model all dimensions	Contradict*	Contradict	Contradict	Contradict	Support*	Support
TABLE 9.11	Mwekera	Individual	Logit model each dimension	Support	Contradict	Contradict	Support	Contradict	Support*
	Mwekera	Individual	Logit model all dimensions	Support	Contradict	Contradict	Support	Contradict	Support*

* statistical significance

On the choice between low-cost prepayment and user fees, the effect of health status is consistently supported by various tests. The tests of effects of income and household size have various results. The estimation of logit model in two-districts contradicts the predictions of the theoretical model. The observed effect of perceived quality of care is various as well. It is worth to note that the effect of drug availability (D1), which is featured in the theoretical modelling, contradicts the prediction with statistical significance in a few models.

On the choice between discount cards and user fees, the effect of income and household size is supported by the tests; and the effect of health status is not supported by the test. These results are contrary to those of the choice between low-cost prepayments and user fees. The observed effect of perceived quality of care is various as well. The effect of drug availability (D1) supports the prediction of the theoretical model.

CHAPTER 10

CONCLUSIONS

10.1 INTRODUCTION

In this chapter, the theoretical and empirical findings of the study are discussed along with the three research questions specified in Chapter 1, after examining background assumptions related to the context of this study. Secondly, the strengths and the limitations, and thirdly, the policy implications and the scope for further research are discussed.

10.2 MAPS OF HEALTH CARE UTILISATION IN THE FIELD

Before going into the discussion related to three research questions, the background of theoretical and empirical investigation of this study is examined in this section.

This study aims to investigate equity in access to health care through analysing the mechanisms for direct payment at governmental health centres. This is only a part of health care provision in the field based on the definition of equity in access operationalised in Chapter 2: equal access for equal need, observed in terms of utilisation. The study also focuses on access to health care, especially by the poor section of the population, regarding the concern for the financial barrier created by the arrangement of direct payment mechanisms as argued in Chapter 1. In order to discuss equity in access in principle, the health care system as a whole, or access to health care at every health facility by every person needs to be taken into account.

Therefore, underlying assumptions here are that health care, which is subject to direct payment, and is provided and consumed at health centres, constitutes a large enough share of health care consumed in the health system of the field to discuss equity, and that health centres are major providers of health care for the poor section of the population.

These are demonstrated through the construction of health care utilisation maps based on LCMS98 data. As shown in Figure 7.1, nearly 70% of health services are consumed by children and adults who are subject to direct payment; and as shown in Table 7.3, among paying patients, the volumes of health care services provided and consumed at health centres are more than 50%.

In addition, as shown in Table 7.6, health care provided in governmental low-cost divisions, which are the predominantly health centres, is consumed by the relatively low-income section of the population, although average income among governmental high-cost department users in Kitwe is not consistent with this conclusion, probably due to small sample size in LCMS98. It is reasonable to say that health centres are major providers of health care for the poor section of the population.

In summary, it can be concluded that the arrangement of direct payment mechanisms at governmental health centres is most likely to have impact on equity in access to health care in two districts in Zambia based on empirical analysis.

10.3 RESEARCH QUESTION 1: CONSUMER'S UTILISATION OF HEALTH CARE UNDER ALTERNATIVE PAYMENT MECHANISM

The first research question concerned the relationship between the consumers' ex-ante choice of payment mechanism and ex-post utilisation of health care services when falling ill. In the theoretical investigation in Chapter 6, the utilisation model which explains the difference in the consumers' utilisation of health care services when falling ill depending on their choice of payment mechanisms in advance was elaborated. It predicted the effect of the subscription of prepayment or the purchase of discount cards on the decision whether to seek health care or not.

In order to explore the appropriateness of the theoretical utilisation model, a hypothesis derived from the model as below is tested in the empirical investigation in Chapters 7 and 8, using observation data from surveys.

a) When falling ill, consumers with prepayment are more likely to seek health care than those with discount card. And consumers with discount card are more likely to seek health care than those with user fees.

In order to test the hypothesis, it was necessary to use data sets which contained at least both variables of ex-ante individual choice of payment mechanism and ex-post individual's utilisation of health care service as discussed in Chapter 7. Therefore, LCMS98 data and records at health centres were employed in testing, while outpatient questionnaire data were not used. Those two data sets were made most use of in testing the hypothesis, although they are not ideal compared to

longitudinal follow-up data of consumers in the community, and have limitations in some categories of variables such as the choice of payment mechanism.

Firstly, direct tests based on samples from the population were carried out using LCMS98 data set. The data employed were follow-up data on health care utilisation. However, the categories of variable on the ex-ante choice of payment mechanism were not specific, lacking in the category for prepayment at health centres. Only the aggregation of consumer's status whether they face financial barrier or not when falling ill was available. Therefore, these tests are not strictly precise in depicting the effect of prepayment on the utilisation of health care services at health centres, and are rather depicting the effect of removing the financial barrier. As shown in Table 7.12, consumers who did not pay at the time of utilisation, for example, subscribers of prepayment or beneficiaries of employer's payment, were more likely to seek health care services than those who had to pay at the time of utilisation, with statistical significance. Since fee schedule differences between children and adults, and income levels are observed among factors which are considered to affect these differences in utilisation in the same data set, these two factors are controlled in assessing the difference with Mantel-Haenszel test, in which statistically significant differences were found. Those without financial barriers to health care when falling ill in Lusaka tend to seek health care 2.2 times as often as those with financial barriers. In Kitwe, the difference is 1.4 times.

Although the subjects of test are not limited to the utilisation at health centres focused upon in this study, these results show the effect of removing financial barriers. And the results of Mantel-Haenszel tests are considered to support the

hypothesis at health centre level, since it means that differences are shown in various strata of samples including the low-income section of population.

Since the sampling frame of LCMS98 did not sample from the catchment areas of the four health centres with the discount card trial, it was not possible to carry out a similar test related to the effect of the discount card.

Secondly, indirect tests based on retrospective data of outpatients were carried out using records at health centres. The differences in the frequencies of consultations by the chosen payment mechanism were analysed. As discussed in Chapter 8, they were not precise, since sampling of outpatients is biased in failing to take non-users into account and the differences in utilisation observed in these analyses are considered to reflect mixed effects of not only the utilisation model but also the choice model.

As shown in Table 8.8, which illustrates the differences in utilisation by the choice of payment mechanism at four health centres employing registry book data, the results on the differences between prepayment subscribers and user fee payers are consistent with the hypothesis with statistical significance at Kabwata and Cosetco. Although contradictory results are found at Chimwenwe, this is not statistically significant when limiting the samples into those who had not changed the choice of payment mechanism through the observed period.

As to discount card, differences in utilisation between discount card holders and user fee payers are consistent with the hypothesis with statistical significance at

Mwekera. Although contradictory results are found at Kabwata, this is not statistically significant when multiple comparisons are carried out.

In order to examine the difference in utilisation between prepayment subscribers and discount card holders, it is needed to analyse the data at Chawama, since only Chawama offers prepayment and discount card at the same time. Table 8.9 shows the differences in utilisation among prepayment discount card holders and user fee payers using patients' medical record book data. The average frequencies of attendances are consistent with the hypothesis, although the differences are not statistically significant. This result is considered to imply the appropriateness of the hypothesis.

Therefore, the results from analyses of records at health centres support the choice model, although the tests are indirect.

In summary, it is reasonable to interpret that the empirical investigation supports the theoretical utilisation model in principle. Relatively strong evidence was accumulated with regard to the differences in utilisation between prepayment payers and user fee payers, while support for the differences in utilisation related to discount card holders is relatively weak.

10.4 RESEARCH QUESTION 2: CONSUMER'S CHOICE OF PAYMENT MECHANISM

The second research question was concerned with consumers' choice of direct

payment mechanism in the face of three available alternatives: user fee, voluntary prepayment, and pre-purchase discount card. In the theoretical investigation in Chapter 6, the choice model which explains consumers' choice of payment mechanism is elaborated. It predicts the effect on consumers' choice of price, income, perceived health status, perceived quality of health care and household size of each consumer.

In order to explore the appropriateness of the theoretical choice model, four hypotheses derived from the model as below were tested in the empirical investigations from Chapters 7 to 9, using data from surveys.

b) In terms of falling income, if the association between strong time preference and low income is assumed, user fees are more likely preferred than prepayment or discount card. Discount card is more likely preferred than prepayment. Therefore, the order of preference with low income is predicted to be (prepayment < discount card < user fees).

c) In terms of falling health status, prepayment is more likely preferred than discount cards. Discount card is more likely preferred than user fees. Therefore, the order of preference with low health status is predicted to be (prepayment > discount card > user fees).

d) In terms of falling perceived quality of care, user fees are more likely preferred than prepayment or discount cards. Discount card is more likely preferred than prepayment. Therefore, the order of preference with low perceived quality of care

is predicted to be (prepayment < discount card < user fees).

e) In terms of falling household size, discount card is more likely preferred than user fees. And user fees are more likely preferred than prepayment. Therefore, the order of preference with household size is predicted to be (prepayment > user fees > discount card).

The effect of price is not tested. Price was constant across districts, preventing the test of price effects at the district level. This is one of the limitations of the study.

Series of tests were carried out fully utilising the three available data sets. Table 10.1a, 10.1b, 10.2a and 10.2b show the summary of statistical tests of the choice model in terms of comparisons between prepayment and user fee, and between discount card and user fee, respectively.

Table 10.1a Summary of statistical analysis on the choice between prepayment and user fee

TABLE	DATA SOURCE	LOCATION	LEVEL OF CHOICE (INDIVIDUAL/ HOUSEHOLD)	MODE OF ANALYSIS	FACTOR		
					INCOME	HEALTH STATUS	HOUSEHOLD SIZE
TABLE 7.14	LCMS98	Lusaka	Individual	Univariate	Contradict*	n.a.	Support*
		Kitwe	Individual	Univariate	Support*	n.a.	Support*
TABLE.7.15	LCMS98	Lusaka	Individual	Logit model	Contradict	n.a.	Support*
		Kitwe	Individual	Logit model	Support	n.a.	Support
		Two-districts	Individual	Logit model	Contradict	n.a.	Support*
TABLE 7.16	LCMS98	Lusaka	Household	Univariate	Contradict*	n.a.	Support*
		Kitwe	Household	Univariate	Support*	n.a.	Support*
TABLE 7.17	LCMS98	Lusaka	Household	Logit model	Contradict	n.a.	Support*
		Kitwe	Household	Logit model	Support	n.a.	Support*
		Two-districts	Household	Logit model	Contradict	n.a.	Support*
TABLE 9.6 - TABLE 9.9	Outpatient	Chipata	Individual	Univariate	Contradict	Support*	Support
	Outpatient	Kabwata	Individual	Univariate	Support	Support	Support
	Outpatient	Chawama	Individual	Univariate	Contradict*	Support*	Contradict
	Outpatient	Chimwemwe	Individual	Univariate	Contradict	Support*	Contradict
	Outpatient	Cosetco	Individual	Univariate	Support*	Support*	Support
TABLE 9.10	Outpatient	Lusaka	Individual	Logit model	Contradict	Support*	Support
	Outpatient	Kitwe	Individual	Logit model	Support	Support*	Contradict
	Outpatient	Two-districts	Individual	Logit model	Contradict	Support*	Contradict

* statistical significance

Table 10.1b Summary of statistical analysis on the choice between discount card and user fee

TABLE	DATA SOURCE	LOCATION	LEVEL OF CHOICE (INDIVIDUAL/ HOUSEHOLD)	MODE OF ANALYSIS	FACTOR		
					INCOME	HEALTH STATUS	HOUSEHOLD SIZE
TABLE 9.6-TABLE 9.9	Outpatient	Mwekera	Individual	Univariate	Support	Contradict	Support
TABLE 9.12	Outpatient	Mwekera	Individual	Logit model	Support	Unclear	Support

* statistical significance

Table 10.2a Summary of statistical analysis on the choice between prepayment and user fee

TABLE	DATA SOURCE	LOCATION	LEVEL OF CHOICE (INDIVIDUAL/ HOUSEHOLD)	MODE OF ANALYSIS	FACTOR					
					QUALITY OF CARE					
					DRUG AVAILABILITY (D1)	STRUCTURAL ASPECTS (D2)	STAFF BEHAVIOUR (D3)	ORGANISATIO-NAL ASPECTS (D4)	TECHNICAL CARE PROVIDED (D5)	CONVE-NIENCE (D6)
TABLE 9.8	Outpatient	Chipata	Individual	Univariate	Contradict*	Contradict	Support	Support	Support	Support
	Outpatient	Kabwata	Individual	Univariate	Contradict	Support	Contradict	Contradict	Support	Support
	Outpatient	Chawama	Individual	Univariate	Contradict*	Contradict*	Contradict	Contradict	Support	Contradict
	Outpatient	Chimwemwe	Individual	Univariate	Contradict	Contradict	Support	Contradict	Contradict	Unclear
	Outpatient	Cosetco	Individual	Univariate	Contradict	Contradict	Support	Contradict	Support	Support
TABLE 9.10	Outpatient	Lusaka	Individual	Logit model	Contradict*	Unclear	Contradict	Contradict	Support*	Support
	Outpatient	Kitwe	Individual	Logit model	Unclear	Support	Support	Unclear	Unclear	Support
	Outpatient	Two-districts	Individual	Logit model	Contradict*	Contradict	Unclear	Contradict	Support*	Support

* statistical significance

Table 10.2b Summary of statistical analysis on the choice between discount card and user fee

TABLE	DATA SOURCE	LOCATION	LEVEL OF CHOICE (INDIVIDUAL/ HOUSEHOLD)	MODE OF ANALYSIS	FACTOR					
					QUALITY OF CARE					
					DRUG AVAILABILITY (D1)	STRUCTURAL ASPECTS (D2)	STAFF BEHAVIOUR (D3)	ORGANISATIO-NAL ASPECTS (D4)	TECHNICAL CARE PROVIDED (D5)	CONVE-NIENCE (D6)
TABLE 9.8	Outpatient	Mwekera	Individual	Univariate	Support	Unclear	Contradict	Support	Contradict	Support*
TABLE 9.11	Outpatient	Mwekera	Individual	Logit model each dimension	Support	Contradict	Contradict	Support	Contradict	Support*

* statistical significance

It is impossible to carry out tests comparing prepayment with discount card. This is due to the limitation of LCMS98 which lacks data for discount card, and due to the low popularity of discount cards among outpatients at Chawama, the only health centre where comparison between prepayment and discount card is feasible, which results in no observation of the choice between prepayment and discount card in outpatient questionnaire survey.

As to the comparison between prepayment and user fee with LCMS98, two levels of choice of payment mechanism: individual choice and household choice, are tested with two levels of analysis: associations between choice and each factor, and simultaneous estimation of logit models, according to the district. With the data from the outpatient questionnaire survey, tests with two levels of analysis: associations between choice and each factor, and simultaneous estimation of logit models, according to health centres are carried out.

Although each test has its limitations as discussed in Chapters 7 to 9, it seems possible to divide the empirically observed effects of factors into two groups: perceived health status and household size which are consistent with hypothesis, and income and quality of care which have mixed results.

The effects of perceived health status on choice between prepayment and user fees are supported by all tests carried out without exception. And the effects of household size on choice are supported by the tests except for four results, which are statistically not significant. The choice model is considered to succeed in explaining consumers' choice in terms of these two factors in principle.

The effects of perceived health status are also supported by the results shown in Table 8.8a, in which the association between consumer's choice of payment mechanism and frequency of attendances is shown. As discussed in the previous section, the association is considered to reflect the effect of perceived health status on choice in the choice model as well as the effect of consumers' choice of payment mechanism on their utilisation in the utilisation model.

In contrast, some of the results in Table 10.1a contradict the model's predictions of the effects of income on choice. Three results out of eighteen contradict the hypothesis with statistical significance, while other three results are consistent with the hypothesis with statistical significance. The choice model does not seem to succeed in explaining consumers' choice in terms of these income factors. However, looking at the summary table with attention to differences between districts, the effects of income on choice is supported in Kitwe, in general.

As to the effects of quality of care, mixed results are found in Table 10.2a. In regards to the choice between prepayment and user fee, among six dimensions of quality, results in relation to drug availability tend to contradict the hypothesis with statistical significance, while the results of technical care provided tend to be consistent with the hypothesis with statistical significance. The results for convenience tend to be consistent with the hypothesis without statistical significance. And mixed and non-significant results are found in the other three dimensions: structural aspects, staff behaviour, and organisational aspects.

As to the comparison between discount card and user fee, any test is impossible

with LCMS98 as discussed previously. In Table 10.1b, using the outpatient questionnaire survey data, repeats the two levels of analysis: associations between choice and each factor, and simultaneous estimation of logit models, according to health centres.

The effects of perceived health status on the choice between discount card and user fee is not consistent with the prediction of the choice model. The results for income and household size support the hypothesis in both analyses. The estimated logit model also supports the effect of income and household size on choice, while the effect of perceived health status is found negligible.

As to the effects of quality of care, mixed results are found in Table 10.2b, too, which are inconsistent with the choice between user fee and prepayment. Among six dimensions of quality of care, all results for convenience are consistent with the hypothesis with statistical significance. All two results for drug availability, and organisational aspects, are consistent with the hypothesis without statistical significance, while results for technical care provided contradict the hypothesis without statistical significance. Mixed and non-significant results are found in relation to structural aspects.

Since no contradictory results have statistical significance and some supporting results are statistically significant, the choice model is considered to succeed in explaining consumers' choice in principle.

In short, the choice model regarding not only the comparison between prepayment

and user fee but also between discount card and user fee is supported by empirical investigation in Kitwe except for the effects of perceived quality of care. Especially, patients' behaviours at Cosetco are well explained. However, the choice model seems to fail in explaining choice in terms of income in Lusaka, comparing prepayment and user fee. There are differences in the dimensions of quality of care, which affect choice with statistical significance. As to the choice between prepayment and user fee, technical care provided has a consistent effect, while drug availability results contradict the model. For the choice between discount card and user fee, the model performs well in predicting the role of convenience.

These failures in the empirical tests could be explained as below. Firstly, as to the failures in the tests of perceived quality of care, patients with perception of low drug availability at the time of illness may keep away from heath centres and seek health care at other facilities even when they have prepaid. In other words, outpatients who attend the health centres and answered the questionnaire have bias compared with consumers assumed in the choice model. This is an expected issue and already discussed in Chapter 5. The outpatient questionnaire survey was the best feasible method. In this sense, this is due to the limitation in the study design. Patients perceiving high drug availability may be willing to pay user fee when they believe drug is available at health centres, which leads to contradictory results to the hypothesis derived from the model. This may be due to oversimplification in the modelling process. Yet, plausibility of these explanations is unclear within the empirical investigation of this study. Another possible explanation of the failures in the tests of perceived quality of care is that consumer's expectation for health facility is diagnosis and procedures rather than drug

prescription. Once diagnosed, they can select pills and purchase them in the market. This explanation seems to be consistent with the generally supporting results of tests of technical care provided in the choice between prepayment and user fee.

Secondly, as to the failures in the tests of income in Lusaka, these are considered to result from the prevailing misuse of prepayment as cheaper user fee with 24 hours waiting, since the model is supported by patients' behaviour at Cosetco, where continuation of prepayment is most strongly enforced as shown in Table 8.7, Table 9.3, and Table 9.4. In Lusaka, waiting time price rationing, which the choice model does not assume, seems to affect consumers' choice of payment mechanisms. Given this rationing, the fee schedule of prepayment departs from that assumed by the choice model. The schedule effectively offers consumers the choice between quick but expensive service and cheap but slow service. Then it can be expected that consumers with low income are likely to choose cheap but slow service, that is, prepayment. The observation of difference in direct payment practice among health centres that health centres in Lusaka but not Kitwe, and large but not small health centres are likely to fail in enforcing proper use of prepayment have certain plausibility in explaining the contradictory results. Another explanation may be possible with regard to these contradictory results that the assumption on the relationship between income and time preference is erroneous. Arguably, this assumption is relatively poorly supported empirically in comparison with the other assumptions made in the theoretical modelling. It is also possible to assume that there is little difference in time preference depending on income among the poorest section of the population.

In conclusion, the choice model has shown a certain power in explaining the effects of health status and household size on choice through empirical investigation, and potential in explaining the effects of income is shown through the extension of theoretical interpretation and empirical investigation at a limited numbers of health centres.

10.5 RESEARCH QUESTION 3: EQUITY CONSEQUENCES OF ALTERNATIVE PAYMENT MECHANISMS

Theoretical investigations in Chapter 6 predict equity consequences of the utilisation model and choice model in terms of two types of equity: equity in access and equity in financing.

Horizontal equity, a situation, which realises equal access by equal need is explored with the uses of proxies: utilisation for access and perceived health status for need as below:

a) When prepayment or discount card are used as mechanism of payment together with user fees, horizontal equity increases if coverage of prepayment or discount card is expanded.

b) If coverage is limited,

b-1) the effects of perceived health status in the choice model suggest positive equity consequence of use of prepayment and discount card together with user fees. This

is more fully realised when low health status correlates with low income.

b-2) the effects of income in the choice model suggest negative equity consequence of use of prepayment and discount card together with user fees.

c) If quality of care is low, the use of discount card together with user fees has more positive equity consequences than that of prepayment.

In the empirical investigation, as shown in Table 9.3, relatively high coverage of prepayment excluding misuse is observed at three health centres: Chipata, Kabwata, and Cosetco. Since the appropriateness of the utilisation model is shown in the discussion above, the use of prepayment together with user fees is considered to have positive equity consequences according to a) at these health centres. Relatively low coverage of prepayment and discount card excluding abuses are observed at three health centres: Chawama, Chimwenwe, and Mwekera. Since the effects of perceived health status in the choice model is empirically supported, the use of prepayment and discount card together with user fees are considered to have positive equity consequences at these health centres according to b-1), although the correlation between low health status and low income is not shown in Table 7.18. Since the effect of income on choice is unclear, the use of prepayment and discount card together with user fees are considered not to have negative equity consequences at these health centres according to b-2).

The comparison of equity consequences between prepayment and discount card in c), is not discussed in this study because no discount card payer is observed at

Chawama, only where c) can be empirically examined.

In short, both use of prepayment and discount card in a user fee environment in the field have positive equity in access consequences.

With regard to equity in financing, a situation, in which payment is according to ability to pay, is explored as below:

d) If the effect of income in the choice model is relatively small, the effect of perceived health status in the choice model suggest marginally positive equity consequences of use of prepayment and discount card together with user fees through the utilisation model.

e) The use of prepayment together with user fees may have more positive equity consequences according to d) than that of discount card.

In the empirical investigation, as shown in Table 10.1a and 10.1b, the effects of perceived health status in the choice model are empirically supported and the effects of income are not clear, presumably small. Use of prepayment and discount cards are considered to have positive equity in financing consequences at these health centres according to d).

The comparison of equity consequences between use of prepayment and use of discount card in e) is not discussed in this study because no discount card payer is observed at Chawama, the only facility where c) can be empirically examined.

In short, both use of prepayment and discount card are concluded to have positive equity in financing consequences.

It should be noted that caution is needed in interpreting the evidence on equity consequences from the empirical investigation of this study, however. The discussion in this section relies much on the empirical results of two demand models according to the study design. It is not directly observed that the difference in the distribution of health care services in the population arises because of the reform of payment mechanism. This would, in principle, be required to produce strong evidence on equity. This study, however, fails to present this kind of empirical result. Only one cross-sectional observation of distribution of illness episodes and utilisation by income stratum under co-existence of user fees and prepayment is presented in Table 7.18, which even contains odd gradients in the distribution: the higher the income, the more illness episodes and utilisation. Although the gradient between income and utilisation, sometimes observed elsewhere (e.g. Makinen et al., 2000), seems to imply inequity, it does not reflect the marginal effect of intervention such as payment mechanism reform. Therefore, it should be interpreted that the gain or loss of equity brought by the introduction or enhancement of prepayment or discount card does not undergo strict empirical tests, although the empirical results answering the first and second research questions implies equity gain. This weakness in the empirical investigation of the third research question is due to the limitations of this study, which will be discussed later.

In summary, the empirical answer to the third research question combines

theoretical inference with partial empirical evidence rather than a wholly evidence based response.

10.6 STRENGTHS OF THIS STUDY

There are several features, which make this study strong and original.

First, the context of this study provides a kind of unique "natural experiment" of health financing policy in low-income countries. The context of Zambian health financing policy places this study at the heart of the international health financing debate, as described in Chapter 1. The institutionalisation of voluntary prepayment for health care and its implication for equity in the health system have been increasingly discussed, and the need for more empirical findings has been pointed out since the time of planning of the empirical investigation (Preker et al., 2002; Palmer et al., 2004; Ekman, 2004; Carrin et al., 2005, Jütting, 2005). The evidence from Zambian field presented by this study can still inform the current health financing policy debate. In addition, the local context of Lusaka and Kitwe districts, that is, the trial of pre-purchase discount card as the third mechanism of direct payment makes this study original, since discount card has never been introduced and studied in health financing in developing countries as reviewed in Chapter 1. Therefore, this study is unique in dealing with discount card. It is also worth to be noted as one of the strengths of this "natural experiment" that the trial is implemented in two districts, both of which have small and large health centres, at the same time. This makes the range of comparisons in the empirical investigation wider, and deepens the interpretation and the discussion.

Second, the approach taken in specifying the research questions makes this study original. As reviewed and discussed in Chapter 2, direct payment mechanisms such as voluntary prepayment and user fee have been studied mainly in terms of its impacts on utilisation of health care by the poor section of population in order to discuss equity. Only a few studies have tried to look at people's preference among payment mechanisms using a hypothetical willingness-to-pay approach. There has been no study which directly investigates people's choice of payment mechanism combined with health care utilization other than this study. The latest extensive systematic review on voluntary prepayment in low-income countries by Ekman (2004) also fails in identifying any study with a similar approach to this study.

The second strength leads to the third one, that is, theoretical rigour. Focusing on two types of people's basic choices, choice of health care utilisation and choice of payment mechanism, in the specified research questions allows the theoretical investigation of this study to build on the law of demand and the expected utility maximisation model. The choice of health care utilisation under alternative payment mechanisms is clearly modelled on the conventional law of demand; and the choice of alternative financing mechanism is soundly elaborated on top of the major models of demand for health care (Joseph, 1971; Holtsman and Olsen, 1976; Heller, 1982; Akin et al., 1985) and health insurance (Pauly, 1968; Phelps, 1997; Holmer, 1984) in preceding studies. It should be noted as a strength that these models are developed on the basis of an explicit use of a modern modelling strategy. Furthermore, theoretical exploration of equity consequences of introduction or enhancement of direct payment, amalgamating two demand models has never been

tried in the literature.

Finally, the empirical investigation using three data sources by themselves and in combination also has its strengths. Availability and the use of LCMS98 data set make strong platform for the discussion of equity in the health system by illustrating unbiased health care utilization maps. LCMS98 data set enables the analysis of ex-ante choice of payment mechanism and ex-post utilization of health care, which is quite resource consuming if an individual researcher has to conduct data collection independently. The accessibility to and the use of records at health centres are the strengths of this study as well. Even when facing the lack of records in registry books, supplementary data collection from individual patient's medical record is implemented in order to answer the research question. The outpatient questionnaire is designed soundly such that questions on perceived quality of care are written based on a preceding study of quality (Ruwe, 1996). Its implementation is devised to control expected seasonality, for example. The combination of these data sets enables empirical tests of most of the hypotheses predicted by the theoretical investigation.

10.7 LIMITATIONS OF THIS STUDY

There are several limitations of this study, despite the strengths pointed out in the previous section.

Limitations of this study are discussed focusing on three aspects: study design, theoretical investigation, and empirical investigation.

With regard to study design, the "natural experiment" context, which provides opportunity for this study, also imposes limitations on the study design in two ways. First, the protocol of the discount card trial is designed not for the purpose of this study, but for policy intervention. In this sense, it is not an "experiment" that the investigator is able to plan and control. Therefore, options in designing data collection for the empirical investigation are limited. For example, randomised assignments of health centres with control, or price setting at various levels for evaluation are not feasible. The former makes "adverse selection", which always accompanies the choice of insurance or some sort of prepayment, uncontrolled. And, the latter results in an inability to test the effect of price predicted in the choice model in this study. Since the fieldwork is conducted in parallel with discount card trial, comparison such as before-and-after is not feasible as well. Second, the break of the protocol of the "experiment" in practice undermines the study design as well. For example, the discount card trial operates effectively at only one health centre out of four which are originally assigned. Even at this one health centre, pregnant women are treated differently from the original protocol. These results in limited empirical tests regarding discount card.

The "natural experiment" context limits the approach taken in specifying the research questions, which restricts the study design as well. As discussed in Section 10.5, the empirical answer to the third research question is rather theoretical inference combining partial evidence than empirically tested evidence, which results from the approach. It can be argued that the study does not investigate the introduction of alternative payment mechanisms such as prepayment or discount card, but investigates the relevance of prepayment or

discount card in a health care market where user fees prevail. The time span for observation is limited by the context, not at investigator's discretion, so that changes of distribution of health services are not observed. Therefore, in interpreting or generalising the answer to the third research question, it is important to notice that the evidence from this study refers to the role of existing alternative payment mechanisms. Caution is needed when discussing the introduction of prepayment or discount card.

Although the use of three data sources in the empirical investigation is discussed as strengths in the previous section, each of them is not ideal from a critical viewpoint of study design. The limited resources for this study such as money, labour, and time, make an ideal data collection with community based follow-up study discussed in Chapter 5 infeasible. The combination of three data sources as illustrated in Table 5.1 can be criticised as insufficient complementary approach.

The selection of records at health centres as a data source undermines the sampling. Ideal random sampling is replaced by convenient sampling depending on the record keeping practice at each health centre. These limit the generalisability of the results.

With regard to the theoretical investigation, the choice of international context to be modelled other than Zambian context, (which implies ignoring the fact of the misusage of prepayment in Zambia), undermined the models' power in explaining the situation in Zambia. Therefore, the empirical tests of theoretical models are limited by this discrepancy between international context and Zambian practice

such that "prepayment as cheap user fee with 24 hours waiting" is not built in the model, undermining the empirical support for theoretical model by the empirical investigation. However, modelling the general rather than specific case realises the scope for the generalisability of the theoretical models, and opens the scope for further research, which will be discussed later.

With regard to the empirical investigation, the divergence from the ideal study design causes difficulty in comparing between ex-ante choice and ex-post choice in data analyses, which has been discussed repeatedly. It further requires much deliberate interpretation and discussion. As discussed in Chapters 5, 7, 8, and 9, three data sets have their own limitations. LCMS98 data set is not detailed enough to elucidate the effects of the subscription to voluntary prepayment on the utilisation; but the effect of the financial barrier only is tested. It also lacks in data on discount cards, frequency of attendance, and perceived quality of care. These result in more limited results than intended in the study design. Records at health centres lack in data on non-users, income, and perceived quality of care. The records are only available like a mosaic even compared to the study design depending on convenient sampling. These result in more limited results than intended in the study design as well. The outpatient questionnaire survey also lacks data on non-users. Although the availability of the data on perceived quality of care based on preceding findings is noted as its strength, the measurement with four simple levels of grading and assuming the scale as cardinal in the statistical analysis leaves room for further research.

Caution is needed when using and generalising the evidence from this study.

10.8 POLICY IMPLICATIONS OF THIS STUDY

As discussed in 10.6, this study has strengths making it original, which provide a certain amount of findings relevant to policy implications, although it encountered some limitations as mentioned above.

The policy context under consideration in this study is whether the use of alternative direct payment mechanisms such as prepayment or discount card alongside user fees is equitable or not. Concerns for impact on the poor section of the population, and whether income related equity loss occurs or not are key issues. Theoretical investigation revealed potential both positive and negative equity consequences of the two alternative payment mechanisms. In other words, income related equity gain or loss are both possible, depending on the condition under which the market of payment mechanisms and the market of health care equilibrate.

According to the empirical answer to the third research question as to prepayment in Zambian context, income seems to have little impact on the choice of voluntary prepayment as a method for direct payment at some health centres where coverage is relatively low. At the other health centres, on the contrary, income seems to have impact on the choice of voluntary prepayment, while coverage is relatively high. Since it is also found that the health care utilisation is facilitated by the choice of prepayment, that is, the removal of financial barrier at the time of utilisation, the institutionalisation of prepayment as an alternative to user fee bring positive income related equity consequences. In this sense, commitment to

promote the use of prepayment in the arrangement of direct payment alongside user fees is recommendable for policy makers in Lusaka and Kitwe, while efforts to improve the implementation such as reducing misuse need to be made in order to realise marginal change of equilibria of health care related markets toward equity gain. In order to find a solution to improve practice, it may be useful to look into the practice at Cosetco health centre, where theoretical benefit of prepayment seems to be realised to a certain extent. It is also advisable that the change of distribution of health care utilization should be monitored in order to directly observe the equity implications of this policy.

Two types of hurdles for the policy to introduce or enhance prepayment as a method of direct payment have been pointed out in the literature as reviewed in Chapter 1 and 2: operational problems and quality of care. The fields of this study suffer from typical operational problems of prepayment as discussed in Chapter 1. The original finding of this study is that use of prepayment even with problems in operation could contribute to equity in access.

An increase of quality of care has been argued to be a prerequisite for positive impact from direct payment in the international literature. Quality of care is argued to be realised through improving the availability of inputs such as drugs to health services. The importance of raising consumer's perceived quality of care is also emphasized. Therefore, the relevance of quality of care for equity is theoretically explored in Chapter 6. The empirical results of this study suggest that the use of prepayment brings about positive equity impact even when the association between consumers' choice of payment mechanisms and dimensions of

perceived quality of health care services are relatively weak compared perceived health status, and even when the relationship between the choice of prepayment and perceived drug availability is found inverse. In other words, consumers even with low perceived drug availability are more likely to subscribe to prepayment, if they themselves are unhealthy, which leads to positive equity impact from the use of prepayment. These findings suggest an increase of quality of care is not a prerequisite for positive impacts from the use of prepayment together with user fees.

Therefore, the continuation of voluntary prepayment in Lusaka and Kitwe is still recommendable taking these hurdles into account.

As for discount cards, this study succeeds in theoretically clarifying the characteristics of the discount card as a payment mechanism, which was invented as an intuitive countermeasure to avoid managerial problems with prepayment. The theoretical investigation illustrates the potential superiority of prepayment in realising equitable conditions, if quality of care is low. Therefore, it seems reasonable to try to introduce discount cards.

However, empirical evidence is very limited due to low popularity and the abandonment of the trial in several health centres. Compared to prepayment, income related equity loss cannot be ruled out, since the observed role of income and convenience dimension of quality of care in the choice between discount card and user fee suggest the possibility that this payment mechanism facilitate access to health care by those who already have had better access.

Therefore, it can only be advisable for the policy makers in Lusaka and Kitwe that further trial with stricter implementation is needed to expand a policy promoting discount cards to test its potential theoretical superiority.

It is also possible to bring out policy implications for health policy makers other than those in Lusaka and Kitwe from this study. Zambia has other urban districts without voluntary prepayments or discount cards, but similar to Lusaka and Kitwe: Ndola and Livingstone. It is recommendable to consider the introduction of alternative payment mechanisms to user fees in these districts by carefully learning lessons from practice in Lusaka and Kitwe. In addition to this policy implication in the short run, growing urbanisation accompanying the increase of people working in the informal sector as seen in Copperbelt area or Mazabuka suggests expansion of voluntary prepayment as a payment mechanism is a reasonable option in order to assure access to health care by the poor section of population in the long run. Existing literature clarifies the difficulties of extending social insurance models to that population.

Since the context specified in the theoretical investigation is not limited to Zambian context, policy implications according to the theoretical model is thought of as applicable to similar settings such as urban informal sector in other low-income countries. It may be worth considering the use of prepayment or the trial of discount card as alternative payment mechanism a viable policy option even where managerial capacity to maintain quality of care is limited. The empirical findings of this study suggest the possibility of realising equilibrium of health care related markets where equity increases.

10.9 SCOPE FOR FURTHER RESEARCH

There is scope for further investigation expanding this study to answer original research questions more precisely.

With regard to the first and the second research questions, theoretical models should be tested and refined. Although the appropriateness of the theoretical models is shown to a certain extent in this study, the evidence is limited such that price factor is not tested, or relatively weak such that the effects of income factors and quality of care in the choice are not clearly demonstrated. Further empirical investigation of the models with different data sets and in different operational contexts is worth while. With these exercises, equity implications of use of voluntary prepayment or discount card together with user fees as direct payment mechanisms will be further clarified.

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APPENDIX 1

THEORETICAL MODELS OF

THE DEMAND FOR HEALTH CARE AND HEALTH INSURANCE

In this Appendix 1, algebraic presentations of the models, which are reviewed in Chapter 3, are shown.

1. Simple Utility Maximisation Model

The model developed by Joseph (1971) is as below.

Maximise $U = U(m, X)$

subject to: $pm + qX = y$

where U = utility

m = constant quality units of medical services

X = a composite of all other goods

p = price of a unit of medical services

q = price of a unit of other goods

y = individual income, which is completely exhausted by expenditures on m and X

The model developed by Acton (1975) is as below.

Maximise $U = U(m, X)$

subject to: $(p + wt)m + (q + ws)X \leqq Y = y + wT$

where U = utility

m = constant quality units of medical services

X = a composite of all other goods

p = price of a unit of medical services

w = hourly earnings

t = time price per unit of medical services

q = price of a unit of other goods

s = time price per unit of other goods

Y = full income including earned income, unearned income, and the opportunity cost of home production

y = unearned income

T= total time available for market work and own production

2. Household Production Model

The model developed by Holtsman and Olsen (1976) is as below.

Maximise $U = U(D, C)$

subject to: $(p_d b_d + t_d w)D + (p_c b_c + t_c w)C = wT + B = Y$

given production relationships: $T_d = t_d D$

$T_c = t_c C$

$X_d = b_d D$

$X_c = b_c C$

where U = utility

D = composite of dental hygiene

C = composite of all other commodities

p_d = fixed price for dental services (X_d)

b_d = fixed coefficient of production relating the market-purchased input, dental services (X_d), to the output of home production, dental hygiene (D)

t_d = the coefficient relating the time input to the production of dental hygiene

w = fixed wage

b_c = the coefficient relating the production of other commodities to the input of a specific market good or bundle of market goods (X_c)

p_c = fixed price of X_c

t_c = fixed time coefficient of production for the other commodities

T = total time available

B = other income

Y = 'full' income

The model developed by Heller (1982) is as below.

Maximise $U = U(k, x, m')$

subject to: $(\pi_1 + wt)k + (\pi_2 + ws)(m + m') + (\pi_3 + wv)x \leqq Y = y + wT$

given: $H = H(x, k; A, E, e)$ [Health Status]

$m = G(H) = g(x, k; A, E, e)$ [Health Need]

where U = utility

k = preventive services

x = composite of other goods and services

m = necessary level of curative care

m' = discretionary purchase of medical care

$M = m + m'$ = total purchase of medical care

π_1 = money price of k

w = wage rate

t = time price of k

π_2 = money price of M

s = time price of M

π_3 = money price of x

v = time price of x

Y = full income

y = unearned income

T = productive time available

wT = earned income

H = health status

A = age

E = hygienic quality of home environment

e = virulence of disease agents in community

3. Human Capital Model

Simplified Grossman's model (1972) is as below.

Maximise $U = U(\Phi_0 H_0, \ldots, \Phi_n H_n, Z_0, \ldots Z_n)$

subject to: $\Sigma[P_i M_i + F_i X_i + W_i(TH_i + T_i + TL_i) / (1 + r)^i]$

$= \Sigma[w_i \Omega / (1 + r)^i] + A_0 = R$

given household

production relationships: $H_{i+1} - H_i = I_i - \delta_i H_i$

$I_i = I_i(M_i, TH_i; E_i)$

$Z_i = Z_i(X_i, T_i, E_i)$

where U = utility

Φ_i = service flow per unit of health capital in the ith time period (healthy days)

H_0 = initial stock of capital

H_i = stock of health in the ith time period

Z_i = total consumption of other commodities in the ith time period

P_i = price of medical care

M_i = quantity of medical care

F_i = price of market goods used in producing Z_i

X_i = market goods used in producing Z_i

W_i = wage rate

TH_i =time used in producing health

T_i = time used in producing other commodities

TL_i = time lost due to illness or injury

r = interest rate

$\Omega = TW_i + TH_i + T_i + TL_i$, total amount of time available in period i

TW_i = hours of work

A_0 = discounted property income or initial assets

I_i = gross investment in health

δ_i = rate of depreciation of stock of health

E_i = stock of human capital

Grossman derives a fundamental relationship from his model as below.

$$\gamma_i + a_i = r - \pi'_{i-1} + \delta_i$$

where γ_i = marginal money rate of return to an investment in health (pecuniary return)

a_i = marginal psychic return of improved health (consumption return)

r = interest rate forgone by investing in health capital instead of other assets

π'_{i-1} = percent change in the marginal cost of health investments from the last period to the current period

δ_i = rate of depreciation of health stock

This states that the marginal cost of investments in health must equal the marginal rate of return to those investments. Pure investment model is reduced through setting $a_i = 0$, which means an assumption that all return to health come from the pecuniary return caused by more healthy days and that there is no psychic return to better health. Pure consumption model is reduced through letting 'i' in the equation zero. Then the marginal return to healthy days is psychic benefits alone.

4. Discrete Choice Model

The general model developed by Akin (1985) is almost similar to Acton's model as below.

Maximise $U = U(H, Z)$

subject to: $(P_H + wT_H)H + (P_Z + wT_Z)Z = y + wT$

where U = utility

H = a vector of health services

Z = a vector or a composite of all other goods and services

P_H = the money price of one unit of health services

w = the shadow hourly wage, or the opportunity cost of one hour of time

T_w = the amount of time spent in wage employment

T_H = the amount of time used to consume one unit of health services, in hours

P_Z = the price of one unit of other goods and services

T_Z = the time required to consume on unit of Z

y = unearned income (rent, profits, interest, gifts)

T = total time used in market work and in the consumption of other goods and services ($T_H + T_Z + T_w = T$)

However, the characteristics of Akin's model lies in the assumption in utility maximisation and the demand system derived from the reduced-form equations. He assumes an individual chooses one provider to consume health care from limited alternatives so as to maximise his/her utility. Then, the utility maximisation among alternatives is as below.

$$U^* = \max(U_i)$$

where U^* = maximum utility

U_i = utility from i^{th} alternative provider

And the demand system derived from the reduced-form equations is as below.

$$Q_{ij} = f_{ij}(Ppu_j, Ppr_j, Ptr_j, Tpu_j, Tpr_j, Ttr_j, Y, Z_j)$$

where Q_{ij} = whether medical service i was used by the jth individual

i = (public, private, traditional, or no care)

j = (all sick or pregnant individuals)

pu_j = Public clinic or hospital serving the jth individual

pr_j = Private clinic or hospital serving the jth individual

tr_j = Traditional healer or midwife serving the jth individual

P = vector of cash prices paid for each service

T = vector of time costs associated with each facility and service

Y_i = household assets for the jth individual

Z_j = a vector of social, demographic, and biological control variables for

the jth individual

5. Models for Health Insurance

The model for insurance in standard textbooks (adopted from Pauly, 1968) is as below.

Maximise $pU(W - L - \pi q + q) + (1 - p)U(w - \pi q)$

where p = probability of losing L

U = utility

W = initial wealth

L = loss

q = coverage

π = premium for unit coverage

The model developed by Holmer (1984) assumes that an individual family choose one health insurance plans among several available ones so as to maximise its expected utility. Then, the utility maximisation is as below.

$$EU^* = \max(EU_i)$$

where EU^* = maximum utility

EU_i = utility from i^{th} health insurance plan

APPENDIX 2

THE OUTLINE OF LCMS98

The Living Conditions Monitoring Survey 1998 (LCMS98) was carried out between November – December, 1998. The LCMS98 is a continuation of the Living Conditions Monitoring Surveys by Central Statistical Office started in 1991, which are intended to be carried out regularly for the purpose of the monitoring of living conditions and poverty: Social Dimensions of Adjustment Priority Survey I (1991), Social Dimensions of Adjustment Priority Survey II (1993) and the Living Conditions Monitoring Survey 1996 .

The LCMS98 was carried out nation-wide and covered 16,710 households representing a sampling fraction of about 1 household per every 113 households. The survey covered 8,487 households in rural areas and 8,223 households in urban areas.

The sample design used is the Probability Proportional to Size (PPS) method. This entailed allocating the total sample proportionately to each stratum according to its population share. Sample selection also followed the PPS method.

The survey covered the following topics:

- Demographic characteristics
- Migration

- Health
    - Has...been sick or injured during the last two weeks?
    - What was...mainly suffering from?
    - Did...consult any health or other institution/personnel for this illness/injury or did he/she only use self administered medicine?
    - How much in total was spent on....'s medication ?
    - How many visits did ..... make to the following institutions in the last two weeks?
    - Which health or other institution/personnel did .... visit first for this illness/injury?
    - Who attended to ... during this visit?
    - What services did... receive from the institution on this visit?
    - If .... was admitted to the institution on this visit, how many nights did he/she spend?
    - How much was spent on the following, for the first visit?
    - What was the method used for paying for the services of the facility on this visit?
    - Why didn't .... pay for the consultation on this visit?
    - Did .....make a second visit to this or another institution/personnel for the same illness/injury?
    - Which health or other institution/personnel did .... visit next for this illness/injury?
    - Who attended to ..... during this visit?
    - What services did .... receive from the institution during this visit?
    - If .... was admitted to the institution on this visit, how many nights did

he/she spend?

- How much was spent on the following, for the second visit?
- What was the method used for paying for the services of the facility on this visit?
- Why didn't .... pay for the consultation on this visit?
- Did ... visit other institutions/personnel for the same illness?
- Which health or other institution/personnel did .... visit next for this illness/injury?
- Etc.

- Education
- Economic Activities
- Income
- Under five Children Nutrition (Anthropometry)
- Access to various facilities & infrastructure
- Household Assets
- Expenditure
    - How much was spent on the following during the last 1 month?
        - Medicines
        - Fees to Doctor/Health Assistant/Midwife/Nurse/Dentist, etc.
        - Fees to Traditional healer
        - Payments to hospital/health centre/Surgery
        - Pre-payment scheme
        - Etc.
- Community Developmental Issues
- Food production

- Poverty

The above topics are the basis for computing poverty and analysing living conditions in Zambia and are based on an internationally accepted list of living conditions components.

The survey used two types of questionnaires to collect data from the field. The listing form was used to list all households in the sample enumeration areas, and the main questionnaire was used to obtain information on the household and each member of the household including questions on ill health episodes and coping behaviours experienced by each member during two weeks before the survey.

(Cited from Report of LCMS 1998 by Central Statistical Office, Lusaka (1999), with modification.)

APPENDIX 3

SAMPLE OF QUESTIONNAIRE USED

IN OUTPATIENT QUESTIONNAIRE SURVEY

Eight types of questionnaires by the district, age group, and discount card trial were used as below:

Lusaka	Adult	without discount card trial
		with discount card trial
	Child	without discount card trial
		with discount card trial
Kitwe	Adult	without discount card trial
		with discount card trial
	Child	without discount card trial
		with discount card trial

The following sample of questionnaire is the one used for adults at health centres with discount card trial in Lusaka.

Date of Interview: Day___ Month ___
Interviewer: _____

Name of Clinic: Chawama
Serial No. |_|_|_|

OUTPATIENT QUESTIONNAIRE

I am working on a research to improve health care in Zambia. I would like you to answer some questions about you, your family and this clinic. Everything you say will be kept CONFIDENTIAL. Thank you for your co-operation.

A. I will ask about your visits to clinics.

01	Do you come to this clinic every time you get sick? Tick one boxes applicable	|_| yes — Go to 03 |_| no — Go to 02
02	In last one year, Have you visited different governmental clinic or hospital? Have you visited private clinic or hospital? Have you visited traditional healer? Have you visited pharmacy? Tick all boxes applicable	|_| different governmental clinic or hospital |_| private clinic or hospital |_| traditional healer |_| pharmacy
03	How often do you usually come to this clinic? Once a month? Every three months? Once a year? Or do you have regular visits because of long standing illness? Tick one box applicable	|_| more than once a month |_| once a month |_| every three months |_| every six months |_| once a year |_| less than once a year |_| having regular visits, then specify diagnosis ( ) frequency ( )
04	How far is this clinic from your home? How many minutes? Record the response or tick one box applicable	( ) minutes |_| 0 – 14 minutes |_| 15 – 29 |_| 30- 44 |_| 45 –59 |_| 1 hour or more
05	How did you come to this clinic? Tick all boxes applicable	|_| walk |_| bus |_| car |_| other specify ( )
06	How much did it cost you to come to this clinic? Record the response	( ) K |_| none

B. I will ask about your feelings on this clinic.

07	Do you think drugs are always available at this clinic? Always available? Sometimes available? Sometimes not available? Always not available? Tick one box applicable	|_| always available |_| sometimes available |_| sometimes not available |_| always not available
08	Do you think this clinic does not have enough medical machines? Almost no machines? Not enough? Enough? Plenty? Tick one box applicable	|_| almost no machines |_| not enough |_| enough |_| plenty

Lusaka with discounted card

09	Do you think the sisters at this clinic are nice and kind? Very nice and kind? Nice and kind? Sometimes rude? Very rude? Tick one box applicable	 |_| very nice and kind |_| nice and kind |_| sometimes rude |_| very rude
10	Do you think the money you pay at this clinic is expensive? Very expensive? Expensive? Cheap? Very cheap? Tick one box applicable	 |_| very expensive |_| expensive |_| cheap |_| very cheap
11	Do you think sisters at this clinic are good at giving shots and doing tests? Very good? Good? Bad? Very bad? Tick one box applicable	 |_| very good |_| good |_| bad |_| very bad
12	Do you think this clinic is far and bothersome to come? Very far Far Close Very close Tick one box applicable	 |_| very far |_| far |_| close |_| very close

C. I will ask about your payment at this clinic.

13	How are you going to pay for today's visit, scheme card, user charge, or discounted card? If this is reattendence, how did you pay for your first consultation? Tick one box applicable	|_| scheme card |_| user charge |_| discounted card |_| unable to pay	Go to 14 Go to 17 Go to 21

If scheme card

14	Did you buy a new scheme card for this visit? (within a couple of days ago) Tick one box applicable	|_| yes |_| no	Go to 16 Go to 15
15	How many months have you had this scheme card? Record the response	( ) months	
16	Do you know discounted card? Tick one box applicable	|_| yes |_| no	 Go to 24

If user charge

17	Have you ever used scheme card? Tick one box applicable	|_| yes |_| no	
18	Do you know discounted card? Tick one box applicable	|_| yes |_| no	Go to 19 Go to 20
19	Have you ever used discounted card? Tick one box applicable	|_| yes |_| no	
20	Why do you chose to pay user charge instead of scheme card or discounted card? Tick one box applicable	|_| not knowing |_| expensive |_| seldom falling ill |_| not living in this district |_| cannot wait for 24 hours |_| other specify ( ) Go to 24	

If discounted card

21	Is this your own discounted card? If no, from whom were you given this? Tick one box applicable	|_| yes |_| no specify relationship ( )
22	Is this your first discounted card? If yes, how many coupons have you used in your card?(before submitting a coupon for today's episode) Tick one box applicable	|_| no, already finished the first card(4 coupons) |_| 0 (buying a new card for this episode) |_| 1 (3 coupons left) |_| 2 (2 coupons left) |_| 3 (1coupons left)
23	Will you purchase a new discounted card when this card is finished? Tick one box applicable	|_| yes |_| no Go to 24

D. I will ask about you and your family.

24	When is your birthday? How old are you? [Check sex and tick one box applicable]	( ) d ( ) m ( ) y ( ) years old |_| male |_| female
25	Do you work? What is your job? Or are you a student? Tick one box applicable	|_| employed |_| self employed |_| not working but looking for |_| retired |_| full-time student |_| full-time homemaker |_| other specify ( )
26	(If student) What is the level of your school attending? (otherwise) What is the highest level of school attended? Primary? Secondary? Higher? Tick one box applicable	|_| less than one year |_| primary |_| secondary |_| higher
27	How many children are you living together as a family? How many adults are you living together as a family including yourself? Record the response	( ) children ( ) adults
28	How many people in your family worked last month? Record the response	( ) people
29	Did you work last month? If yes, how much money did you make last month? Tick one box applicable	|_| yes ( ) K |_| no
30	This is the last question. How much money did your family make last month in total? Record the response or tick one box applicable	( ) K |_| 0 - 24,999 K |_| 25,000 - 49,999 |_| 50,000 - 99,999 |_| 100,000 - 199,999 |_| 200,000 - 399,999 |_| 400,000 - over

Thank you for your time. And I hope you will feel better soon.

Lusaka with discounted card

APPENDIX 4

LIST OF VARIABLES IN THEORETICAL MODELS

The abbreviations for variables in theoretical models are as below.

1. Utilisation model

Cusr = cost of health care with user charge

Cpre = cost of health care with prepayment

Cdis = cost of health care with discount card

Qusr = quantity demanded with user charge

Qpre = quantity demanded with prepayment

Qdis = quantity demanded with discount card

2. Choice model

alt = (usr, pre, dis)

C = cost of an alternative

d = discount rate for the price of discount card

EH = expected consumption of health care

EU = expected utility

EW = expected wealth

F = user fee

f = whether an alternative is chosen or not

h = number of persons in the group of consumers

HS = current health status

IW = initial wealth

k = expected number of discount card purchased

m = number of coupons in one discount card

n = expected number of episodes he/she has during the period

n' = expected number of episodes the group of consumers have during the period

Q = perceived quality of care

q = probability of receiving appropriate health care

R = premium of prepayment

t = private time preference rate

TCH = total cost of health care

V = value of one coupon at the point of purchase

Z = a vector of other factors