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Antenatal care and pregnancy outcomes in a safe motherhood health voucher system in rural Kenya, 2007–2013

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Setting: A rural private health facility, Ruby Medical Centre (RMC), participating in a safe motherhood health voucher system for poor women in Kiambu County, Kenya.

Objectives: Between 2007 and 2013, to determine 1) the number of women who delivered at the RMC, their characteristics and pregnancy-related outcomes, and 2) the number of women who received an incomplete antenatal care (ANC) package and associated factors.

Design: Retrospective cross-sectional study using routine programme data.

Results: During the study period, 2635 women delivered at the RMC: 50% were aged 16–24 years, 60% transferred in from other facilities and 59% started ANC in the third trimester of pregnancy. Of the 2635 women, 1793 (68%) received an incomplete ANC package: 347 (13%) missed essential blood tests, 312 (12%) missed the tetanus toxoid immunisation and 1672 (65%) had fewer than four visits. Presenting late and starting ANC elsewhere were associated with an incomplete package. One pregnancy-related mortality occurred; the stillbirth rate was 10 per 1000 births.

Conclusion: This first assessment of the health voucher system in rural Kenya showed problems in ANC quality. Despite favourable pregnancy-related outcomes, increased efforts should be made to ensure earlier presentation of pregnant women, comprehensive ANC, and more consistent and accurate monitoring of reproductive indicators and interventions.

Access to good quality antenatal care (ANC) is critical to ensure favourable maternal and neonatal outcomes. While good ANC is provided for >90% of pregnant women in industrialised countries, coverage is far lower in sub-Saharan Africa due to poor health-seeking behaviour, lack of access to services, social and cultural barriers and poverty.1,2 Maternal and perinatal mortality therefore remains high in many African countries.

In Kenya, the maternal mortality ratio was reported at 488 per 100,000 live births in the 2008/2009 Kenya Demographic Health Survey.1 This is a far cry from the projected target of 147/100,000 live births, which would accelerate attainment of the Millennium Development Goal 5 by 2015.3 Impoverished pregnant women are particularly vulnerable due to malnutrition, lower levels of education, less empowerment and financial insecurity, and this often results in no or delayed access to reproductive health services, which in turn compromises quality of care.4 Various strategies have been used to improve the uptake and quality of care, including targeted ANC, conditional cash transfer voucher schemes, subsidised financing, free maternity services and maternity waiting homes for pregnancy and childbirth.5–7

In Kenya, one recent strategy is output-based aid (OBA), a health voucher system that targets low-income mothers, enabling them to obtain a package of antenatal, intrapartum and postpartum care along with the provision of long-term family planning. Unlike the routine established health system in Kenya, where women have to pay out-of-pocket expenses for pregnancy and childbirth, fees paid by women in OBA are highly subsidised, with health facilities being reimbursed by the voucher management agency depending on the services that they have provided to expectant and post-partum mothers.8,9

The OBA project in Kenya was established in 2006 as a collaborative public-private partnership between the Kenyan and German governments, with services being provided to pregnant women in the Nairobi slums and the counties of Kisumu, Kitui and Kiambu.10 A number of health facilities within each of these areas are accredited to provide a package of reproductive health services under the OBA health voucher system. This is designed to provide the safe motherhood package of services in a structured manner and to encourage mothers to attend the recommended scheduled visits and receive the appropriate interventions, with freedom to select their preferred OBA facility.11 The Ruby Medical Centre (RMC), based in Kiambu West, was incorporated into the OBA project in 2007 and is one of 10 OBA accredited health facilities in Kiambu.

The OBA health voucher system has not yet been formally evaluated at the county level. As it is now in its seventh year of implementation, and given the importance of public-private partnership in Kenya, this is an appropriate time to conduct this assessment.12 The aim of the present study was to report on the use of ANC and pregnancy outcomes among women who delivered through the OBA health voucher system at the RMC. Specific objectives were to determine 1) the number of women who delivered at the RMC, their characteristics and pregnancy-related outcomes; and 2) the number of women who received an incomplete ANC package and associated factors.

METHODS

Study design
This was a cross-sectional study using routinely collected programme data.

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Setting

General
Kenya is an East African country (population 38 million) with a gross domestic product of USD 882 per capita per year in 2012.13,14 The country is now divided into 47 counties, each with a local administrative bureaucracy, with health care being decentralised to the county level. Health care is not free at the point of care; out-of-pocket expenditures occur for every aspect of diagnosis, treatment and prevention, including reproductive services. However, free maternity services have been offered in government facilities since June 2013.

Study setting
The study was carried out at the RMC, Kiambu West, Rungu township, 22 km from Nairobi, the capital city of Kenya. The catchment area has a radius of 10–15 km and serves a population of approximately 150000, consisting mainly of poor subsistence farmers earning <USD 1.00 a day. RMC is a private maternity centre, with 12 beds, a delivery room, an operating theatre and a newborn nursery that handles term babies. All pre-term or low birth weight babies (defined as <2.0 kg) are referred to specialised services. RMC operates as a private-public partnership with the Ministry of Health, with services offering capacity building for health personnel, pregnancy and childbirth services, including caesarean sections, family planning, neonatal immunisation and a rigorous monitoring system in line with Ministry of Health systems and quality assurance. The clinical staff consists of one obstetrician-gynaecologist, one medical officer, one clinical officer-anesthetist, two general care clinical officers and five midwives. Sick mothers and babies requiring intensive care are referred to Kenyatta National Hospital or Kijabe Mission Hospital.

OBA system
The essential aspects of the OBA voucher system are shown in Table 1. Pregnant women who enrol in an OBA facility are encouraged to stay with that facility for the duration of the pregnancy, the delivery and 6 weeks of post-partum care. However, they may transfer to another of the nine OBA facilities within the county at any stage.

Study population
The study population included all women who enrolled and delivered in the OBA health voucher system at the RMC between January 2007 and December 2013.

Data variables
Data variables included numbers enrolled in each quarter, socio-demographic and reproductive characteristics, the use by each woman of the different components of the ANC package, and maternal and perinatal outcomes at delivery. These data were routinely captured in patient file records, Ministry of Health antenatal enrolment records, maternal log booklets and delivery registers, which were extracted into an Excel (Microsoft, Redmond, WA, USA) electronic database maintained by the RMC between August 2013 and April 2014. Data in the electronic database were validated for consistency and checked for missing variables using pre-developed Stata scripts (StataCorp, College Station, TX, USA). A complete ANC package was defined as blood tests for haemoglobin, blood group, screening for syphilis and human immunodeficiency virus (HIV), tetanus toxoid immunisation, and four or more antenatal visits. An incomplete ANC package was defined as failure to undergo one or more of these listed components.

Analysis and statistics
Data were transferred and analysed using EpiData Analysis software (version 2.2.2.182, EpiData Association, Odense, Denmark), and a descriptive analysis was performed. Maternal and neonatal outcomes in women who received a complete ANC package and those who received an incomplete package were compared using the χ² test, with relative risks (RRs) and 95% confidence intervals (CIs). Levels of significance were set at 0.05. For morbidity statistics, we report disease episodes instead of patient-specific morbidity due to the multiplicity of diagnoses per patient.

Ethics approval
Ethics approval for the study was obtained from the Moi University Institutional Research and Ethics Committee (Eldoret, Kenya) and met the Médecins Sans Frontières (MSF, Brussels Operational Centre, Luxembourg). The specific SORT IT programme which resulted in this publication was jointly developed and implemented by: the Operational Research Unit (LUXOR), MSF, Brussels Operational Center, Luxembourg; the Centre for Operational Research, The Union, Paris, France; the Union South-East Asia Regional Office, New Delhi, India; the Centre for International Health, University of Bergen, Bergen, Norway.

Special thanks go to the Administrator of Ruby Medical Centre, F C Njoroge, and the record clerks who entered the data, D M Gitari and R M Nthiga. The programme was funded by MSF, The Union, the Department for International Development (London, UK) and the WHO. The funders had no role in study design, data collection and analysis, preparation of the manuscript, or preparation of the publication. In accordance with the WHO’s open-access publication policy for all work funded by WHO or authored/co-authored by WHO staff members, the WHO retains the copyright of this publication through a Creative Commons Attribution Intergovernmental Organizations licence (http://creativecommons.org/licenses/by/3.0/goi/egacode), which permits unrestricted use, distribution and reproduction in any medium provided the original work is properly cited. Conflict of interest: none declared.

TABLE 1 Key components of the OBA system in Kenya

| Eligibility of patients for the OBA voucher system is determined by voucher distributors who assess the individual’s poverty status based on set criteria in a poverty index tool provided by the government.4 When a pregnant woman is enrolled into the OBA system, she pays the equivalent of USD 2.5 to access a package of antenatal, intrapartum and postpartum care. She can also opt to pay an additional equivalent of USD 1 for long-term family planning. She receives a maternity booklet (which serves as a log of services provided), her next scheduled visits and health messaging. The antenatal services that should be provided for the pregnant woman in the OBA system include comprehensive past reproductive history and pregnancy risk status, a minimum of four antenatal visits at scheduled times with appropriate monitoring, prophylactic administration of tetanus toxoid, and blood tests that include haemoglobin, blood group, screening for syphilis and HIV. | }

ACKNOWLEDGEMENT
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Board-approved criteria for the analysis of routinely collected programme data. It also satisfied the requirements of the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France, and met their approval.

RESULTS

A total of 2635 women were enrolled and delivered at the RMC during the study period, (numbers for each quarter are shown in Figure 1). There was a striking decline in deliveries starting in the second half of 2008 as a result of both reaccreditation processes and financial constraints within the OBA health voucher system and another decline in the second half of 2013, coinciding with the Ministry of Health’s introduction of free maternity care in the country.

Socio-demographic and reproductive characteristics of women delivering at RMC are shown in Table 2. Key findings were that half of the women were aged 16–24 years, most were married and housewives, and only about half had primary school education. Most women already had children. There was poor documentation of pregnancy risk status, but where it was indicated the majority (402/427) were high risk. Two thirds of women started ANC in OBA clinics elsewhere and transferred to the RMC for their delivery. Figure 2 shows the gestational age in weeks of women presenting for their first ANC visit. It should be noted that 1548 (59%) women started their care in the third trimester.

The numbers and proportions of women receiving a complete or incomplete ANC package each year are shown in Figure 3: 842 (32%) received the complete package. Of the 1793 women who received an incomplete package, the number and proportion that missed different components of the package are shown in Table 3. In summary, 13% missed one or more laboratory tests, 12% missed their tetanus toxoid injection and 66% had fewer than four antenatal care visits. Factors associated with receiving a complete or an incomplete ANC package are shown in Table 4. Receiving an incomplete care package was associated with starting ANC elsewhere and presenting in the third trimester.

Two thousand, two hundred and sixteen (84%) women had a spontaneous vaginal delivery, 8 (<1%) had an assisted vaginal delivery and 409 (16%) had a caesarean section: no record of the mode of delivery was found for two patients. Maternal morbidities included postpartum haemorrhage (37/151, 25%), obstructed labour (17/151, 11%), pre-eclampsia/eclampsia (25/151, 17%) and HIV (2/151, 1%). There was one pregnancy-related...
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FIGURE 2  Gestational age at first ANC visit for women who delivered at the Ruby Medical Centre, Kiambu, Kenya, 2007–2013. ANC = antenatal care.

FIGURE 3  Pregnant women who delivered and received a complete or incomplete ANC package at the Ruby Medical Centre, Kiambu, Kenya, 2007–2013. ANC = antenatal care.

TABLE 3  Pregnant women who delivered and received an incomplete ANC package at the Ruby Medical Centre, Kiambu, Kenya, 2007–2013

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total deliveries</td>
<td>2635 (100)</td>
</tr>
<tr>
<td>Women who received an incomplete ANC package</td>
<td>1793 (68)</td>
</tr>
<tr>
<td>Women with any missed blood test*</td>
<td>347 (13)</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>303 (12)</td>
</tr>
<tr>
<td>Blood group</td>
<td>159 (6)</td>
</tr>
<tr>
<td>VDRL</td>
<td>162 (6)</td>
</tr>
<tr>
<td>HIV test</td>
<td>124 (5)</td>
</tr>
<tr>
<td>Women who missed an injection*</td>
<td></td>
</tr>
<tr>
<td>Tetanus toxoid immunisation</td>
<td>312 (12)</td>
</tr>
<tr>
<td>Women attending fewer than four ANC visits*†</td>
<td>1672 (65)</td>
</tr>
<tr>
<td>No visit</td>
<td>6 (&lt;1)</td>
</tr>
<tr>
<td>1 visit only</td>
<td>461 (18)</td>
</tr>
<tr>
<td>2 visits only</td>
<td>606 (23)</td>
</tr>
<tr>
<td>3 visits only</td>
<td>599 (23)</td>
</tr>
</tbody>
</table>

* The number and proportion of women who missed different components of the ANC package.
† Number of ANC visits was known for 2579 women, with 56 not recorded.
ANC = antenatal care; VDRL = venereal disease reference laboratory test for syphilis; HIV = human immunodeficiency virus.
maternal death from eclampsia. Among neonates, there were 2695 (99%) live births, 28 (1%) still births (16 fresh and 12 macerated) and 2 with no documentation, giving a still birth rate of 10 per 1000 births. Among the causes of neonatal morbidity, birth asphyxia (57/119, 48%), respiratory distress (30/119, 25%) and prematurity (26/119, 22%) were common. There was no significant difference in maternal or perinatal outcomes between those who received a complete and those with an incomplete ANC package.

**DISCUSSION**

This is the first formal assessment of the OBA health voucher system in a large county in Kenya. Over the 7-year period, the system worked well, with over 2600 women delivering at the RMC, and resulted in excellent maternal and perinatal outcomes compared with national figures. The health voucher system in general targeted young married housewives, the majority of whom already had children.
An interesting finding was that two thirds of women started ANC in another OBA-accredited facility, generally in the public sector, and transferred to the RMC for delivery. Many of these women also presented for ANC late in their third trimester of pregnancy. The reasons for not attending the RMC first are not clear, but may be related to health-seeking behaviour, the proximity of their homes to the health facility,2 transport costs and enrolment bureaucracy.

Only a third of the women received the complete ANC package. The main reason for not receiving the full package was failure to visit the ANC on four or more occasions, one of the key factors recommended by the World Health Organization for achieving the full life saving potential that ANC promises for women and babies.15 A proportion of women also missed their tetanus toxoid immunisation and blood tests for haemoglobin, syphilis and HIV. Ascertainment of a woman’s haemoglobin level is essential, as anaemia in the antenatal period can be corrected with iron and folate supplementation, and precautionary preparations can be made before delivery, as haemorrhage is a major cause of maternal mortality.16 Maternal syphilis is an important cause of stillbirth, and is treatable.15 In Kenya and other African countries with high HIV prevalence,14,17 HIV testing is crucial to identify HIV-infected women, prevent mother-to-child transmission of HIV and ensure maternal and childhood survival.18

Although perinatal outcomes were good, there were 28 stillbirths. In worldwide data-collating systems, stillbirths do not count. In 2009, there were an estimated 2.6 million stillbirths, the majority in South Asia and sub-Saharan Africa, and although these are thought to be declining, progress is not as good as with maternal mortality and deaths in infants and children aged <5 years.19 Stillbirths cause considerable maternal grief, stigma and marginalisation, with the mother’s sins and evil spirits being held by rural communities to be important causes.20 It is believed that appropriate high-quality interventions in the pre-conception, antenatal and intrapartum periods could reduce the incidence of stillbirths by 33%.21

The strengths of this study were the large number of women included, the 7-year period of observation and the generally good documentation of socio-demographic characteristics, ANC interventions and pregnancy-related outcomes. Attention was also paid to following internationally agreed recommendations for reporting on observational studies.22,23

There were some limitations. First, the design study would have been strengthened by including a comparator group. However, this was difficult to do within the clinic, as the voucher system targeted women from low-income settings, while the clinic provided services to private patients. Furthermore, there were no other similar clinics not running a voucher system with which to compare data. Second, recording of reproductive characteristics focusing on pregnancy risk status was poor, and this needs to be improved in future. Third, we did not look at the county uptake of care in the OBA health voucher system; this would have required information on all deliveries in the county between 2007 and 2013. Studies have shown an increased uptake of institutional delivery using maternal health voucher schemes in South Asia,24,25 and this is an area of work that we would like to look into in future.

The study has several implications. First, the striking decline in the number of deliveries at the RMC in 2008 and 2009 was associated with bureaucratic hurdles and financial constraints, and these must be anticipated and prevented so that services are not interrupted. Such management practices are now in place. Second, women should be strongly encouraged to present earlier in pregnancy so that they can receive optimal benefit from appropriate ANC interventions that are known to reduce maternal and perinatal morbidity and mortality.15 One ANC visit and late presentation is not enough to predict or prevent obstetric complications.26 More needs to be done to provide ANC at the community level close to women’s homes. Third, documentation should be improved so that there is comprehensive, good-quality data, especially for reproductive health characteristics. In these settings, there is a need for regular, structured and rigorous monitoring of interventions to determine whether the quality of care is good and whether this is making a difference to maternal health, and a cohort analysis approach might be useful.27 Finally, further quantitative and qualitative research is needed to better understand the dynamics and client perspectives of the OBA health voucher system, whether this can be further decentralised into the community and whether it is still viable now that national policy includes free maternal care.

In conclusion, this first formal assessment of the health voucher system in rural Kenya uncovered problems with the quality of ANC. Despite favourable pregnancy-related outcomes, increased efforts should be made to ensure earlier presentation of pregnant women, comprehensive ANC, and more consistent and accurate monitoring of reproductive indicators and interventions.

References
Objetivos: Entre 2007 y 2013, determinar 1) el número de mujeres que accedieron a ANC incompleta, sus características y el porcentaje de gestantes que no visitaron el programa y 2) el número de embarazadas que recibieron un paquete de ANC incompleto.

Schéma: Estudio transversal basado en series de datos recopilados en el sistema de ANC.

Résultats: De las 2635 mujeres que acudieron al RMC, 50% tenían entre 16 y 24 años, 60% había comenzado la ANC durante el tercer trimestre del embarazo. De las 2635 mujeres, 1793 recibieron una ANC incompleta (68%) a saber: en 347 no se practicaron los principales exámenes sanguíneos (13%); 312 (12%) n’ont pas eu de vaccination anti-tétanique et 1672 (65%) ont eu moins de quatre consultations. Un démarrage tardif y des ANC completó al menos 68% de las mujeres.

Conclusion: El presente estudio es la primera evaluación del sistema de cupones por una maternidad sin riesgo en el condado de Kiambu en Kenia. En el curso de este estudio, se atendió el parto de 2635 mujeres en el RMC, el 50% de las cuales tenía entre 16 y 24 años de edad, el 60% acudió como remisión de otros centros de atención y el 59% tenía una ANC incompleta. Un decés lié a la grossesse est survenu et le taux de mortalidad de los órganos de la ANC se ha reducido.

Marco de referencia: El Ruby Medical Centre (RMC) es un centro de atención de salud privado en zona rural, que participa en el sistema de cupones por una maternidad sin riesgo en el condado de Kiambu en Kenia. En el contexto, se realizó un estudio transversal para determinar el número de embarazadas que recibieron una ANC incompleta y los factores asociados con esta situación.

Métodos: Fue un estudio transversal retrovisor para identificar el número de embarazadas que recibieron una ANC incompleta y los factores asociados con esta situación.

Resultados: Durante el período del estudio, se atendió el parto de 2635 mujeres en el RMC, el 50% de las cuales tenía entre 16 y 24 años de edad, el 60% acudió como remisión de otros centros de atención y el 59% tenía una ANC incompleta durante el tercer trimestre del embarazo. De las 2635 mujeres, 1793 recibieron una ANC incompleta (68%) a saber: en 347 no se realizaron los principales exámenes sanguíneos (13%); 312 no recibieron la vacuna anti-tétanico y 1672 (65%) no tuvieron más de cuatro consultas. Un démarrage tardif y des ANC completó al menos 68% de las mujeres.

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