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## PUBLIC HEALTH | RESEARCH ARTICLE

# Maternity care system in Maputo, Mozambique: Plans and practice?

Qian Long<sup>1,2\*</sup>, Tavares Madede<sup>3</sup>, Saara Parkkali<sup>2</sup>, Leonardo Chavane<sup>3</sup>, Johanne Sundby<sup>4</sup> and Elina Hemminki<sup>2</sup>

**Abstract:** Mixed methods were used with various data sources to describe organisation and delivery of maternity care in Maputo city, Mozambique in early 2010s and to compare the plans with the service provision in practice. In the public health sector, maternity care was organised to be area based and hierarchical with a planned referral system. The provision of basic and emergency maternity care was publicly funded, largely dependent of donor funds, and free of charge for users. Even though Maputo City was better resourced than the rest of the country, there was a large lack of health professionals. Women's choices and self-referrals, even to higher levels of care, were common, which broke the plans of areas responsibility, gate keeping and care by medical needs. Private services for maternity care had emerged for those who were able to pay, leading to dual practices of health professionals and shortage of care providers in the public system at odd hours. Information of maternity care was aggregate and poorly stored. The gap between “planned” services delivery and “practice” in a real-life requires overall health system strengthening to improve efficiency and effectiveness of health services delivery.

### ABOUT THE AUTHORS

The research team is cross-disciplined and research interests include health system and policy research, epidemiology of diseases and implementation, particularly in low-income countries. Recent interests include maternal health and health equity. This study is part of the project “Medical technology in maternity services – care practices, caesarean section and iron prophylaxis as examples in Maputo, Mozambique (METEMA)” funded by the Academy of Finland. The project aimed to study maternity care organisation with particular interest in the use of technology in Maputo city, Mozambique, to provide evidence for health system development in low resource settings.

### PUBLIC INTEREST STATEMENT

We studied organising maternity care in Maputo, Mozambique. In public sector, maternity care was organised by primary healthcare approach and it was planned to be area based with a referral system. Basic and emergency maternity care was publicly funded, largely dependent of donor funds, and free of charge for users. Numbers of health professionals were insufficient, even though Maputo was the capital with best healthcare resources. Women commonly chose their treatment site and/or bypassed primary healthcare, which broke the principle of area responsibility, gate keeping and judgment by medical needs. Private services had emerged for those who were able to pay, leading to dual practices of health professionals and shortage of care providers in the public facilities. Information of maternity care was aggregate and poorly stored. The gap between “planned” service delivery and “practice” in a real-life setting requires overall health system strengthening to improve performance of health services delivery.

**Subjects: Public Health Policy and Practice; Maternal and Child Health; Global Health**

**Keywords: maternity care; health policy formulation; health system performance; low-income setting**

## **1. Introduction**

International and national organisations have been active in formulating health policies and how health services ought to or could be organised in developing countries. But little research exists in forming how health services are actually carried out or what impact they have had (Knippenberg et al., 2005; Travis et al., 2004). Most statistics and research concern health level, utilisation of health care or specific vertical programmes with focus on disease reduction targets (Gazi, Hossain, Zman, & Koehlmoos, 2011; Kassebaum et al., 2014; Souza et al., 2013) rather than broad health system strengthening.

This concerns also maternity care, which for reason (Bhutta et al., 2014; Kinney et al., 2010; Lawn et al., 2014; Say et al., 2014) has been a special focus of various international and national health policies in poorer countries (Jasseh et al., 2011; Sundby, 2014; WHO, 2015). In many sub-Saharan African countries, the desired model of maternity care occurs in primary health care with referral system and arrangements for emergencies. In Mozambique previous studies on maternity care have concerned and quantified access, coverage and utilisation of prenatal and intrapartum care as measures towards achieving Millennium Development Goals (MDG) for reducing maternal mortality (Biza et al., 2015; Brentlinger et al., 2007; Chavane et al., 2014; Jamisse, Songane, Libombo, Bique, & Bique, 2004; Santos et al., 2006). These indicators are useful for health system framework, but do not tell how the health system works in practice.

In this paper we describe the maternity care services in Maputo city post the millennium shift, and compare how they are related to the official framework for service provision. We also give thoughts on explanations for discrepancies between plans and practice and the implications for health system development in low resource country. We do not discuss decentralisation, extent of community participation or leadership issues, as we did not have enough data of these issues.

## **2. Methods**

### **2.1. Study context**

Mozambique is a low income country in Sub-Saharan African region with a population of 25 million according to the estimates from the 2007 population census. After the long civil war ending in 1992, Mozambique economic development gradually recovered. Population health improved steadily over time, with the exception of a severe HIV epidemic. Maputo city is the capital of Mozambique located in the southern region. It has more than one million residents. In Maputo, indicators of socio-economic development and health status are notably better than in Mozambique overall and there are several training institutions of health professionals including medical faculties. Due to the civil war, Maputo was isolated until 1992 and HIV arrived there late, but then spread rapidly. More details of the study context are given in the Supplementary file.

### **2.2. Data sources**

Mixed methods from various data sources were used. The planned maternity system was concluded from national and Maputo city documents, completed with information received from expert interviews. Documents included strategic plans, programme assessment reports, various internal reports, and published research articles. In addition, published master theses related to maternity care delivery in Mozambique and/or Maputo city were searched and reviewed. Documents were identified via experts and researchers having done research in the field. A local researcher (TM) reviewed documents in Portuguese and summarised them in English, using a data extraction guide

developed by the research team. An international researcher (QL) reviewed documents in English. The remaining authors reviewed the text and added relevant information.

To understand how the maternity care system functioned in practice, we used following data sources: semi-structured interviews of experts, unstructured interviews and discussions with local and international experts, observations when preparing a pragmatic randomised controlled trial on routine iron prophylaxis during pregnancy in Maputo (PROFEG), observations when collecting trial outcome data and the outcome data itself, Demographic and Health Survey (DHS) data used in a sub-study (Long, Kempas, Madede, Klemetti, & Hemminki, 2015) and local authors' (LC, TM) experience and observations.

Semi-structured in-depth interviews were conducted with four key informants, two decision makers in charge of maternity services at Maputo city, two staff members working in international organisations, and eight maternity care providers working in different health facility levels in Maputo City. The people were selected by a snow-ball method: a preliminary list was made on the basis of position, and further experts were asked from those already interviewed. The interview instrument included topics to explore perceptions of stakeholders on strengths and weaknesses of current maternity care system and asked their suggestions to improve maternity services. Most interviews were conducted in 2012 in Portuguese and recorded. They were later transcribed in Portuguese and translated into English. One interview was made in English.

PROFEG-trial was prepared in 2005–2006. Discussions, observations and written material accumulating during trial preparations and later during the trial were used to describe the system in practice (Hemminki et al., 2016; Nwaru et al., 2015). The principal investigator (EH) made several visits to Maputo doing observations, studying documents and interviewing local care providers, health care planners and financiers, international experts. These were frequently followed by later correspondence. A Finnish research coordinator (SP) knowing Portuguese fluently stayed in Maputo in 2004–2010. She made notes of the system while preparing the trial, recruiting health centres and monitoring the trial. She recoded observations of her visits to health care facilities in a diary and abstracted information from study nurses diaries; meeting minutes and correspondence with health authorities and maternity care providers were retained and used in this paper.

PROFEG trial recruited 4,326 pregnant women and data of their service utilisation were collected in various ways, included recording their subsequent prenatal visits, place of birth and delivery mode (Hemminki et al., 2016). To find the births of women, who were lost with the original data collection method, all births in key health facilities and all mothers' deaths in a certain time period and were collected from routine records. To link these data to the study women, negotiations with care providers and thorough examination of the maternity care sites and vital registration system were made.

The most recent Mozambique DHS was made in 2011. The multi-stage, stratified sampling procedure was used to randomly select households. In each household, women aged 15–49 years were interviewed. The long questionnaire included information on maternity care utilisation (for more details, see Long et al., 2015). Data were downloaded from the website of the Measure DHS, and data on births in Maputo City were analysed.

### **2.3. Data analysis**

The qualitative interview data were analysed using the frame-work approach. An analytical framework of various dimensions in maternity services organisation and delivery was developed on the basis of literature review, preliminary findings of the PROFEG trial, reports of Mozambique DHS and field observations. The framework was modified according to themes emerging from the interviews. Research team members read, discussed and clarified contents in the interview transcripts, particularly in relation to planned maternity services. Common and/or divergent perceptions of different stakeholders were identified and classified. Analysis of quantitative data from documents and previous reports was descriptive. The results of the PROFEG trial and the utilisation of maternity care with

a focus on the use of C-section from DHS data were reported in other publications (Hemminki et al., 2016; Long et al., 2015), and mainly served for data triangulation in this paper. Explanations for discrepancies between the plans and practice were developed by authors' own field experiences and by consulting experts.

#### **2.4. Ethics and permissions**

To access unpublished documents as well as health register data, permissions were obtained from the Mozambique Ministry of Health and Maputo City Health Authority. To make the semi-structured interviews, a supplement to the application approved for the PROFEG trial was made. All interviewees gave their oral consent to data collection for the study; one interviewee asked not to be identified. For the PROFEG trial and data collection ethical approvals were obtained from the Mozambique Ministry of Health Ethics Committee (CNBS [Ref. 84/CNBS/06] 29 May 2006; administrative approval by MOH 19 September 2006) and Eduardo Modlane University Medical Faculty Ethics Board (Jan 25, 2006) (Hemminki et al., 2016). For tracing, permissions from relevant data owners were obtained. The experts interviewed during preparation for the PROFEG trial and for tracing of participants were done to increase researchers' understanding of the context and the interviewees were not regarded as research participants. To use the Mozambique DHS data, we obtained permission from the team of Measure DHS to access the anonymous data (Long et al., 2015). All notes of discussions and interviews have been kept confidential and not published with names.

### **3. Results**

#### **3.1. Health system in Mozambique and Maputo**

We first describe the general health system and its financing in Mozambique around 2010. More details are given in the Supplementary file.

Health services were largely organised and provided through public health sector where the Ministry of Health (MOH) was responsible for health financing, staff training and deployment. The non-profit private sector which was funded by international non-governmental organisations and religious entities was mostly integrated into the public system. The state did not plan private for-profit health services to be part of the health system, and they emerged by outside initiatives. To establish one, permission from the local health directorate was needed. In addition, there existed informal healthcare, such as traditional medicine practitioners.

The public health system was organised and administered in three levels: national, provincial and district levels, with four level health facilities (Figure S1. Structure of the national health care system in Mozambique around 2013, Supplementary file). Level I included health centres and health posts providing basic primary health care. Level II included district, rural and general hospitals providing first level referral care, emergency care and surgeries. They provided technical support to and supervised Level I facilities in their area. Level III and IV included seven provincial and five central and specialised hospitals providing specialised care and acting as referral places.

Maputo hospitals served much larger area than the city itself as people from near-by areas used them. There were three health areas (= urban districts), each having a general hospital. Maputo Central hospital was directly under MOH and worked as the province level hospital. It had an agreement with the university to be used in teaching physicians.

Public health services were mainly funded by international donors and from taxes (Figure S2. Flow of funds in the health sector, Supplementary file). Another smaller financier was user fees. The public sector employees contributed to a social security scheme, which provided co-payments for health care. A very small proportion of population who were employees of private companies and their family members were covered by private health insurance. Estimates of donor financing varied from 50–75% of all health system costs. Ministry of finance distributed the budget money to health facilities and drug procurement agency, via Treasure-Unique Account, by the orders from MOH. The role

of MOH was strong as most donor money went directly to it, as a part of sector wide approach (PROSAUDE).

### 3.2. Planned maternity care system in Maputo

Maternity care was organised in the same way as health care in general. Compared to other provinces, Maputo city was better resourced with health personnel and facilities. Health centres and health post provided prenatal care and family planning services. Health centres were divided into two levels. Type A centres (21 centres) were to provide basic obstetric care, including vaginal delivery. Type B health centres (7 centres) and health posts were not to provide delivery care. Comprehensive and emergency obstetric care, including caesarean sections (C-sections) were provided in three hospitals: two of the general hospitals and Maputo central hospital.

The MOH had recommended at least four prenatal and one postnatal visit. The content of visits was defined by three packages on preventive interventions and on essential and emergency obstetric care. The MOH sent orders and recommendations for new policies to provincial directorate (chief provincial physician). From there the flow was: to chief district physician, director of the health centre (physician), chief nurse in the health centre, other nurses.

At the time of the study, in Maputo women with visible pregnancy or proved by medical tests were eligible for prenatal care and most women used it. Women were advised to come to prenatal care from 3 months pregnancy onwards. HIV testing was routinely offered and treatment with antiretroviral drugs was to be given to HIV-positive women.

#### 3.2.1. Primary health care approach

Primary health care approach was a central item in national health plans; it was introduced to ensure equal access to health care (Table 1). In maternity care, it was reflected in the hierarchical and referral based system (see below) and the types of personnel educated and employed by health facilities. MOH determined the number and distribution of posts for health professionals. After

**Table 1. Features of maternity services in Maputo City, as planned and in practice, early 2010s**

Topic	Planned	Practice	Possible causes for discrepancy
Primary health care approach	Equal access to maternity care Functional referral system	Primary health care in prenatal care Referral system crumbling	Shortage of resources Deficient budget allocation mechanisms
Area responsibility and continuity of care	Care site by residence Continuity of care from pre- to post-natal care Functional referral system Gate keeping	Self-choice for place for childbirth Referral system crumbling Continuity of care deficient	No enforcement mechanisms Poor information system Women moving to their relatives Problems of transportation Uneven availability of emergency services Long waiting times, fear of social stigma
Care availability	Increasing access Equal access to all Free of charge to women	Crowding of services Shortage of health professionals and goods, especially in lower level facilities Some user fees	Shortage of health professionals Private services draining health professionals Self-choice for place for childbirth
Private services	Not planned	Non-profit services integrated into public system Emerging private services within public hospitals Emerging for-profit health facilities	Low salaries and other incentives to care providers in public sector Perceived higher care quality in private sector
Information system	Plans for specific programmes	Much anonymous log-keeping Insufficient information for planning or distributing resources Careless storage and archiving of records	Care providers overloaded with clinical work Separate resources not available Documents not valued

graduation, in public health care MOH usually assigned professionals to rural health centres. After two years they could apply for transfers to other places and depending on the reasons and posts available, MOH could grant transfers. Health centres were not to employ specialist physicians, only general practitioners.

The key professionals in maternity care was to be maternal and child health nurses (MCH nurses) with midwifery skills (Table S1. Maternity care providers in Mozambique around 2013, Supplementary file). Nurses were of three different kinds, classified by the length of the education and training (elementary, basic and mid-level, high level nurses). High level nurses were entitled to provide emergency and complicated obstetric care, including C-sections.

### 3.2.2. *Area responsibility and continuity of care*

Under this title we describe what the health system was planned to be in regard to area responsibility, gate keeping, referrals and continuity of care. In Maputo, as elsewhere in Mozambique, health care was planned to be organised by geographical areas (Table 1). In maternity care women from each local area (bairro) were expected to use the MCH centre of the area. They were assumed to use the same centre from prenatal to postnatal care, unless referred by health professionals to a higher level of care. Women having prenatal care in Type B health centres were expected to go to the Type A health centres in the area for delivery and the first postnatal check-up.

Maternity care was to be hierarchical: women with complications and needing higher level care were to be referred to the next care level; in certain pre-specified cases women were to be sent directly to the highest care level (the central hospital). MOH had provided health professionals lists of problems and women to be referred and where to refer. An important reason for referrals was the need of a C-section as in Maputo surgery was not to be made in health centres. After the treatments, women were to be referred back to health centres in their living area and followed up by MCH nurses there, unless clinical situation required otherwise. The state or municipal plans did not recognise self-referrals.

### 3.2.3. *Care availability and equal access*

Under this title we describe physical access to maternity care, financing of care and budget allocation, and affordability of care (costs to users) (Table 1).

The national health policy emphasised increasing access to health services, and particularly to maternity services. All women should have an easy geographic access to a public health facility. A place for delivery should be within 10 km in a catchment area. There were no norms on the availability of surgical and emergency facilities. In Maputo, with relatively tight city structure, the large number of health centres and three hospitals with obstetric services apparently made specific local plans unnecessary.

There were national plans to increase the numbers of health professionals, both through training and retaining the existing workforce, as well as to distribute them across different regions (Ministério da Saúde, 2008). Regarding maternal and child health care, training nurses at basic and middle level was a priority. Training of higher level professionals was conducted with support of international non-government organisations.

To have equality in access to health services, services in public sector were mainly publicly funded (see the Figure S2. Flow of funds in the health sector, Supplement file). The money for public health care, including maternity care, was to flow from the Ministry of Planning and Finance to the city health administration, which was to distribute it to the general hospitals, which further were to distribute it, as well as materials, to health centres. MOH was to say how much money and to where was to be distributed. Also international donor money was to go via MOH, but some, particularly smaller scale money, could go directly to district or health facility level. There was no earmarked budget for maternity care, but the allocation for it was to be done in the health facility level.

All maternity services were to be free of charge for users. Women were not to pay for vaccinations or drugs for pregnancy care, including HIV and malaria drugs; for other drugs a small sum was to be paid.

#### 3.2.4. *Private services*

We found no national or local plans for private services (Table 1). Private health facilities were required to registry and should comply with national norms and regulations for health service provision.

#### 3.2.5. *Information system*

Until 2010, there were no overall plans for the information system in maternity care. Women were to carry their maternity cards, and the city officials made models for information gathering (Table 1). Various specific programmes, such as immunisation and malaria programmes had their own data collection systems, to be followed in maternity care. In 2010, advice for systematic group level information gathering was issued by the Ministry of Health. MCH nurses were to record by log-keeping various information on family planning, prenatal, intrapartum and postnatal care, gynecology services and healthy child consultation. In each health facility, a summary of these events was to be made and submitted to the district health officials. From there the information was forwarded to provincial officials and Ministry of Health.

### 3.3. *Maputo maternity care system in practice*

#### 3.3.1. *Primary health care approach*

In prenatal care the planned primary care approach was working well (Table 1). Prenatal care was independently taken care by MCH-nurses. Specialists of obstetrics and gynaecologists were few and they were little involved with prenatal care. When HIV screening was introduced in 2000s into Maputo health centres, it disturbed the primary care approach: it was introduced as a separate vertical programme with its own personnel and own practices. However, later this was changed and HIV care was integrated into the rest of prenatal and delivery care.

In birth care, the primary care approach was crumbling due to women choosing their place of birth (see below). Another threat to the primary health care approach was the general lack of resources and the mechanism of distribution. Health centres were under the general hospitals. In circumstances of too few resources, the hospitals very likely put priority to their own needs (see the chapter on care availability).

#### 3.3.2. *Area responsibility and continuity of care*

Even though maternity care was organised so that each health centre or health post was to serve women from a certain geographical area, there was no way of enforcing this (Table 1). The personal information of a woman was recorded only at first prenatal visit. After that women carried their prenatal records and for subsequent visits. The centres recorded only the number of women visiting. We do not have statistics of the proportions of women using other centres than the one meant for them. But according to anecdotal evidence such choices were common. Health centres usually accepted all women seeking care. Some interviewed health practitioners said that they tried to advise women to seek care in their living region. But it was difficult, as women reported living with their relatives or other reasons.

There was a well-thought referral system with specific lists of conditions, both for pregnancy and labor made by MOH. Ambulance services worked from health centres to hospitals; such service did not work from home to health facilities. Anecdotal evidence showed that too late referrals occurred due to lack of qualified health professionals in primary level or lack of information of women's health. Women's decisions not to go for a higher level hospital when recommended also occurred. Fear of C-sections was reported to be a reason to avoid higher level hospitals.



Self-referrals, shopping of services, were not part of the planned system. But they were common, particularly for births. Women without medical reasons decided to go to another place than stipulated by their living area, usually to a higher level health facility. In hospitals it was up to the hospital physicians and nurses to decide whom to take. During labor women were not usually turned away even though there was no reason for a higher level care. An unpublished estimate from 2004 (we did not learn a more recent estimate) showed that in one general hospital (Jose Macamo), 78% of women giving birth were self-referred and many of them in vain. There was no continuity of care and loss of information was evident; the prenatal cards did not always contain all relevant information and they were not always available.

Various reasons were reported for women choosing prenatal care places. A reason was accessibility: how easy the facility was to reach by public transportation. During pregnancy women may move to the house of their mother or more often to that of their mother-in-law. Thus the centre close to that place was chosen. Known or assumed long waiting times in the local health facility influenced, too. In addition, fear of social stigma may have led to choose a health centre further away from home. HIV and other chronic infectious diseases were common, and women may have wanted to avoid neighbors knowing if they had one.

We do not know how much the (assumed) quality of care or availability of services, such as drugs and other supplies or special programmes run by non-profit organisations, influenced the choice. But women must have known the availability of those and it may have influence their choice. At the time of the study HIV testing was routinely offered, but not all prenatal centres had antiretroviral drugs to HIV-positive women.

To choose the delivery place, besides better physical accessibility, the perceived better quality of care and availability of 24 h emergency services were reported to be important reasons. Emergency obstetric services were unevenly available in different health facilities. Around 2010, health centres and one general hospital (Chamanculo) did not do C-sections, one general hospital (Mavalane) did not do them at night, but the other (Jose Macamo) and the central hospital had 24 h service. Lack of health care personnel, both MCH-nurses and physicians, was a factor underlying the shopping practices.

### 3.3.3. *Care availability and equal access*

According to the 2011 DHS survey about 70% of pregnant women in Maputo city had had more than four prenatal visits, and about 70% had received HIV counselling and test (National Institute of Statistics of Mozambique, Ministry of Health of Mozambique & Measure DHS, 2013). However, results from the PROFEG trial suggest that these numbers are overestimates, or that women used various health centres during prenatal care: women recruited into the trial had entered prenatal care late and many had only a few visits after the recruitment visit (Hemminki et al., 2016). Most women gave birth in public health facilities (Long et al., 2015).

With the current workload, health professionals did not have incentives to increase the use of prenatal care. Prenatal consultations were provided in a rush, and the practicing nurses felt that they could not meet women's health needs. Even though fertility rate was lower in Maputo City compared to the rest of the country, the population of Maputo was increasing and number of pregnancies was still high (National Institute of Statistics of Mozambique et al., 2013). For example, one chief nurse told that in her facility one MCH-nurse attended 75–90 pregnant women per day. Women come in the morning and queued for their short visit. At birth, a nurse took care of several births at the same time.

We do not know how many informal care givers there were in Maputo city. According to the DHS survey, around 5.5% of birth in Maputo occurred at home (National Institute of Statistics of Mozambique et al., 2013). Crowding of health facilities perceived inadequate care may have caused

women to choose informal care givers. Difficulty in accessing health facilities (e.g. long distance and lack of transportation) was another reported reason to have care out of health facility.

Even though Maputo was better resourced than the rest of the country, there was a general lack of both human resources and goods. In 2010 there were 40 specialists of gynaecology and obstetrics, out of which 16 worked in Maputo City (13 in the central hospital) (Ministério da Saúde, 2011). The number of MCH nurses was estimated to be 410 in Maputo. General practitioners were only little involved in maternity care. All experts commented that lack of skilled maternity care providers in all levels of public health facilities was a major hinder for quality improvement.

Availability of resources in health centres was a problem (Table 1). There was no earmarked budget for maternity care and in each maternity care facility usually the head of department or unit made the budget and a list of goods and supplies needed for maternity care, based on the consumption in the previous year. He/she submitted it to the administrative directorate of the general hospital. Goods (e.g. drugs, equipment, and food) were allocated at national level to provincial and within provinces to districts, which allocated them to health facilities at different levels. Physically the route varied depending of the type of goods, but usually goods were stored in district warehouses. In case of drugs, they came from the central drug deposit to the provincial and district deposits and from there to the pharmacy of the health centre and then to the pharmacy of the maternity unit. Small scale goods from international donors could go directly to health facilities.

The discrepancy between the planned area based system (and the allocation of resources accordingly) and the free choice by women in practice led to various problems. Higher level health facilities and those close to public transportation were increasingly overcrowded. There was a lack of beds and staff, and the burden was felt to impact the quality of care. Non-risk women entering the referral places took resources meant for high-risk women; it was said to contribute to maternal and infant deaths.

Maternity care in public sector was free of charge, but some women had difficulties to pay for transportation costs. If a woman herself bypassed primary care to seek care at higher level, she could be charged for registration, hospital stay or interventions made. These fees were low. Customs to ask for fee for un-referred hospital visits had varied over time and the physician. A common practice was that women could enter free of charge to general hospitals, but they had to pay to the Central hospital.

Sometimes bribing of nurses occurred to pass ques or to achieve certain services. Also other misuses were reported, such as selling drugs which were meant to be given free of charge. We only have anecdotal information of such practices, but apparently these occurred rarely.

#### 3.3.4. *Private services*

Various international non-profit organisations had provided services, mostly within the same facilities as public sector (Table 1). Many activities were related to HIV/AIDS prevention and treatment. For-profit private sector had traditionally concerned drugs and they could be bought from private pharmacies and from street markets. Other for-profit private services started to develop in the 1990s. In maternity services they included freely standing private clinics and hospitals, as well as private services integrated into Maputo central hospital. The numbers of pregnant and delivering women using them is not known, as there was no statistics of their use. But it is estimated to be low, less than 5% of women around 2010.

Various negative consequences were mentioned resulting from private sector. One was that it drained MCH-nurses and physicians from the public sector. Often health managers of private facilities identified competent specialists and nurses who were working in public health system, and contacted them for employment. Most health professionals were employed only part-time and dual practice was common. Dual practices could lower care quality, as practitioners had long working

hours. Absence from the public sector at office hours also was a problem. Some interviewees mentioned that in private sector unnecessary activities such as many ultrasounds and unfounded C-sections were made to satisfy the customer wishes.

Opinions in regard to the integrated private services in Maputo central hospital varied. Some thought that it was a way to keep specialists in the hospital and improve their (low) salary. Some thought that it took resources from public patients.

Private services were for well-to-do women who could pay for them. A reason for women to use private services was said to be crowding with long waiting times and queues in the public sector. Practitioners had various reasons to work in private sector. Salaries of both nurses and physicians were very low in the public sector, compared to relatively high living costs in Maputo City. Additional work in private sector gave a possibility to raise income. Furthermore, many practitioners were said to be unhappy with their working environment in public sector. For example, maternity care providers were often exposed to infectious diseases, such as HIV and tuberculosis, but protection measures in work settings were lacking and no compensation existed, if a contagion occurred.

### 3.3.5. Information system

Much individual level information was lost. Women kept their maternity cards recording their health and use of services. A new card was issued for each pregnancy. Filled maternity cards should have been taken to the birth place and returned back to women after delivery (Table 1). Women should give the card to the site of their postnatal care. However, many women did not have postnatal visits and sometimes hospitals collected the cards; thus many cards were not returned. Health centre and hospital records were log-based, i.e. information of each visit was recorded separately by time, and not sorted out by a person. In health centres, the collected information was very basic. Separate anonymous log-keeping was made on some programmes or diseases, for example for immunisation and malaria control programmes.

Most women giving birth outside health facility brought their newborn (if alive) into a health facility to have vaccination against tuberculosis. Vaccination was tied to the child's registration and the "child's card" was given to mothers. The card was needed for registration and was also to be carried for further child care visits. Women valued the card leading most home births to be entered into the records of the health care system.

With the exception of sporadic projects in the Central hospital, notes were hand written. There was no unique identification number and women's names were written in a variety of ways. Some women did not know their birth date and approximations of age were used, varying from visit to another. The records were often filled out in a hurry, making them susceptible to mistakes.

Our observations and experiences from the field trial showed that due to high work load, record keeping was not a priority (Hemminki et al., 2016). Furthermore, notes (usually in books) were not valued, and their storage was careless, and books could easily be lost. For example, during a renovation of a hospital, birth books were put into tidying closet and forgotten there. Storage of returned maternity cards carried by women also was casual. Data collected separately for various programmes had their own information flow, resulting maternity care data ending to various places. Poor archiving also was true for electronic data, and technical problems were common.

Data on perinatal deaths were unreliably collected, as only live born children were systematically recognised. In some health facilities data of deaths were collected to a register, in others not. In vital statistics, early infant deaths were not recorded. Identification of maternal deaths related mainly to in-hospital deaths or deaths during delivery, and was not complete (Hemminki et al., 2016)

We also observed that information was a commodity: statistical data were protected and effort was required to obtain it. Information relating to organisations was sometimes considered sensitive.

Research access to health care professionals required permissions from higher levels, both from MOH and city administrators.

#### 4. Discussion

In Mozambique, state administered health care and the role of Ministry of Health (MOH) was central through financing, regulating the location of health professionals and through content guidance. Health care was organised in a top-down type of model with local administration fulfilling the requirements of national advice. Health care financing was largely dependent of foreign donor money. In Maputo public maternity care was to be associated with primary care, be area-based with professional decisions of transfers to higher levels of care, be free to users, and to offer equal access for all women. Even though better resourced in the city than the rest of the country, maternity care suffered from lack of human resources with overload of work. In practice women's choices and self-referrals were common and broke the plans of area responsibility, gate keeping and care by medical need. Reasons for self-referrals included easier access via public transportation, crowding of health centres, and perceived better quality in hospitals. Private services for maternity care had emerged offering better compensation to health professionals and new choices for wealthy women. Information of maternity care was aggregate, separately collected for different purposes, made by hand and women carried their health records. Getting information of one woman from one place was not possible and statistical data on service use per pregnancy did not exist.

In prenatal care the planned primary care approach was working well but in birth care, it was crumbling due to women choosing their place of birth. A qualitative study exploring facilitators and barriers to access to prenatal care in Mozambique (Biza et al., 2015) supported our findings. Biza and colleagues found that women perceived prenatal care important, but organisational (e.g. unfriendly environment and long waiting times) and cultural (e.g. seeking care before pregnancy was visible) factors discouraged early care seeking. Our finding that easy access and perceived good care quality were the main reasons for women to bypass the area based health facility and choose their place of delivery, has been found in other African, Asian and Latin American countries, too (Bohren et al., 2014; Kruk, Hermosilla, Larson, & Mbaruku, 2014; Tappis, Koblinsky, Doocy, Warren, & Peters, 2016).

Even though maternity care was organised so that each health centre was to serve women from a certain area, there was no way of enforcing this. Record keeping in health centres after the first visit did not identify individual women, and thus no statistics were available of the use per person. Gate-keeping was weak: even though there was a well-thought referral system with specific lists of conditions, women changing care sites and self-referring themselves to higher levels of care, ruined that plan. Problems of transportation were a reason for women to choose their care sites outside. Few had own cars, ambulances did not serve transfers from homes and public transportation often did not match for easy access to the own health centre. The routes of busses and "minibuses" offered better access to hospitals, which were by major roads. Another reason was the uneven availability of 24 h emergency services, and women's wish to go for such a place to be on a safe side. Apparently the lacking emergency services was due to lack of qualified staff. Normal deliveries utilised a high proportion of resources in higher care levels, and as such, they were detrimental to the care of complicated cases.

Insufficient resources particularly in health centres, for example lack of beds and staff were a problem (Sundby, Rwamushajja, & Usta, 2005). Even though the official policy was to support primary care approach, the way how money was allocated resulted emphasis in hospital services; also hospitals suffered from lack of resources. The large number of births and the serious HIV-epidemic, having a toll on health professionals and consuming the scarce resources, were contributing to the imbalance between needs and services. Allocation of resources was largely made by area. The resulting discrepancy between the allocation basis and the free choice by women in practice also were contributing to overcrowding of maternity services in higher levels of care.

Women did not pay for public services, and in theory there was an equal access. But private health care had started to be more common, and that was used by more wealthy women. Bribing is a common problem in Africa, even within health services (Peiffer & Rose, 2014). We found no evidence that it was common or large scale in Maputo maternity care. Studies on abolition of user fees for health services in Africa have showed an unexpected increase in the use of private services (Morestin & Ridde, 2009). This may have been due to greater demand for services that could not be accommodated in public sector.

In Mozambique, for-profit private services were not officially planned. Even though their size was modest in maternity care it had negative consequences on services in the public system. There was a general lack of trained health professionals and private sector drained MCH-nurses and physicians from the public sector, to care a relatively small number of women. Salaries of both nurses and physicians in the public sector were very low, and it is difficult to stop transfer of professionals in such circumstances. One article analysing the state of public health in 46 countries in Africa concluded that it is difficult for the public sector alone to address heavy burden of maternal and child mortality and communicable and non-communicable diseases, and thus the private sector would play a significant role in accelerating the attainment of health MDGs (Sambo & Kirigia, 2011). Government planning and interacting with private sector might make private services an effective player in health system.

Lack of information of service use and need for services was apparent. Lack of basic data resulted in trusting expert views and assumptions of the current state and future needs. Women carrying their records had its merits, but it being the only source for data was vulnerable to data loss. Some of the factors behind the weak information system are difficult to amend, such as lack of time due to high caring load. But some factors could be amended within the existing system. Rather than making statistics with log-keeping for different problems and diseases, having an integrating data collection system at health centres and making it person based (i.e. recording visits and treatments by name), would offer a more versatile basis for statistics. Some previous studies provided the suggestions for health information system development in low resource settings. For example, a retrospective data abstraction, by using samples if needed, from the integrated records by non-health data collectors would solve some of the problems relating to time (Salomao, 2010). A universal identification code would be very helpful also for health statistics (Braa, Hanseth, Heywood, Mohammed, & Shaw, 2007). Organising proper storage of collected data is feasible within the current system.

This study used various quantitative and qualitative data to increase trustworthiness of findings. However, there are several limitations. The health care system in Maputo was changing rapidly and our data collection occurred in various times. Thus, the results may not reflect a certain time point, as aimed. Nevertheless, we believe that the principles of maternity care financing and organisation in Mozambique did not change. Information on financing, organisation and delivery of health services was often perceived sensitive. It took a long time to reach the key-persons and to obtain permission to access relevant policy papers and internal reports. Key informants were very busy and scheduled appointments were often cancelled due to competing demands. Our study included only the capital. But it is reasonable to assume that the gap between plans and practice is larger in less-resourced areas.

Our findings and lessons are valuable for policy evaluation for improving maternal and newborn health. International health declaration and climate have shaped structure and approach of health services delivery, particularly in low resourced countries largely relying on external donor funds. Performance of health system in these settings is often measured to track indicators of health service coverage and utilisation towards achieving health related MDGs. This directs international and domestic efforts to fragmented approach rather than a more systems understanding. Discrepancies between planned health services delivery and implementation in a real life world very likely are not unique to Maputo city or Mozambique. Common health system constraints in many African settings,

for example lack of qualified and incentivized health professionals, inadequate health supplies and weak health information system result in poor quality of care and undermine response to the “targets”. With stepping in the era of the Sustainable Development Goals (SDGs), understanding and tackling challenges at health system level would be essential to improve patient-centred quality of care and achieve health priorities (World Bank/JICA/The Global Fund/African Development Bank/WHO, 2016).

## 5. Conclusions

Although primary healthcare approach has been planned to ensure equal access to area-based continuity care, the use of maternity care was not in line with the plan due to various factors at all level of health system, for example, lack of mechanism to effectively allocate limited health resource, incentivize healthcare providers and manage and use health information. Private services for childbirth had emerged unplanned.

Improvement of maternity care requires overall health system strengthening rather than fragmented investment in part of components of maternity services. Thus, further implementation researches (e.g. quality of care studies, cost-effective studies etc.) could be explored using health system research approaches targeting on multi-stakeholders in order to narrow the gap between the plan and practice. There is an urgent need for better, more centralised and universal medical and civil birth health information systems, such as district health information systems linked to a central hub. In addition, private services for childbirth in Mozambique should be mapped in order to have better understanding and explore potential cooperation between private and public sectors in improving maternal and newborn health.

### Supplemental data

Supplemental data for this article can be accessed at  
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### Competing Interests

The authors declare no competing interest

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