



Health System Readiness to Meet Demand for Obstetric Care in Eritrea: Implications for Results-Based Financing (RBF)

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Introduction

Progress towards the reduction of maternal mortality has been slow (UNICEF, 2008) and the Millennium Development Goal of reducing maternal mortality by three-quarters by 2015 (MDG-5) may not be achieved (Rasch, 2007) except in a handful of countries. The two main interventions to prevent obstetric deaths among pregnant women—delivery by skilled birth attendants and seeking emergency obstetric care from health facilities—are underutilized. Economic barriers are a major determinant of low utilization of maternal health care (Gabrysch and Campbell, 2009). Hart's decades-old *Inverse Care Law*, which states that the wealthy are more likely to receive care than the poor (Hart, 1971), unfortunately has held up quite well over the years, especially for maternal health (Gage, 2007; Kiwanuka, Ekirapa et al, 2008; UNICEF, 2008; McNamee, Ternent et al, 2009). Recognizing the limited returns of existing strategies for improving effectiveness and equity, governments and development partners are looking for innovative approaches for increasing the impact of their investments in health.

Results-based financing (RBF) is one such promising strategy for improving health services (Eichler and Levine, 2009; International Health Partnership (IHP+), 2009). RBF is an umbrella term encompassing both supply- and demand-side approaches for increasing the quantity and improving the quality of essential, high impact health services through the provision of financial and/or in-kind incentives to a range of actors after measurable actions have been taken. Performance-based financing (contracting in) and performance-based contracting (contracting out) approaches are examples of supply-side schemes. Demand-side approaches include voucher schemes and Conditional Cash Transfers (CCTs). Evidence on the effectiveness of these approaches, particularly those on the supply-side, is limited (Eldridge and Palmer, 2009; Fiszbein and Schady, 2009; Basinga, Gertler et al, 2010) but systematic evaluations of supply-side programs are underway in several countries (Naimoli, 2009). All these approaches, however, have limitations and are not risk-free.

On the demand side, an increasing number of low-income countries are providing cash incentives to women to seek antenatal care and deliver in health facilities (Lagarde, Haines et al, 2007; Fiszbein and Schady, 2009). Lagarde and colleagues caution, however, that the most successful programs have been implemented in middle-income countries, with relatively well-functioning health systems, where effective mechanisms to target and monitor beneficiaries as well as transfer money in a timely fashion have been in place (Lagarde, Haines et al, 2009). Furthermore, these programs raise questions as to whether health providers can respond effectively and in a timely manner to what is expected to be an increased demand for services. Demand for both normal and complicated deliveries is expected to rise under such schemes, especially in resource poor settings where health systems are weak.

On the supply side, health facilities and providers in an increasing number of low-income countries are receiving financial incentives linked to good performance in delivering maternal and child services (Meessen, Musango et al, 2006). Meessen and colleagues have identified five major risks that need to be carefully monitored - providers may:(International Health Partnership (IHP+), 2009)

- 1) inflate records for the remunerated services;
- 2) induce unnecessary demand for the remunerated services;
- 3) deliver the remunerated services in spite of insufficient capacity;
- 4) neglect services that are not remunerated; and

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5) neglect quality attributes (on the basis that only quantity matters) of the services that are delivered (Meessen, Musango et al, 2006).

In this paper, we investigate one issue of common concern to both demand- and supply-side results-based financing programs: the readiness of the health system to respond to an anticipated increase in demand for care. We present the findings from an assessment that we carried out in Eritrea, where the possibility of introducing an RBF program to increase the use and improve the quality of obstetric services is being explored. Following a brief overview of evolving approaches to maternal mortality reduction in Africa, we describe the simple diagnostic approach that we used to examine the quality of the Eritrean health system and its readiness to meet a potential increase in demand for services. The paper describes how this approach was applied and with what results. We discuss and conclude with a set of challenges for future RBF programs that aim to improve maternal health services.

Evolving approaches to maternal mortality reduction in Africa

Sub-Saharan Africa and parts of South Asia will be the key battlegrounds for achieving MDG 5. Sub-Saharan Africa accounts for more than half of all maternal deaths in developing countries (World Bank, 2009). The evidence base linking maternal health care utilization with mortality reduction, however, is evolving. Earlier views that women at risk of complications could be identified during antenatal visits, that complications could be detected and averted during pregnancy, and that traditional birth attendants could provide timely and appropriate clinical care now hold less credence (Bergstrom and Goodburn, 2001; World Health Organization, 2005). Evidence from Africa suggests that even in countries where a majority of women seek antenatal care (> 80%) and are assisted at delivery by a skilled attendant (> 50%), high maternal mortality ratios can persist (Table 1).

Table 1: Maternal Health Care Utilization and Maternal Mortality Ratios in Selected African Countries

Country	ANC (1 or more visits)(%)	Skilled attendance at delivery (%)	MMR (per 100,000 live births)
Congo	86 (2005)	83 (2005)	740 (2005)
Zimbabwe	95 (2005-2006)	80 (2005-2006)	880 (2005)
Benin	88 (2006)	78 (2006)	840 (2005)
Cameroon	82 (2006)	63 (2006)	1,000 (2005)
Cote d'Ivoire	85 (2006)	57 (2006)	810 (2005)
Gambia	98 (2006)	57 (2006)	690 (2005)
Lesotho	90 (2004)	55 (2004)	960 (2005)
Burkina Faso	85 (2006)	54 (2006)	700 (2005)
Malawi	92 (2006)	54 (2006)	1,100 (2005)
Senegal	87 (2005)	52 (2005)	980 (2005)

Source: UNICEF: Tracking progress in Maternal, Newborn and Child Survival: The 2008 Report

In recent years, there has been a movement away from the risk-based approach, which emphasized antenatal care and home-based deliveries by traditional birth attendants, in favor of an approach to prevent maternal mortality through skilled attendance at birth as well as basic and emergency obstetric care (EmOC). The basic EmOC package includes five services- administration of parenteral antibiotics, oxytocic drugs, anticonvulsants, manual removal of placenta and retained products and assisted vaginal delivery. The comprehensive EmOC package includes all services in the basic EmOC package as well as cesarean section and blood transfusion. Rigorous data on the effectiveness of these strategies in reducing mortality, however, are not yet available.

Several failures in the health service delivery system are implicated in maternal deaths among women who do not reach health facilities- insufficient numbers of personnel, an unproductive workforce, inadequate or poorly trained personnel, the lack of drugs and equipment, administrative delays, and clinical mismanagement of patients (Sundari, 1992; Thaddeus and Maine, 1994). Several studies in Africa indicate deficiencies in the quality of maternal health services at health facilities (Olsen, Ndeki et al, 2004; Pearson and Shoo, 2005; Leigh, Mwale et al, 2008), which can have an impact on obstetric outcomes (Graham, Bell et al, 2001). Emergency obstetric care requires not only skilled practitioners, but also highly functioning health facilities that can provide basic or emergency obstetric care in life-threatening situations (Paxton, Maine et al, 2005).

The Diagnostic Framework

A quality of care diagnostic framework was applied to assess health system quality in Eritrea along five dimensions. Expanding on a framework proposed by Donabedian, which incorporates structure, process, and outcome as elements of quality (Donabedian, 2003), we define quality of maternal health services, with particular emphasis on obstetric care, as follows:

- 1) accessibility of services,
- 2) availability of services,
- 3) infrastructure,
- 4) process of care, and
- 5) management (Figure 1).

We also include both demand factors and elements of the policy environment in this expanded framework; however, since the study focused on health system quality, we did not attempt to measure demand and policy factors but discuss their implications as relevant.

Each element of the framework is defined below and the framework is summarized in Figure 1.

Accessibility of care is defined as the ease with which patients can access a referral facility. Indicators include location of the facility, distance from referral sources, time taken to reach the facility from the referral source, and the availability of facility-based or public transport to reach the facility.

Availability of care is defined by several variables, including operating hours of the facility, availability of clinical obstetric services at the facility, availability of medical staff, and medical staff workload, which may determine their ability to provide those services.

Infrastructure is defined as structural elements that influence obstetric care provision. These include maternity ward characteristics and facility infrastructure for providing emergency obstetric care.

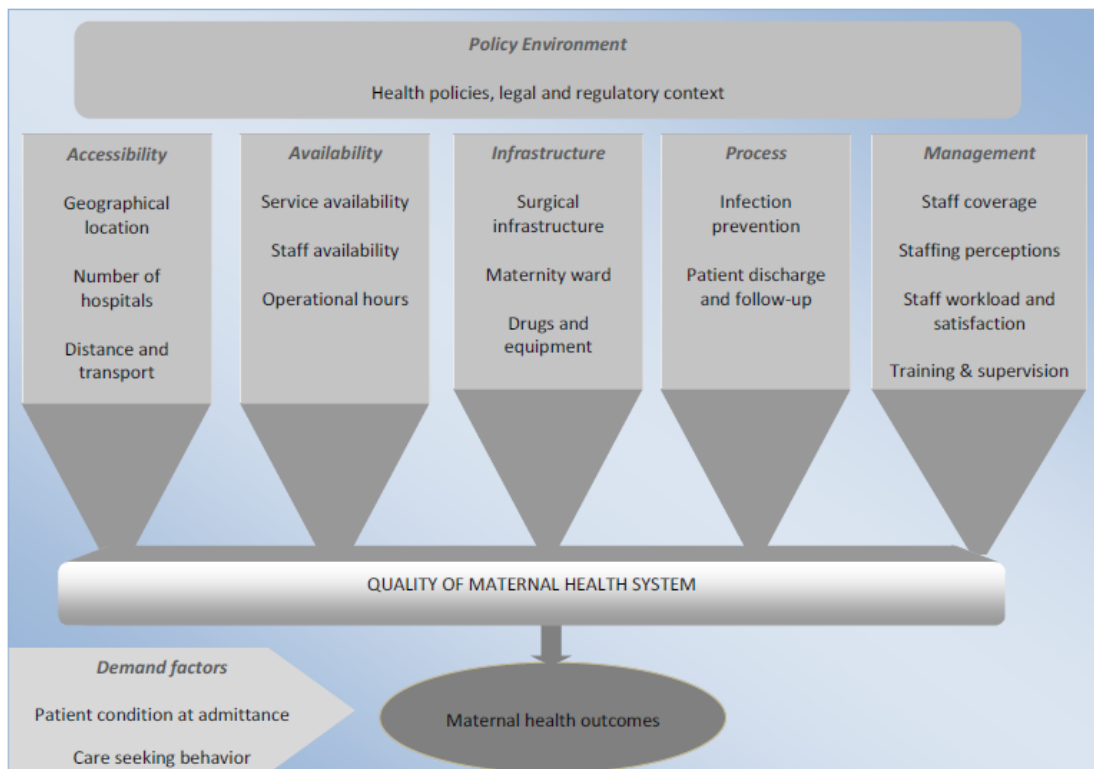
Process of care refers to the characteristics of obstetric care provision, which includes provider coverage, waiting time for obstetric procedures, duration of patient stay, appropriateness of treatment provided (i.e. adherence to clinical practice guidelines), and adherence to infection prevention and follow-up care procedures.

Management refers to the type of managing authority and includes various facility management indicators, such as the availability of drugs, supplies and equipment, as well as the level of staff training, motivation and supervision. Other indicators of management include the manner in which services are planned and organized, which influence the day-to-day work at the facility.

Demand includes those factors that may affect maternal health outcomes including patient condition at admission and care-seeking behavior patterns.

Policy environment includes health policies, laws, and regulations that may affect maternal health service delivery and maternal health outcomes.

Figure 1: Diagnostic Framework for Assessing the Quality of the Maternal Health System



Eritrea: At-A-Glance

Eritrea, located in the horn of Africa, has a surface area of 122,000 square kilometers. The country shares boundaries with Ethiopia in the south, Sudan in the west and northwest, and Djibouti in the southeast. The Red Sea coast hugs the eastern and northeastern boundary. Although no census has been carried out in the country, the population size is estimated at about 3.5 million. About 60 percent of the population consists of women of childbearing age and children. Eritrea is administratively divided into six zones (zobas), 58 sub-zones, 704 administrative areas, and 2,580 villages.

At the time of liberation in 1991, the government inherited an inadequate health care system. The number of facilities and trained human resources were deficient, and drugs and medical supplies were not equitably distributed. Since then the government has undertaken several initiatives to rehabilitate existing health facilities, construct new ones, and equip them with medical equipment and supplies. Efforts are also underway to develop additional human resources for health. The Ministry of Health is the sole provider of health services in Eritrea. The number of mission and private health facilities is negligible. The national referral hospital is located in Asmara, while zonal referral hospitals are located at the zoba headquarter level. Rural areas in zobas are served by community hospitals, health centers and health stations.

The estimated maternal mortality ratio (MMR) in 1995 was 998 per 100,000 live births (National Statistical Office Eritrea and Macro International Inc., 1995). Subsequent estimates have been lower, but all exceed the average estimate for sub-Saharan Africa (824 per 100,000) (Hill, Thomas et al, 2007). Indirect MMR estimates between 2002 and 2005 were as follows: 630 in 2000 (World Health Organization, UNICEF et al, 2004), 752 in 2002 (Ghebrehiwet, 1998; Ghebrehiwet and Morrow, 2006) and 450 in 2005 (World Health Organization, UNICEF et al, 2007). Although 70 percent of pregnant women had attended at least one antenatal visit in 2002, only 26 percent delivered in health facilities. The majority of births (73 percent) took place at home, and only 28 percent were assisted by trained personnel, mostly nurses and midwives. Forty-three percent of deliveries were attended by TBAs and 27 percent by relatives and friends. Family planning use remains very low (8 percent) and total fertility high (4.8) (National Statistical Office Eritrea and Macro International Inc., 1995; National Statistical Office (NSEO) Eritrea and ORC Macro, 2003).

Over the years, the government has adopted several macro policies that reflect its commitment to improving women's health. In 1998, the Ministry of Health developed the National Safe Motherhood Protocol, which focused on upgrading health services, establishing standards of obstetric care, training service providers, and adopting quality improvement strategies (Ministry of Health Eritrea, 1998). In 2008, a Reproductive Health Policy and Reproductive Health Road Map were adopted. The Road Map lays out eight strategies for improving reproductive health, including improving access to skilled birth attendance and improving provision of and access to quality medical services, strengthening the referral system for maternal and neonatal health, and strengthening the district health planning for and management of maternal and neonatal health. Abortion is illegal in Eritrea unless medically indicated (treating life-threatening complications) or on other exceptional grounds.

Methodology

We conducted a nationally representative facility survey in 2008-09. The sample included all higher level facilities that provided maternity services, including the national referral hospital, zoba hospitals and community hospitals. In addition, all health centers and a random sample of 30 percent of the lowest level facilities (health stations), were included in the sample. A total of 116 facilities (18 hospitals, 45 health centers, and 53 health stations) from the six zobas were surveyed. All facilities included in the study provide maternity care. The study was carried out in collaboration with the Eritrean Nursing Association. The data were collected from May to July 2008.

At each of the selected facilities, health providers on duty at the time of the survey were interviewed. The health facility in-charge, the matron in-charge of the maternity ward, and 3-4 nurses working in the maternity ward were all interviewed in the hospitals. Nurses or midwives were interviewed at health centers and health stations. Three survey modules were administered; one for each type of provider, including health facility in-charge, maternity ward matron and maternity ward nurse. The health facility in-charge module included questions related to the health facility in general, the matron module included questions about the maternity ward, and the nurse module had questions related to maternity service provision. At the hospitals, the selected providers responded to their respective modules. At the health centers and health stations, the nurse or midwife on duty responded to all modules since only one provider generally is available at that level.

Medical records of maternity patients admitted to health facilities in 2007 were reviewed to obtain data on patients admitted to hospitals with an obstetric complication during the period January 1 to December 31, 2007. These included case records of 6,315 patients. A list of obstetric complications based on the International Classification of Diseases-10 manual was used as a reference for selecting medical records for inclusion. An instrument was filled out for each patient. It included data on the complication experienced by the patient, treatment provided, survival outcome of the patient and other details.

In addition, summary statistics from maternity ward registers for the year 2007 were recorded at each of the facilities. The summary statistics provided a total count of the number of deliveries, including normal and cesarean deliveries, number of maternal deaths, stillbirths, neonatal deaths, and other pregnancy and delivery outcomes. At the health centers and health stations, it was not possible to review medical records because case notes on individual patients were not maintained. Consequently, only summary statistics were recorded at this level.

Geographical Information System (GIS) data were collected to map the location of the health facilities. The survey team used GPS receivers to record the longitude and latitude of each health facility that was surveyed.

Findings

The findings on accessibility, availability, infrastructure, process and management of care were reported by health providers during interviews. The maternal complications and deaths case review was based on retrospective data obtained from medical records.

Accessibility of services

There were only 18 hospitals that provided maternity care in Eritrea. These were the National Referral Hospital located in the capital, Asmara, and five zoba referral hospitals, 11 community hospitals and one parastatal hospital in the zobas. The remaining facilities are health centers and health stations, which are dispersed throughout the country (Figure 2).

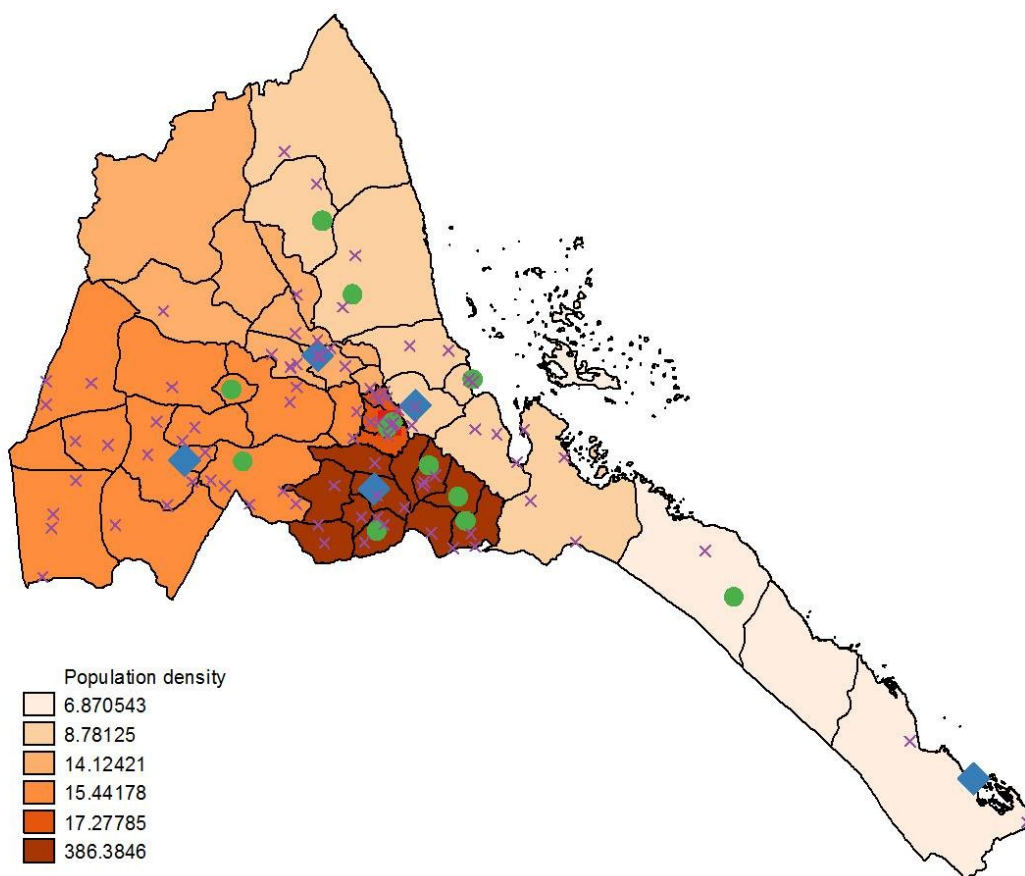
Most hospitals are concentrated in the central zoba and located in densely populated urban areas. The rural areas, especially the peripheral zobas, are grossly underserved. Only hospitals can perform complex obstetric procedures including caesarian deliveries. Of the 18 hospitals, only 11 could provide comprehensive emergency obstetric care. The spatial distribution of the EmOC facilities where caesarian section deliveries are offered shows that those hospitals are mostly concentrated in the central part of the country. There is no emergency obstetric care available in the rest of the country.

The mean distance from a zoba referral hospital to the nearest referral facility is 191 kilometers. Similarly, on average a patient has to travel 81 kilometers to reach a referral facility from a community hospital and 42 kilometers from a health center/station. The time taken to reach a referral facility from a referring source varied from 1.5 to 9.6 hours.

Emergency transport was usually available at hospitals. Fifteen of the 18 hospitals surveyed had an ambulance and one had a car or other form of transport for emergencies. A large proportion of health centers and health stations (41 percent) did not have any emergency transport and 11 percent had animal carts for transporting patients in emergencies.

In addition, public or private transport was available at the hospitals in all zobas. Patients could also find transport to travel to a referral facility from about 79 percent of health centers and stations but the cost of transportation was high. To travel to a referral facility on public or private transportation, patients have to pay on an average \$26 from a referral hospital; \$17 from a community hospital and \$32 from a health center/station. The cost of transport represents a fairly large proportion of the annual GDP per capita in Eritrea (\$336) (World Bank, 2009).

Figure 2: Spatial Distribution of Sampled Health Facilities



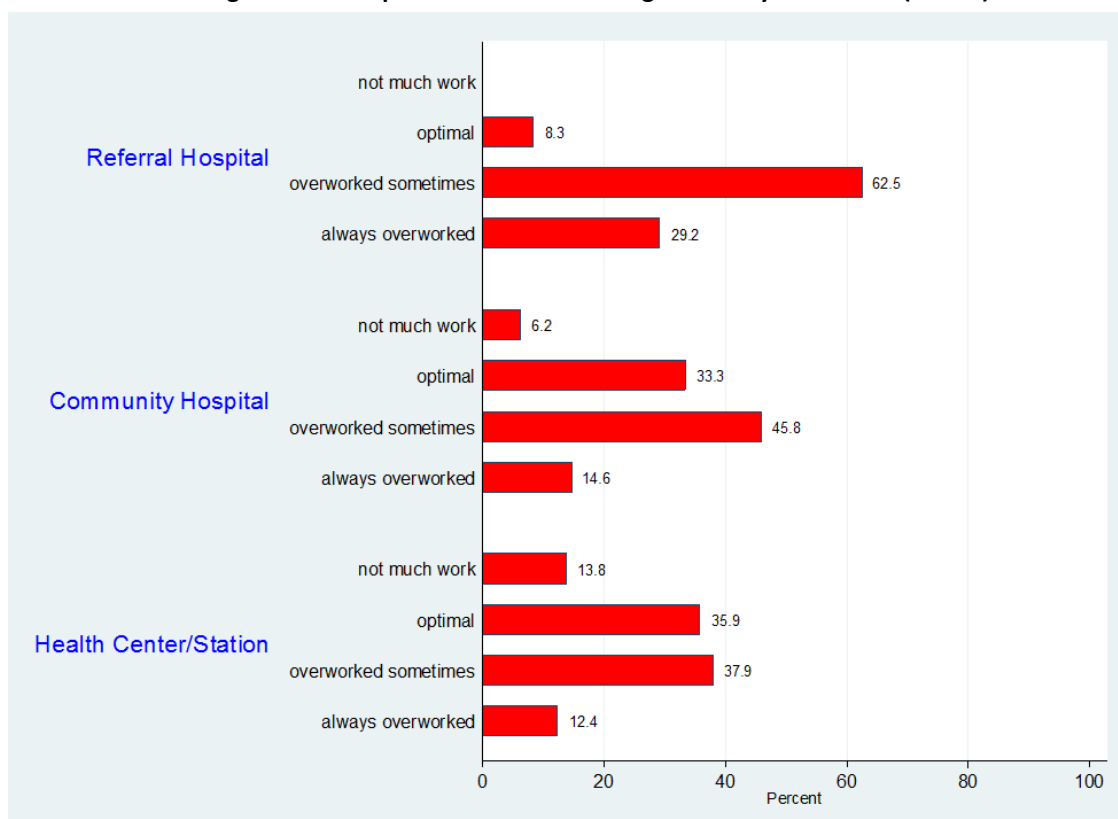
Availability of services

Data on service availability indicate that caesarian section deliveries are conducted only at hospitals, but not all hospitals provide caesarian deliveries. Out of the 18 hospitals in Eritrea, caesarian-section was performed only at 11. None of the health centers or health stations provided caesarians. Only normal deliveries and basic emergency obstetric care procedures are available at health centers. If a woman needs to undergo a caesarian section, or if she experiences a serious complication, she must be referred to a hospital. Consequently, the referral hospitals, and the national referral hospital, in particular, receive a disproportionate number of obstetric complication cases. The national hospital typically receives more than half of all patients who seek treatment for obstetric complications.

There are only 17 obstetricians/gynecologists in the entire country, all of whom are based in hospitals. Providers at hospitals report being overworked, which creates a high degree of pressure on the existing workforce at the higher levels of the health system (Figure 3). The health centers and health stations are mostly staffed by nurses (3 years of training), nurse-midwives or midwives (one year of training in post-basic midwifery), and associate nurses (18 months training) who have basic qualifications for providing clinical support. Providers at the lower-level facilities do not receive a large number of patients and so are not sharing the proportionate burden of work.

In the absence of appropriate services and health personnel at the lower level health facilities, women may bypass these facilities and seek care at higher-level facilities.

Figure 3: Self-reported Workload among Maternity Ward Staff (N=217)



Infrastructure

Only 7 of the 116 facilities reported having a functioning blood bank on site. Operating theaters were available at 15 of the 116 facilities. An intensive care unit for maternity patients was only available at the National Referral Hospital. None of the lower-level facilities had an operating theater or the infrastructure required for admitting complicated cases.

Data on the occupancy of labor wards show that 83 percent of referral hospitals had all beds occupied, while 17 percent reported having some empty beds. The reverse was true at the community hospitals: 16 percent reported having all beds occupied, while the remaining two-thirds had some empty beds in the labor wards. Bed occupancy was relatively low at the health centers and health stations (Figure 4).

Figure 4: Reported Bed Occupancy in Labor Wards on an Average Day (N=116)



Process

To minimize bias, we adopted a projective method: respondents were asked to report on the degree of compliance, by personnel other than themselves, with recommended infection prevention practices. Compliance with infection prevention practices was reported to be high at all levels of health facilities. Over 95 percent of staff reported that staff in the maternity ward always used disposable gloves at all levels. Similarly, the use of disinfectant, soap and decontamination was reported as being above 90 percent at all types of facilities.

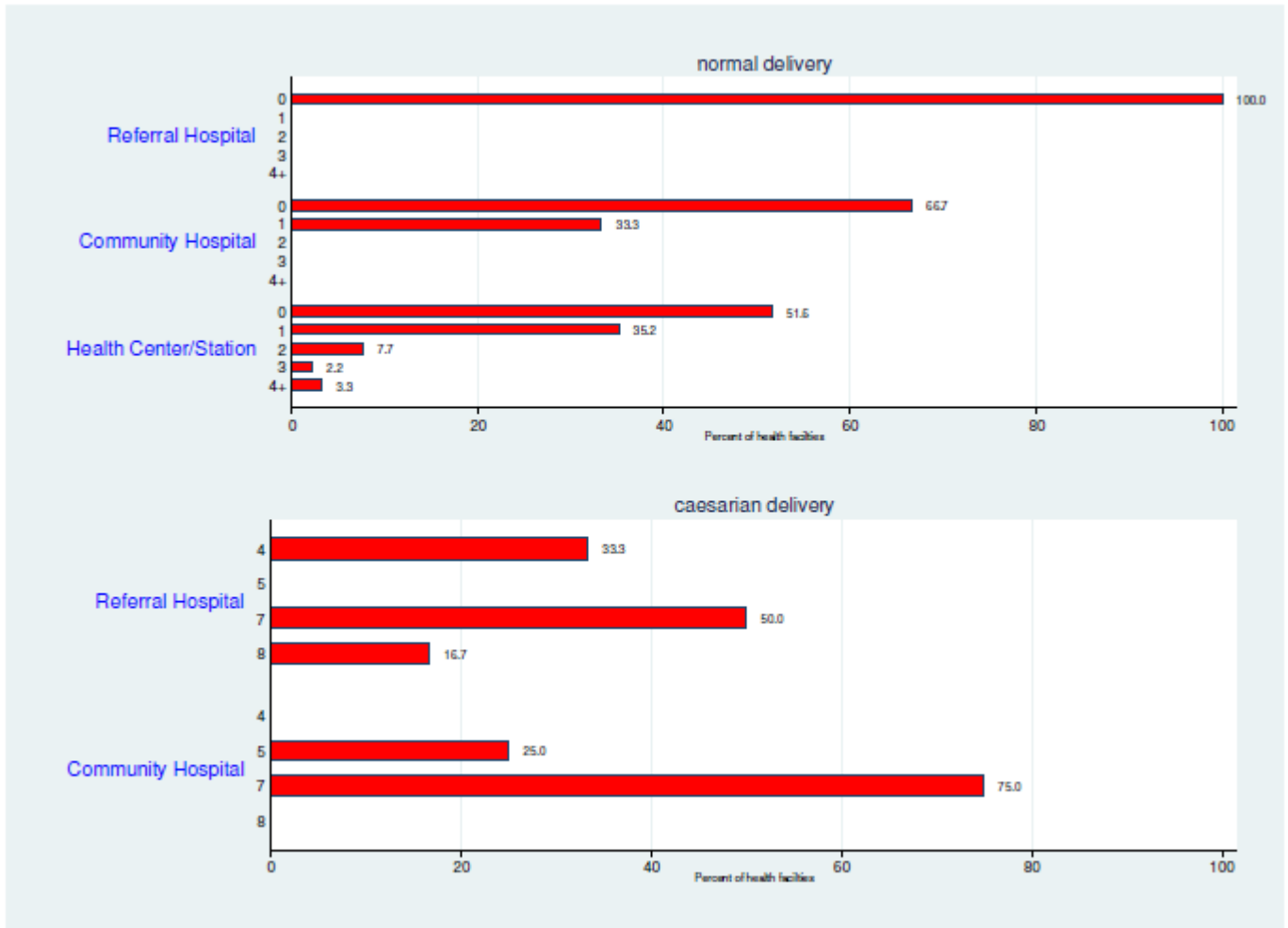
Staff coverage was reported to have been available round-the-clock and patient follow-up in the wards optimal. At the referral and community hospitals, maternity patients were visited at least once per day by either doctors or nurses/midwives. At the health center level, doctors were typically not present and rounds were made at least once a day by nurses/midwives (53 percent of health centers and health stations).

The average duration of patient stay, however, was short. At the referral hospital, patients were usually discharged on the

same day after a normal delivery. At two-thirds of the community hospitals patients were discharged on the same day; at the remaining one-third, they were discharged one day after delivery. The health centers kept women longer than the referral hospitals and community hospitals because of a lighter patient load. More than a third of the health centers/stations allowed women to stay for a day after normal delivery and the rest let them stay for two or more days (Figure 5).

The average duration of stay after caesarian deliveries also showed a similar pattern. The length of stay was the shortest at the referral hospitals, and slightly higher at the community hospitals. While the referral hospitals discharged caesarian-section patients after 4-5 days, the community hospitals allowed them to stay for 5-7 days (Figure 5).

Figure 5: Average Duration of Patient Stay at Facilities after Normal (N=109) and Caesarian Deliveries (N=11)



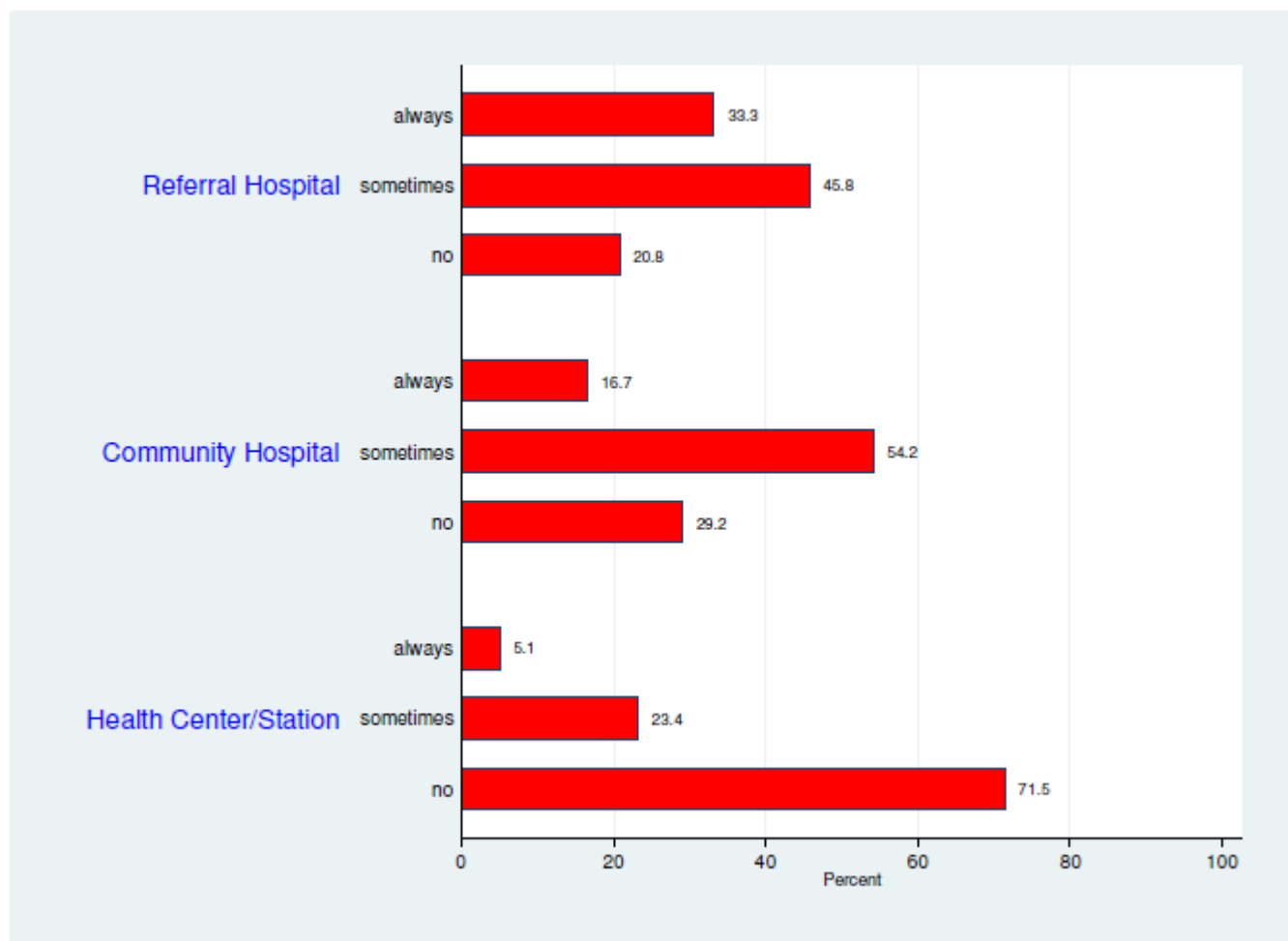
Management

Most essential drugs, such as oxytocics, anticonvulsants, antibiotics and painkillers were reported to have been available at hospitals. There were some shortages at health centers but no major stock-outs were reported. Medical supplies such as syringes, needles, scissors, blades, suture materials, gloves, and washing soap were reported to have been available at all health facilities.

The majority of hospitals had the equipment needed for maternity services, including gynecological examination table, fetoscope, autoclave, speculum, forceps, etc. One-third of hospitals did not have an operating table and anesthesia equipment. The health centers and health stations were not as well-equipped as the hospitals, presumably because they did not perform complex procedures.

Management problems were mostly related to patient load. The large majority of referral hospitals had experienced problems in handling patient load for maternity care. One-third of referral hospitals always had problems; 46 percent sometimes had problems. The majority of community hospitals also had problems in handling patient load. In contrast, less than a third of health centers reported having had problems managing patient load (Figure 6).

Figure 6: Reported Problems in Handling Maternity Patient Load (N=207)



Maternal Complications and Deaths Case Review

The main causes of obstetric complications among hospital admissions in 2007 were abortion complications, obstructed/prolonged labor, abnormal fetal presentation and pre-eclampsia/eclampsia. The largest proportion of obstetric complications was due to complications of abortion (45.6 percent) (Table 2). Data collected from the medical records were inadequate to determine whether the abortions were spontaneous or induced.

There were a small number of maternal deaths at facilities. Out of the 6,315 patients who were admitted for obstetric complications in 2007, 41 were classified as maternal deaths. The cause of death could be identified from medical records in 34 out of the 41 cases. The case-fatality rate for obstetric complications was 0.54 percent, well within the UN recommended level of less than 1 percent.

The leading causes of maternal death among these 34 cases was identified as pre-eclampsia/ eclampsia in 26.5 percent of the cases, abortion complications in 23.5 percent cases, and postpartum sepsis and post-partum hemorrhage in 17.6 percent each.

Limitations

There were limitations to our study. Data about provider adherence with standards of care were based on interviews and could not be independently verified. The medical record review used retrospective data, which had limitations related to quality and completeness. Direct observations of deliveries were not considered feasible, although this method might have produced additional important insights into the quality of maternity care and should be considered in the future.

Table 2: Causes of Pregnancy Complications for Hospital Admissions in 2007

Obstetric complication	N=6315	Percent *
Abortion complications	2881	45.62
Obstructed/prolonged labor	1163	18.42
Abnormal fetal presentation	650	10.29
Pre-eclampsia/eclampsia	485	7.68
Premature rupture of membranes	408	6.46
Preterm labor	234	3.71
Retained placenta	228	3.61
Antepartum hemorrhage	224	3.55
Postpartum sepsis	207	3.28
Postpartum hemorrhage	197	3.12
Retained placenta products	191	3.02
Cord prolapse	76	1.20
Ruptured uterus	40	0.63
Ectopic pregnancy	7	0.11

*Percent based on multiple responses

Discussion

The biggest constraint facing the Eritrean health system in general, and to providing good quality obstetric care specifically, is the severe shortage of health care providers. Obstetricians and gynecologists are in short supply. Doctors are generally not available at the lower levels of the health system, where nurses and midwives predominate. However, life-threatening complications cannot be treated by providers with only basic clinical skills; invariably, the majority of patients with complications are referred to hospitals where doctors are available.

Interestingly, our findings show that despite these considerable human resource constraints, the few hospitals at the national and community level are functioning well and appear to be maintaining reasonably good quality of care. Drugs, supplies and equipment are usually adequate. The relatively low case-fatality rates and other process indicators indicate

that the health system is maintaining good quality with the current patient load. The system, however, appears to be walking a fine line between maintaining current levels of quality and becoming potentially overwhelmed by higher demand, which needs to be taken into consideration when introducing an RBF program. The findings related to bed occupancy, staff workload and problems in handling patient load clearly indicate that there is significant pressure on the current infrastructure and the service providers.

The strategy for preventing maternal mortality in Eritrea relies on the referral system, which is less than optimal. There is wide heterogeneity in the cost and availability of transport for emergencies. The distance and time required to reach a referral facility from a lower-level center also varied greatly depending on the location. This is another important finding with respect to introducing an RBF program. These programs tend to provide financial incentives to alleviate the cost of transport; however, the variability of financial and logistical constraints suggests that such incentives cannot be applied uniformly throughout the country.

According to guidelines such as the UN Process Indicators, Eritrea has an adequate number of EmOC facilities and almost the recommended number of BEmoC facilities as per population size (Ghebrehwet and Morrow 2007). Based on this assessment, however, we contend that Eritrea has an inadequate number of facilities that are capable of providing comprehensive obstetric care and the geographical distribution of existing facilities is not equitable. Existing hospitals are stretched to capacity as the majority report not having empty beds. Patient discharge patterns also indicate that the hospitals are trying to accommodate the current huge demand for services by discharging patients as soon as possible. All hospitals discharge normal delivery patients on the same day or the following day. A short post delivery hospital stay may not be optimal, however, as a large proportion of obstetric complications develop in the postpartum period.

Any results-based financing strategy likely to increase demand also must be cognizant of the existing levels of patient load on the system. Health facility load could be exacerbated by an RBF program. Increasing the burden on overstretched hospitals can lead to overcrowding, which can have an impact on the quality of care. In the Dominican Republic, overcrowding of referral hospitals was found to be associated with over-medicalization of uncomplicated deliveries, degradation of quality of care, and compassion fatigue, which can affect the interpersonal care necessary to maintain the dignity and rights of all patients (Miller, Cordero et al, 2003). Overcrowding of maternity wards has also been associated with the spread of infections, such as puerperal sepsis, which leads to maternal deaths (Loudon, 1986). Some anecdotal evidence from India suggests that quality of care at public health facilities may have deteriorated because of a conditional cash transfer scheme intended to increase institutional deliveries (Devadasan, Elias et al, 2008; Iyengar, Iyengar et al, 2009).

A growing body of evidence further suggests that quality is an important determinant of maternal health care utilization. The availability of qualified staff, institutional arrangements, and capacity determine the quality of emergency obstetrical care, which tends to be an important predictor of the use of services by women (Olsen, Ndeki et al, 2005). Moreover, patients prefer to bypass facilities that offer poor quality care in favor of facilities that provide high quality care, are staffed with more knowledgeable physicians, and are better stocked with supplies, even though this decision involves additional travel cost (Leonard, Mliga et al, 2002).

Similarly, in Eritrea, patients appear to be making rational choices about where to seek care. As suggested by admission patterns, the majority of patients self-refer directly to the hospitals instead of going to health centers. The choice is understandable because visiting a health center first requires precious time and costs additional money. Moreover, since treatment for serious complications is not available at health centers, patients would eventually be referred to hospitals. If demand generating incentives attempt to redistribute patient load, they should be careful not to restrict women's choices for a superior level of care. Tying the financial incentive to a specific type of health facility would be a cause for ethical concern.

Abortion in Eritrea is illegal and therefore medical abortion services are not provided at health facilities. The high proportion of complications due to abortion (46 percent) suggests that women are seeking unsafe abortions outside health facilities. This finding presents a challenge to any incentive-based strategy that aims to increase demand for care. Providing incentives to seek care from facilities where services most needed by women are not available would be unfounded. Before demand for maternity care is generated, necessary steps towards increasing access to family planning and provision of safe legal abortion services, including policy reforms and training in abortion provision, counseling, management of abortion complications, and post abortion care, should be ensured.

Strengthening the health system by upgrading health centers and stations for comprehensive obstetric care provision,

filling human resource gaps, and providing good quality family planning and safe abortion services are all strategies that need to be pursued for improving maternal health outcomes in Eritrea. Upgrading a substantial number of lower-level health facilities to function as emergency obstetric care facilities with functional referral to tertiary level care will be essential for providing easily accessible and effective treatment for maternal health complications. For example, the availability of cesarean section and blood banks at lower-level facilities will not only reduce the pressure on over-stretched hospitals, but also enhance women's access to emergency obstetric care, thereby reducing their need to undertake expensive and sometimes perilous journeys across the country.

The findings clearly indicate the need for strengthening human resources for comprehensive obstetric care. Increasing dependency on health workers with basic clinical qualifications, however, is unlikely to be a viable solution for expanding provision of skilled attendance or emergency obstetric care. Life Saving Skills (LSS) training, a course ranging from two weeks to three months, is provided to nurses, midwives and at times, to doctors in Eritrea. Although LSS training is meant to upgrade skills of the existing workforce for managing the five leading causes of maternal deaths (hemorrhage, infection, obstructed labor, abortion, eclampsia), there are not enough providers who have expertise in comprehensive obstetric care.

Conclusion

New results-based financing programs that intend to increase demand and improve quality must ensure that the health system is equipped to meet the anticipated increase in demand satisfactorily, and that in so doing, will improve quality and not leave current quality and patient satisfaction worse-off. Generating demand without requisite attention to quality carries risks (Meessen, Kashala et al, 2007). Encouraging more women to seek maternal health care from facilities without strengthening the system may have a detrimental impact on current care. It may cause quality of care, which is currently satisfactory, to deteriorate. It may also raise serious credibility issues if new levels of demand cannot be met. To increase their likelihood of success, it is recommended that results-based financing schemes ensure that facilities have the technical capacity to deliver remunerated services, consider the possibility of requiring some accreditation process as a prerequisite for participation in the scheme, monitor frequently that capacity is sustained, and consider the possibility of paying for performance conditional on quality (Meessen, Kashala et al, 2007).

Major deficiencies in health systems can impede maternal mortality reduction even in settings where gains are being or have been made in improving the use of maternal health care services. Although financial incentives may improve utilization of health care, they may not impact health outcomes unless a minimum supply of effective health services is ensured (Lagarde, Haines et al, 2007). In settings where health systems are weak, strategies for demand creation are found to have the greatest impact on utilization of emergency obstetric care when accompanied by interventions to upgrade health facilities and improve quality of maternal health care (Hossain and Ross, 2006). Increasing the volume of services delivered, alone, without addressing quality or strengthening health system functioning may hinder progress towards achieving MDG 5.

References

- Basinga, P., P. J. Gertler, et al. (2010). Paying Primary Health Care Centers for Performance in Rwanda. Washington DC, World Bank.
- Bergstrom, S. and E. Goodburn (2001). The role of traditional birth attendants in the reduction of maternal mortality. Safe Motherhood Strategies: A Review of the Evidence. V. De Brouwere and W. Van Lerberghe. Antwerp, ITG Press: 77-96.
- Devadasan, N., M. A. Elias, et al. (2008). A conditional cash assistance programme for promoting institutional deliveries among the poor in India: process evaluation results Reducing financial barriers to obstetric care in low-income countries. F. Richard, S. Witter and V. De Brouwere, ITG Press.
- Donabedian, A. (2003). An Introduction to Quality Assurance in Health Care. New York, Oxford University Press.
- Eichler, R. and R. Levine (2009). Performance Incentives for Global Health: Potential Pitfalls. Washington DC, Center for Global Development.
- Eldridge, C. and N. Palmer (2009). "Performance-based payment: some reflections on the discourse, evidence and unanswered questions." Health Policy and Planning. **24**(3): 160-166.
- Fiszbein, A. and N. Schady (2009). Conditional Cash Transfers. Washington DC, The World Bank.
- Gabrysch, S. and O. Campbell (2009). "Still too far to walk: Literature review of the determinants of delivery service use." BMC Pregnancy and Childbirth **9**(1): 34.
- Gage, A. J. (2007). "Barriers to the utilization of maternal health care in rural Mali." Social Science & Medicine **65**(8): 1666-82.
- Ghebrehiwet, M. (1998). Iodine Deficiency Disorder Survey in Eritrea. Asmara, Ministry of Health, Eritrea.
- Ghebrehiwet, M. and R. Morrow (2006). "Determining the level of maternal mortality in Eritrea using RAMOS." Journal of the Eritrean Medical Association JEMA **1**(1): 3-7.
- Graham, W. J., J. B. Bell, et al. (2001). Can skilled attendance at delivery reduce maternal mortality in developing countries? Safe Motherhood Strategies: A Review of the Evidence. V. De Brouwere and W. Van Lerberghe. Antwerp, ITG Press: 97-130.
- Hart, J. T. (1971). "The inverse care law." The Lancet **1**(7696): 405-12.
- Hill, K., K. Thomas, et al. (2007). "Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data." The Lancet **370**(9595): 1311-1319.
- Hossain, J. and S. R. Ross (2006). "The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh." International Journal of Gynecology & Obstetrics **92**(3): 320-328.
- International Health Partnership (IHP+) (2009). Working Group 2: Raising and Channeling Funds: Progress Report to the Taskforce. Taskforce for Innovative Financing for Health Systems.
- Iyengar, S. D., K. Iyengar, et al. (2009). "Comparison of domiciliary and institutional delivery-care practices in rural Rajasthan, India." Journal of Health Population & Nutrition **27**(2): 303-12.
- Kiwanuka, S. N., E. K. Ekirapa, et al. (2008). "Access to and utilisation of health services for the poor in Uganda: a systematic review of available evidence." Transactions of the Royal Society of Tropical Medicine and Hygiene **102**(11): 1067-1074.
- Lagarde, M., A. Haines, et al. (2007). "Conditional Cash Transfers for Improving Uptake of Health Interventions in Low- and Middle-Income Countries: A Systematic Review." JAMA **298**(16): 1900-1910.
- Lagarde, M., A. Haines, et al. (2009). "The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries." Cochrane Database of Systematic Reviews. **7**(4): CD008137.
- Leigh, B., T. G. Mwale, et al. (2008). "Emergency obstetric care: How do we stand in Malawi?" International Journal of Gynecology & Obstetrics **101**(1): 107-111.
- Leonard, K. L., G. R. Mliga, et al. (2002). "Bypassing health centres in Tanzania: revealed preferences for quality." Journal of African Economy **11**(4): 441-471.

- Loudon, I. (1986). "Deaths in childbed from the eighteenth century to 1935." Med History **30**(1): 1-41.
- McNamee, P., L. Ternent, et al. (2009). "Barriers in accessing maternal healthcare: evidence from low-and middle-income countries." Expert Review of Pharmacoeconomics and Outcomes Research **9**: 41-48.
- Meessen, B., J. P. Kashala, et al. (2007). "Output-based payment to boost staff productivity in public health centres: contracting in Kabutare district, Rwanda." Bulletin of the World Health Organization **85**(2): 108-15.
- Meessen, B., L. Musango, et al. (2006). "Reviewing institutions of rural health centres: the Performance Initiative in Butare, Rwanda." Tropical Medicine & International Health **11**(8): 1303-1317.
- Miller, S., M. Cordero, et al. (2003). "Quality of care in institutionalized deliveries: the paradox of the Dominican Republic." International Journal of Gynecology & Obstetrics **82**(1): 89-103.
- Ministry of Health Eritrea (1998). Primary Health Care Policy and Policy Guidelines. Asmara.
- Naimoli, J. (2009) "Contributing to global learning about Results-Based Financing (RBF): The Health Results Innovation Trust Fund." www.rbfhealth.org.
- National Statistical Office (NSEO) Eritrea and ORC Macro (2003). Eritrea Demographic and Health Survey 2002. Calverton, Maryland, USA, National Statistics and Evaluation Office and ORC Macro.
- National Statistical Office Eritrea and Macro International Inc. (1995). Eritrea Demographic and Health Survey, 1995. Calverton, Maryland, National Statistics Office and Macro International Inc.
- Olsen, Ø. E., S. Ndeki, et al. (2005). "Human resources for emergency obstetric care in northern Tanzania: distribution of quantity or quality?" Human Resources for Health **3**(1): 5.
- Olsen, Ø. E., S. Ndeki, et al. (2004). "Complicated deliveries, critical care and quality in Emergency Obstetric Care in Northern Tanzania." International Journal of Gynecology & Obstetrics **87**(1): 98-108.
- Paxton, A., D. Maine, et al. (2005). "The evidence for emergency obstetric care." International Journal of Gynecology & Obstetrics **88**(2): 181-193.
- Pearson, L. and R. Shoo (2005). "Availability and use of emergency obstetric services: Kenya, Rwanda, Southern Sudan, and Uganda." International Journal of Gynecology and Obstetrics **88**(2): 208-215.
- Rasch, V. (2007). "Maternal death and the Millennium Development Goals." Danish Medical Bulletin **54**: 167-9.
- Sundari, T. K. (1992). "The untold story: how the health care systems in developing countries contribute to maternal mortality." International Journal of Health Services **22**(3): 513-28.
- Thaddeus, S. and D. Maine (1994). "Too far to walk: Maternal mortality in context." Social Science & Medicine **38**(8): 1091-1110.
- UNICEF (2008). Tracking Progress in Maternal, Newborn and Child Survival: The 2008 Report. Countdown to 2015: Maternal, Newborn and Child Survival. New York, UNICEF. **V2**.
- World Bank (2009). Online Atlas of the Millennium Development Goals, The World Bank.
- World Bank (2009). World Development Indicators. Washington DC, The World Bank.
- World Health Organization (2005). The World Health Report 2005, Making every mother and every child count. Geneva: 62.
- World Health Organization, UNICEF, et al. (2004). Maternal mortality in 2000. Geneva.
- World Health Organization, UNICEF, et al. (2007). Maternal mortality in 2005. Geneva.

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