Matern Child Health J (2009) 13:687–694
DOI 10.1007/s10995-008-0380-y

Availability, Utilisation and Quality of Basic and Comprehensive Emergency Obstetric Care Services in Malawi

Eugene J. Kongnyuy · Jan Hofman · Grace Mlava · Chisale Mhango · Nynke van den Broek

Published online: 26 June 2008
© Springer Science+Business Media, LLC 2008

Abstract *Objective* To establish a baseline for the availability, utilisation and quality of maternal and neonatal health care services for monitoring and evaluation of a maternal and neonatal morbidity/mortality reduction programme in three districts in the Central Region of Malawi. *Methods* Survey of all the 73 health facilities (13 hospitals and 60 health centres) that provide maternity services in the three districts (population, 2,812,183). *Results* There were 1.6 comprehensive emergency obstetric care (CEmOC) facilities per 500,000 population and 0.8 basic emergency obstetric care (BEmOC) facilities per 125,000 population. About 23% of deliveries were conducted in emergency obstetric care (EmOC) facilities and the met need for emergency obstetric complications was 20.7%. The case fatality rate for emergency obstetric complications treated in health facilities was 2.0%. Up to 86.7% of pregnant women attended antenatal clinic at least once and only 12.0% of them attend postnatal clinic at least once. There is a shortage of qualified staff and unequal distribution with more staff in hospitals leaving health centres severely understaffed. *Conclusions* The total number of CEmOC facilities is adequate but the distribution is unequal, leaving some rural areas with poor access to CEmOC services. There are no functional BEmOC facilities in the three districts. In order to reduce maternal mortality in Malawi and countries with similar socio-economic profile, there is a need to upgrade some health facilities to at least BEmOC level by training staff and providing equipment and supplies.

Keywords Emergency obstetric care · Maternal and neonatal health care · Quality of care · UN process indicators · Malawi

E. J. Kongnyuy (✉) · J. Hofman · N. van den Broek
Child and Reproductive Health Group, Liverpool School of Tropical Medicine, Liverpool, UK
e-mail: kongnyuy73@yahoo.com

J. Hofman
e-mail: hofmanj@liverpool.ac.uk

N. van den Broek
e-mail: vbreok@liverpool.ac.uk

G. Mlava
The Health Foundation Consortium, Lilongwe, Malawi
e-mail: gracemlava90@yahoo.com

C. Mhango
Reproductive Health Unit, Ministry of Health, Lilongwe, Malawi
e-mail: c-mhango@yahoo.com

Introduction

Malawi has an estimated population of 14,000,000 and is one of the poorest countries in the world with 20.8% of the population living on below $1 per day and ranking position 164 out of 177 countries with a human development index of 0.439 [1–3]. The life expectancy at birth is estimated at 46.3 years [3]. The literacy rate of 15–24 year-olds now stands at 76.0% and the HIV prevalence among the adult population (15–49 years) is currently estimated as 12% [2, 4].

Poor indicators also apply to maternal and neonatal health. Malawi's unadjusted Maternal Mortality Ratio (MMR) of 984 per 100,000 live births [2] is one of the highest in the world [5]. The MMR increased from 620 per 100,000 live births in 1992 to 1,120 per 100,000 live births in 2000 before dropping slightly to 984 per 100,000 [2]. The infant mortality rate is currently estimated as 76 per

1,000 live births and the neonatal mortality rate at 27 per 1,000 live births [2].

Malawi is one of the 189 nations of the world that signed on to the Millennium Development Goals (MDGs). The targets of one of these goals (MDG 5) are to 'reduce the MMR by three quarters, between 1990 and 2015' and to increase skilled attendance at birth to 95% of births by 2015 [6]. Achieving these targets in Malawi is a challenge because there are many barriers to accessing health care coupled with the fact that the institutional delivery rate is low (57%) [2] resulting in many deliveries not assisted by a skilled attendant. Three major barriers have been identified, (a) sub-optimal quality of care which includes communication, attitudes and cooperation, (b) cultural barriers such as traditional view of pregnancy and perception of danger signs and (c) unsatisfactory availability and accessibility of skilled delivery care in terms of transport, distance, costs and critical shortage of skilled attendants [7].

The United Nations (UN) process indicators have been used to evaluate emergency obstetric care in many developing countries. Malawi was one of the first countries where they were used on large scale to assess the availability, utilisation and quality of maternity services in the Southern Region in 2000 [8]. In 2005 a national survey of all hospitals and 25% of health centres in Malawi revealed that Malawi has almost double the minimum recommended number of hospitals offering Comprehensive Emergency Obstetric Care (CEmOC) services, but Basic Emergency Obstetric Care (BEmOC) facilities were not available in sufficient numbers (see box 1) [9]. In addition, severe shortcomings in the quality of care were noted in maternity units.

We conducted an in-depth assessment of all health facilities providing maternal and neonatal health services in three districts of Central Region of Malawi (Kasungu, Lilongwe and Salima). The aim of this survey was to establish a baseline for the availability, utilisation and quality of maternal and neonatal health care services for monitoring and evaluation of a maternal and neonatal morbidity/mortality reduction programme, which is funded by the Health Foundation. Unlike the two previous surveys in Malawi which focused on UN process indicators this survey includes both the UN process indicators and other reproductive health indicators such as contraceptive prevalence rate, antenatal coverage, postnatal coverage and percentage of deliveries by skilled birth attendants. Furthermore, this is the first study that assesses all the health facilities in the three districts.

Methods

This study is a survey of all hospitals and health centres providing maternal and neonatal health services, regardless of the managing agency, in three target districts of the programme in Malawi: Kasungu, Lilongwe and Salima. The survey was conducted in August 2006. Figure 1 presents the map of Malawi showing the three districts surveyed.

There were a total of 92 health facilities in the three target districts—this includes 13 hospitals, 60 health centres and 19 dispensaries. In general dispensaries do not provide maternity services apart from family planning services. All 73 health facilities (13 hospitals and 60 health centres) that provide maternity care were included in the survey; 18 in Kasungu district, 42 in Lilongwe district and 12 in Salima district.

The proportion of deliveries assisted by a skilled attendant and institutional delivery rate were used synonymously, as currently skilled birth attendance is only provided at the facility level in these districts. However, some institutional deliveries are assisted by unskilled health workers, such as cleaners and patient attendants. The definition of terms as used in this study is presented in Tables 1 and 2. The expected number of deliveries per year in each district (used as denominator for facility delivery rate, Caesarean section rate, antenatal care coverage and postnatal care coverage) was estimated to be 4.6% of the population of the catchment area based on the Malawi Crude Birth rate of 44.6 per 1,000. Contraceptive prevalence rate was calculated as the total number of family planning clients reported in the survey (3 months) divided by the total number of women of reproductive age (which for Malawi is 23% of the total population).

All District Health Management Information System Officers were approached to obtain general information such as the district population and a list of health facilities in the district. A Health Facility Rapid Assessment Tool (available on request) was used to collect data. All hospitals and health centres were visited. Person(s) in charge of the maternity units were interviewed and the registers were inspected, while availability of equipment or other items was checked by direct observation. In hospitals the operation register was used to determine the number of Caesarean sections. Data was collected on maternity services provided in the second quarter of 2006 (April–June). In addition the referral (transport) and communication (telephone, radio) systems were assessed.

The Health Facility Rapid Assessment Tool was adapted from the Rapid Assessment used by the Population Council in Kenya. The adapted tool was initially used for a baseline survey in Kenya before being used in Malawi. The tool consists of six parts: (a) general information about the facility (such as the type, ownership, catchment population etc.), (b) availability of general maternal and neonatal health care services (such as antenatal care, delivery care, postnatal care, family planning etc.), (c) availability of emergency obstetric care services (basic and comprehensive), (d) human resources (staffing and training), (e) quality of care (women

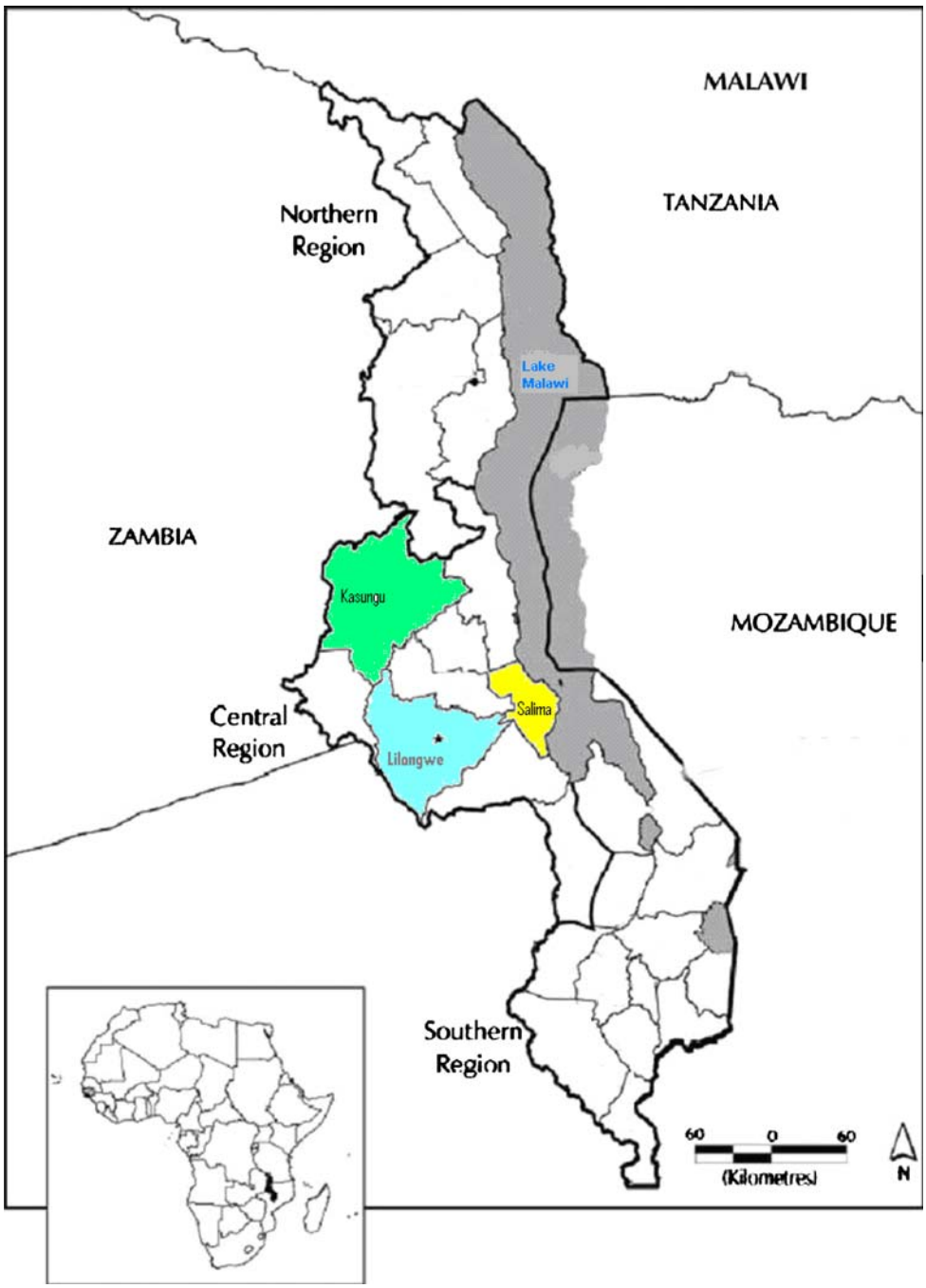

Fig. 1 Map of Malawi showing the three districts surveyed

friendly care, baby friendly care, quality improvement activities), (f) referral system and (g) vital statistics. The survey was conducted by four investigators (two medical doctors and two midwives). Each facility was visited jointly by a doctor and a midwife. All investigators had a half day training on the use of the rapid assessment tool prior to the start of the survey.

All data were doubly entered by two data entry clerks, using SPSS version 12. Data were then analysed and tabulated. The results are stratified where necessary and presented as *proportions* (percentages) for nominal variables and *means* for continuous variables. All reproductive health indicators were calculated based on the definitions in Tables 1 and 2.

Permission for the survey was obtained from the Head of the Reproductive Health Unit (RHU) of the Ministry of Health. The District Health Management Teams of the three target districts were informed through the RHU, and they supported the planning and execution of the survey. At the beginning of the interviews and facility assessments, all healthcare workers were informed about the purpose of the survey and verbal informed consent was obtained.

Table 1 Definitions of obstetric emergency complications and obstetric signal functions

Obstetric emergency complications (EOC)	Emergency obstetric care (EmOC) signal functions
• Antepartum haemorrhage	Basic EmOC (BEmOC)
• Postpartum haemorrhage	1. Injectable oxytocic drugs
• Prolonged/obstructed labour	2. Injectable antibiotics
• Puerperal sepsis	3. Injectable anticonvulsants
• Pre-eclampsia/Eclampsia	4. Manual removal of placenta
• Ruptured uterus	5. Removal of retained products (e.g. MVA)
• Abortion complications	6. Assisted vaginal delivery (e.g. vacuum extraction)
• Ectopic pregnancy	Comprehensive EmOC (CEmOC)
• Retained placenta	All the BEmOC signal functions 1–6 plus
	7. Blood transfusion
	8. Caesarean section

Results

Availability of Maternal and Neonatal Health Care Services

Nine hospitals functioned as full comprehensive emergency obstetric care (CEmOC) facilities—one in Kasungu, one in Salima and seven in Lilongwe. None of the remaining four hospitals could even provide all the six basic emergency obstetric care (BEmOC) signal functions (Table 3). The rate of CEmOC facilities per 500,000 population was 0.8 for Kasungu, 1.5 for Salima and 1.8 for Lilongwe. Overall, there were 1.6 CEmOC facilities per 500,000 (Table 4). The number of CEmOC facilities was therefore adequate in two districts and slightly below the minimum recommended (1 per 500,000 population) in the third district. The distribution of CEmOC facilities was unequal with poor access in some rural areas.

With the exception of the functional CEmOC facilities, there was only one facility that provided all the six BEmOC signal functions within the 3 months prior to the survey. The signal functions which require specific manual skills and specific equipment were the least available. Only 3.3% (2/60) of health centres could do vacuum extractions, 3.3% (2/60) could perform manual vacuum aspiration for retained products of conception, and 35.0% (21/60) could perform manual removal of placenta. Injectable anticonvulsants, oxytocics and antibiotics were provided by 83.3%, 95.0% and 96.7% of health centres, respectively. The percentage of health centres with 3, 4 and 5 BEmOC signal functions were 51.7% (31/60), 26.7% (16/60) and 1.7% (1/60), respectively (Table 3).

The geographical distribution of these facilities was determined by using district health maps with facilities plotted in them, and by visiting these facilities. Lilongwe district had seven CEmOC facilities and there was no equitable distribution as some rural areas are not covered.

Table 2 Definition of variables used in the survey

Variables	Definitions	Recommended level
UN process indicators		
Availability of EmOC	Number of facilities providing EmOC per 500,000 population	1 CEmOC per 500,000 population; 4 BEmOC per 500,000
Proportion of all births in EmOC facilities	Proportion of all births in EmOC facilities	>15%
Met need for EmOC	Proportion of women with obstetric complications delivered at EmOC facilities	100%
Population-based Caesarean section rate	Caesarean deliveries as a proportion of all births	5–15%
Case fatality rate for emergency obstetric complications	Proportion of women with obstetric complications admitted to facility who die	<1%
Other indicators		
Institutional delivery rate	Proportion of all births in health facilities	–
Expected number of deliveries per year	4.5% of the population based on the Malawi Crude Birth rate of 44.6 per 1,000	–
Antenatal care coverage	First antenatal visits as a proportion of expected number of deliveries	–
Postnatal care coverage	First postnatal visits as a proportion of expected number of deliveries	–
Contraceptive prevalence rate	Total number of family planning clients reported in the survey period (3 months) divided by the total number of women of reproductive age (which for Malawi is 23% of the total population)	–

Table 3 EmOC signal functions in health facility in the three districts

		EmOC signal functions							
		MVA	VE	MRP	IAB	IAC	IO	BT	CS
Hospitals	Kasungu ($n = 3$)	1/3	2/3	2/3	3/3	3/3	3/3	2/3	1/3
	Lilongwe ($n = 9$)	7/9	7/9	7/9	9/9	9/9	9/9	8/9	7/9
	Salima ($n = 1$)	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
	Total	9/13	10/13	10/13	13/13	13/13	13/13	11/13	9/13
Health centres	Kasungu ($n = 15$)	0/15	1/15	5/15	15/15	12/15	12/15	0/15	0/15
	Lilongwe ($n = 33$)	2/33	1/33	12/33	31/33	28/33	33/33	0/33	0/33
	Salima ($n = 12$)	0/12	0/12	4/12	12/12	10/12	12/12	0/12	0/12
	Total	2/60	2/60	21/60	58/60	50/60	57/60	0/60	0/60

MVA = manual vacuum aspiration; VE = vacuum extraction; MRP = manual removal of placenta; IAB = injectable antibiotics; IAC = injectable anti-convulsants; IO = injectable oxytocics; BT = blood transfusion; CS = Caesarean section

Table 4 Availability, utilisation and quality of maternal and neonatal health care in three districts over a 3 month period (April, May and June 2006)

Variables	Kasungu	Lilongwe	Salima	Total
Population	608,917	1,871,958	331,308	2,812,183
CEmOC facilities per 500,000 pop.	0.8 (1/608,917)	1.8 (7/1,871,958)	1.5 (1/331,308)	1.6 (9/2,812,183)
BEmOC facilities per 500,000 pop.	0.0 (0/608,917)	0.3 (1/1,871,958)	0.0 (0/331,308)	0.2 (1/2,812,183)
% of deliveries conducted in EmOC facilities	15.3 (1,045/6,850)	27.6 (5804/21,060)	7.4 (272/3,727)	22.5 (7125/31,637)
Met need for EmOC services (%)	9.7 (100/1,028)	26.8 (847/3,159)	6.4 (36/559)	20.7 (983/4,746)
Population-based CS rate (%)	1.8 (121/6,850)	3.1 (645/21,060)	2.8 (104/3,727)	2.7 (870/31,637)
Case fatality rate (%)	4.9 (10/203)	1.6 (18/1,156)	1.4 (2/143)	2.0 (20/1,502)
% of deliveries by skilled attendants	27.7 (1,898/6,850)	45.4 (9,568/21,060)	28.9 (1,078/3,727)	40.6 (12,844/31,637)
Coverage of ANC (%)	84.5 (5,788/6,850)	86.0 (18,111/21,060)	94.6 (3,525/3,727)	86.7 (2,7429/31,637)
Average no. of ANC visits per client	2.7	3.0	2.6	2.9
Coverage of PNC (%)	12.1 (828/6,850)	12.0 (2,527/21,060)	11.5 (428/3,727)	12.0 (3,796/31,637)
Contraceptive prevalence rate (%)	7.3 (10,223/140,051)	10.0 (41,813/14,8130)	6.3 (48,006/76,2001)	9.0 (58,212/646,802)

Most of the CEmOC were located in the central area of Lilongwe District and three were actually in or near the capital city.

Utilisation of Maternal and Neonatal Health Care Services

There were considerable differences in the proportion of deliveries assisted by skilled health personnel in the three districts: Kasungu (27.7%) Salima (28.9%) and Lilongwe (45.4%). Overall, 40.6% of deliveries in the three districts were assisted by skilled providers, as Lilongwe has a larger population than the other two districts.

The population-based Caesarean Section rate was low (2.7%) despite an overall adequate number of CEmOC facilities. Only 20.7% of expected emergency obstetric complications were handled in EmOC facilities while the UN agencies involved in Safe Motherhood recommend that all EOCs be managed in EmOC facilities.

Eighty-seven percent of pregnant women attended antenatal care (ANC) at least once during pregnancy. The average number of antenatal visits per woman was 2.9. At the district level, there was little variation in ANC uptake between the three districts. At the health facility level utilisation varied considerably between different health facilities. While some health facilities have a low uptake for ANC, others show figures of more than 100% of expected pregnancies in the catchment population, implying that probably women are coming from neighbouring catchment areas or catchment areas of health facilities overlap.

Postnatal care is provided in all hospitals and health centres. The overall utilisation of PNC services is low. Only 12% of women who give birth receive postnatal care within 2 weeks following delivery.

All the hospitals and health centres provide family planning services. The overall modern contraceptive prevalence rate for the three districts was estimated at 9% and varied between 6.3% for Salima, 7.3% for Kasungu

and 10% for Lilongwe. The true contraceptive prevalence rate is probably higher because contraceptives provided by dispensaries and community-based distribution agents were not considered in this study.

Quality of Maternal and Neonatal Health Care

Quality of care was assessed using mortality data, client-friendly care services and factors that could interfere with quality such as referral systems and staffing. The case fatality rate for emergency obstetric complications was 2% compared to a maximum of 1% currently recommended by the UN.

Screens or curtains were available in the delivery room in 59 out of 73 health facilities (81%). In most facilities women were allowed to take food and move around while in labour. However a companion—such as a mother or sister—was allowed to stay with the mother in the labour ward only in 22 out of 73 health facilities (30.1%). A bed sheet to cover the mother while in the delivery room was available in 26 out of 73 maternity units (35.6%).

In all three districts, regular reviews of maternal deaths were conducted at the district health office on a monthly basis. The reviews bring together representatives of the various health facilities to the district health office. Maternal death audit was not done at facility level in the three districts.

In Kasungu and Salima, all health facilities had a functional radio communication system or a ground telephone line. A car ambulance was available in 28% of health facilities in Kasungu and 6.5% of facilities in Salima. In Lilongwe most of the health facilities have short-wave radios, but radio communication was not functional in 5 of the 8 hospitals with radio (63%) and 23 of the 33 health centres (70%).and 13 out of 42 (31%) facilities had a car ambulance so that in case of emergency timely referral and calling for an ambulance remained problematic.

There was shortage of health care providers in all the health facilities. There was uneven distribution of staff between the three districts and between the hospitals and health centres. Most of the staff worked in the hospitals while the health centres were severely under-staffed. Most health centres had only 1 or 2 midwives. Sixty-seven percent of HCs in Lilongwe had less than three midwives, and for Kasungu and Salima these figures were 93% and 83% respectively.

Discussion

The survey revealed that the three health districts have a fairly adequate number of CEmOC facilities, although geographical distribution was unequal, but fully functional BEmOC facilities were almost non-existent. This is reflected in the very low met need for emergency obstetric care and the low Caesarean section rate. The adequate number of CEmOC facilities and inadequate number of BEmOC facilities reported in this study seems to be a universal finding in many EmOC surveys. In the assessment of EmOC facilities in Morocco, Nicaragua and Sri Lanka, it was found that the number of CEmOC facilities were more than the recommended minimum while the number of BEmOC facilities in all the three countries were below the recommended minimum [10]. Paxton et al. examined the global patterns of the availability of EmOC functions and concluded that CEmOC facilities are usually available to meet the recommended minimum, but BEmOC facilities are consistently not available in sufficient numbers both in countries with high and moderate levels of maternal mortality [11].

The population-based CS rate, which is an indicator of accessibility and utilisation of EmOC, is low despite an overall adequate number of CEmOC facilities. This can partly be explained by the unequal distribution of CEmOC facilities resulting in poor geographical accessibility of these services in some rural areas, but financial accessibility may be a problem as well since 5 out of 9 CEmOC hospitals charge user fees, which are difficult to afford for poor rural families. Long distances to health facilities and lack of means of transport are major problems affecting the referral system in the rural areas of the three districts, compounded by the non-functional communication system in many rural health facilities in Lilongwe, while during rainy season roads also become difficult to navigate. While the rates of Caesarean section remain low in sub-Saharan Africa, Latin America and industrialised countries have very high rates, generally above 20% [12]. This may reflect the differential availability of resources, attitudes of health care professionals and women's perceptions and attitudes towards Caesarean section [13, 14].

The institutional delivery rate of 40.6% is rather low even according to Malawian standards. The Malawi Demographic and Health Survey of 2004 indicates that 57% of deliveries were conducted in health facilities and 56% by skilled attendants [2]. It is not clear whether the low figures found in this survey reflect a general downward trend in the country as a whole or whether the three districts are performing less than other districts in the country.

The percentage of deliveries conducted in EmOC facilities is higher than the minimum recommended value of 15% in the three districts. However, the met need for Emergency Obstetric Complications is less than the recommended 100% because many cases managed in EmOC facilities are not Emergency Obstetric Complications and many of these complications do not reach health facilities.

Utilisation of antenatal care services is good in all three districts and approximates the national average of 92% [2].

Wide variation in the utilisation levels of antenatal care services between health facilities could be due to incorrectly defined catchment areas and overlap of catchment areas between health facilities. Almost everywhere in the districts expecting mothers visit the antenatal clinic on average less than three times during their pregnancy, while four visits are the minimum recommended [15].

Antenatal care coverage is high but the facility delivery rate is only 40% and postnatal care coverage is even lower. Many surveys have found consistently high antenatal coverage, low facility delivery rates and even lower postnatal care coverage in African countries [16, 17]. More efforts have to be taken to increase uptake of delivery care and postnatal care, because most maternal deaths occur during and after delivery [18]. This can be done by improving quality of care, including improving availability and skills of health workers and making services more client friendly, as well as by sensitising and mobilising communities. The antenatal care tends to be high even among refugees [19].

The contraceptive prevalence rate of 9% reported in this study is likely to underestimate the true rate because the contraceptives provided by dispensaries and community-based distribution agents were not included in the survey.

Quality of care was assessed by using the case fatality rate of emergency obstetric complications and some aspects of client-friendly care of maternity services. Privacy in the labour ward was assessed by looking at the availability of screens or curtains around the delivery bed(s). Quality of maternity services from the client's perspective has other aspects as well, such as the attitudes and behaviour of the maternity staff towards women in labour and the care given during labour and after delivery. In addition, the quality of management is an important aspect that needs to be considered when evaluating the quality of care. Health managers in the three districts work under constant pressure from scarce financial and human resources. Quality from the client's and manager's perspectives are important as well [20], but difficult to assess in a structured rapid health facility survey.

A serious set-back to the provision of quality maternal health care services in all the three districts is the critical shortage of qualified health workers, particularly professional midwives, which also jeopardises the availability of maternity services throughout the year, 24 h a day and 7 days a week,. When continuous availability of skilled attendants at birth cannot be ensured at health facilities it is not surprising that utilisation of maternity services is below expectations. Inadequate staffing and high workload affect quality of care and in combination with low remuneration, also staff morale, and may lead to client-unfriendly behaviour. The severe shortage of qualified medical staff at the health facilities to provide maternity services reflects the general shortage of human resources in developing countries [21].

The findings of this study should be interpreted with caution because of the possibility of over-diagnosis or under-diagnosis of some obstetric emergencies. Despite the fact that these definitions are found in the maternity registers, different health care providers could interpret them differently. Poor diagnosis and under-recording of obstetric emergency complications could affect both the case fatality rate and the met need for emergency obstetric complications.

In order to be successful in reducing maternal and neonatal mortality in Malawi and other countries with similar socio-economic profiles, there is need to increase availability and accessibility of skilled attendants at birth, address the low utilisation of maternity and postnatal services, and improve the availability and accessibility of EmOC services, BEmOC in particular. This can be achieved by upgrading some health centres to at least BEmOC level through training of staff and provision of equipment and supplies. Introduction of quality improvement methods such as maternal death reviews and criteria-based audit can further improve quality of care and utilisation of services [22]. In addition, there is need to improve the referral and communication systems by stationing some ambulances at strategic sites in rural areas of the districts or motorcycle ambulances at health centre level, as have been piloted in Malawi. Also communities have to be sensitised and mobilised to overcome barriers at the community and household levels for women to access essential maternal and newborn health services. Interventions such as provision of bicycle ambulances at community level or construction of maternity waiting homes next to health facilities may alleviate the accessibility problem. There is high fertility rate (6.0 children per woman) and high unmet need for family planning (28%) [2]. Therefore the provision of family planning would eliminate unwanted births, reduce work load in health facilities and help improve the quality of care. Further qualitative research may reveal other reasons for the low utilisation of delivery services.

Acknowledgements We wish acknowledge the Health Foundation for providing financial support for this study. We also thank the staff of all the health facilities and the Health Foundation Consortium staff for the cooperation shown during the data collection phase.

Authors' Contribution EJK wrote the protocol, collected the data, analysed and interpreted the data, and drafted the first copy and all versions of the manuscript. JH and GM participated in data collection. CM and NVDB reviewed the manuscript for important intellectual content.

References

1. United Nations. Millennium Development Goals Indicators. http://mdgs.un.org/unsd/mdg/Data.aspx. Accessed on December 10, 2007.

2. National Statistical Office (Malawi), ORC Macro. (2005). *2004 Malawi Demographic and Health Survey*. Calverton: ORC Macro, Maryland.
3. United Nations Development Programme. Human Development Reports: Human Development Index—going beyond income. http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_MWI.html. Accessed on January 24, 2008.
4. WHO. Mortality and burden of disease. http://www.who.int/countries/mwi/en/. Accessed on 10/12/2007.
5. World Health Organisation. (2004). *Maternal mortality in 2000: Estimates developed by WHO, UNICEF, UNFPA*. Geneva: Department of Reproductive Health and Research, World Health Organisation.
6. United Nations. (2006). *Progress towards millennium development goals, 1990–2005*. New York: Statistics Division, Department of Economics and Social Affairs, United Nations.
7. Seljeskog, L., Sundby, J., & Chimango, J. (2006). Factors influencing women's choice of place of delivery in rural Malawi—An explorative study. *African Journal of Reproductive Health, 10*, 66–75.
8. Hussein, J., Goodburn, E. A., Damisoni, H., Lema, V., & Graham, W. (2001). Monitoring obstetric services: Putting the 'UN Guidelines' into practice in Malawi: 3 years on. *International Journal of Gynaecology and Obstetrics: The Official Organ of the International Federation of Gynaecology and Obstetrics, 75*, 63–73. doi:10.1016/S0020-7292(01)00474-X.
9. Ministry of Health (Malawi). WHO, UNICEF, UNFPA. (2004). *Assessment of emergency obstetric care in Malawi*. Lilongwe: Malawi Ministry of Health.
10. AMDD Working Group Indicatiors. (2003). Group on indicators. Program note: Using UN process indicators to assess needs in emergency obstetric services: Morocco, Nicaragua and Sri Lanka. *International Journal of Gynaecology and Obstetrics: The Official Organ of the International Federation of Gynaecology and Obstetrics, 80*, 222–230. doi:10.1016/S0020-7292(02)00390-9.
11. Paxton, A., Bailey, P., Lobis, S., & Fry, D. (2006). Global patterns in availability of emergency obstetric care. *International Journal of Gynaecology and Obstetrics: The Official Organ of the International Federation of Gynaecology and Obstetrics, 93*, 300–3007. doi:10.1016/j.ijgo.2006.01.030.
12. Chaillet, N., & Dumont, A. (2007). Evidence-based strategies for reducing Cesarean Section rates: A meta-analysis. *Birth (Berkeley, Calif.), 34*, 53–64. doi:10.1111/j.1523-536X.2006.00146.x.
13. Aziken, M., Omo-Aghoja, L., & Okonofua, F. (2007). Perceptions and attitudes of pregnant women towards Caesarean Section in urban Nigeria. *Acta Obstetricia et Gynecologica Scandinavica, 86*, 42–47. doi:10.1080/00016340600994950.
14. Hopkins, K. (2000). Are Brazilian women really choosing to deliver by cesarean? *Social Science and Medicine, 51*, 725–740. doi:10.1016/S0277-9536(99)00480-3.
15. Carroli, G., Villar, J., Piaggio, G., Khan-Neelofur, D., Gulmezoglu, M., Mugford, M., et al. (2001). WHO systematic review of randomised controlled trials of routine antenatal care. *Lancet, 357*, 1565–1570. doi:10.1016/S0140-6736(00)04723-1.
16. Ghana Statistical SErvice, Noguchi Memorial Institute for Medical Research, ORC Macro. (2003) *2003 Ghana Demographic and Health Survey*. Calverton: ORC Macro, Maryland.
17. National Institute of Statistics, ORC Macro Calverton. (2004). *Cameroon Demographic and Health Survey*. Calverton: ORC Macro, Maryland.
18. Ronsmans, C., & Graham, W. J. (2006). Maternal mortality: Who, where, when and why. *Lancet, 368*, 1189–1200. doi:10.1016/S0140-6736(06)69380-X.
19. Orach, C. G., Dubourg, D., & De Brouwere, V. (2007). Costs and coverage of reproductive health interventions in three rural refugee-affected districts, Uganda. *Tropical Medicine & International Health, 12*, 459–469.
20. Chalmers, B., & Quliyeva, D. (2004). A report of women's birth experiences in Baku, Azerbaijan. *Journal of Psychosomatic Obstetrics and Gynaecology, 25*, 3–14. doi:10.1080/01674820410001737397.
21. Lanata, C. F. (2007). Human resources in developing countries. *Lancet, 369*, 1238–1239. doi:10.1016/S0140-6736(07)60573-X.
22. Lewis, G. (2003). Beyond the numbers: Reviewing maternal deaths and complications to make pregnancy safer. *British Medical Bulletin, 67*, 27–37. doi:10.1093/bmb/ldg009.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.