

Research Article

QUALITY IMPROVEMENT OF EMERGENCY OBSTETRIC AND NEWBORN CARE IN SELECTED HEALTHCARE FACILITIES AT LOWER MANYA KROBO MUNICIPALITY IN THE EASTERN REGION OF GHANA

^{1,*}Henry Okorie Ugorji, ²Dr. Reuben Esena, ³Lucy Ofori and ³Ike Onyema Obi

¹Department of Community Health, Ensign College of Public Health, Kpong, Ghana

²Reproductive Health and Gender Unit, United Nations Population Fund (UNFPA), Accra, Ghana

³Sexual and Reproductive Health Department, Pyronie Research Firm, Accra, Ghana

Received 12th May 2021; Accepted 18th June 2021; Published online 22rd July 2021

Abstract

Background: Improving the quality of Emergency Obstetric and Newborn Care (EmONC) in health facilities is crucial to the survival of mothers and their babies, but across the world about 60-80 cases of maternal mortality were as a result of preventable diseases; bleeding, obstructed labour, hypertension complication in pregnancy and complications of unsafe abortion. About ninety-nine per cent of avoidable maternal deaths occurred in low- and middle-income countries the maternal mortality ratio is 240 per 100000 births whilst in high-income countries maternal mortality ratio is 16 per births. **Method:** The study used a cross-sectional design that used quantitative method (checklist, assessment tool, and structured questionnaire) to gather data from record reviewing, healthcare providers and observing the healthcare facilities. A simple random sampling technique with proportional allocation done for the selection of about 271 records of pregnant women who had complications in the three selected healthcare facilities. The sample frame used was gotten from records on all obstetric complications in the healthcare facilities. **Results:** St. Martins Catholic Hospital had about 38.81%, Akuse Government Hospital had 32.84% and Atua Government Hospital had 28.36% of healthcare workers providing EmONC services. The most common obstetric complications in these three healthcare facilities were; Fetal Distress (18.08%), Previous C/S in Labour (13.28%) Pre-eclampsia & Eclampsia (8.12%), Cephalopelvic Disproportion (6.64%), Breech Presentation in Labour (6.64%), etc. None of the three selected healthcare facilities had Infant Laryngoscope with spare bulb and batteries. **Conclusion:** The study concludes that the three selected healthcare facilities provided both basic and comprehensive Emergency Obstetric Care and Newborn (EmONC) services and had qualified healthcare workers who provided these services for twenty-four hours in a day and Seven days in a week.

Keywords: Maternal Health, Neonatal Health, Child Health, Emergency Obstetric and Newborn Care (EmONC), Emergency Obstetric Care (EmOC), Ghana, Lower ManyaKrobo Municipality, Eastern Region

INTRODUCTION

Enhancing the quality of Emergency Obstetric and Newborn Care (EmONC) in health facilities is very important to the survival of mothers and neonates but across the world about 60-80 cases of maternal mortality were as a result of preventable diseases; bleeding, obstructed labour, hypertension complication in pregnancy and complications of unsafe abortion (UNFPA, 2006). Maternal mortality has been a difficult problem, even though there are ongoing efforts to curb this situation, about ninety-nine per cent of avoidable maternal deaths occur in low- and middle-income countries. Despite significant decrease in maternal mortality by forty-five per cent since 1990, eight hundred females die daily, before, during and after having a child from preventable causes. Vulnerable groups in a society are prone to death, so maternal health must be entwined with the improvements of healthcare for the woman, child and the newborn (WHO *et al.*, 2015). Yearly, about 189 million women get pregnant, 122 million end up with live birth whilst about 3 million end up with stillbirth. Also, the babies born to their mothers, about 15 million are preterm and amongst the preterm 1 million will die within one week after birth (USAID 2015). Those mostly susceptible to maternal mortality are adolescent girls; negative effects relating to childbirth and pregnancy are most prevalent in this group, which leads to an increase in maternal mortality ratio among adolescent girls. Women in the low-income part of the world have an increased number of pregnancies than those in the high-income countries high-income countries.

Also, during the period of life in a woman, the vulnerability of a 15-year-old woman to maternal death, is 1 in 3800 in high-income countries and 1 in 150 in low-income countries (WHO 2014). Maternal and neonatal mortality can be associated with three factors; delay in receiving emergency care at the facility, delay in receiving skilled care by the pregnant woman and not making it on time to the health care facility to receive the emergency care (USAID *et al.*, 2016). In low-income countries, the maternal mortality ratio is 240 per 100000 births whilst in high-income countries, maternal mortality ratio is 16 per 100000 births. There is a huge disparity in mortality ratio between developing and high-income countries, with low-income countries having maternal mortality ratio of 1000 or 100000. Even within low-income countries, maternal mortality ratio differs according to one's socio-economic status and location; living in the rural and urban areas (WHO 2014).

METHODS

Study Site

There are twenty-six (26) municipalities and districts in the Lower ManyaKrobo, which is at the Eastern Region of Ghana. It lies between latitude 6.05S and 6.30N and longitude 0008E and 0.20W. The Administrative Capital of the District is Odumase. The District covers an area of 1,476 km, constituting about 8.1% of the total land area within the Region (18,310 km). The major towns in the district include Odumase township (which incorporates Atua, Agormanyaand Nuaso), Akuse and Kpong in the Lower Manya area. The District shares Boundaries with Upper ManyaKrobo District to the

*Corresponding Author: Henry Okorie Ugorji, Department of Community Health, Ensign College of Public Health, Kpong, Ghana.

north, to the south with DangmeWest and YiloKrobo respectively, to the west with YiloKrobo Municipal and to the east with Asuogyaman District. There are three hospitals at the municipality; which are Akuse Government Hospital, Atua Government Hospital and St. Martin's Catholic Hospital. There are four (4) Health Centers, six (6) operational Community-Based Health Planning and Services (CHPS), five (5) functional Community-Based Health Planning and Services (CHPS) and two (2) clinics as seen in Figure 1. The Lower ManyaKrobo District has an estimated population of 108,049 as at 24th January,2018 as shown in table 1.

Study design and study population

A cross-sectional design with quantitative method was used for this study. The reason behind using this approach was to identify the obstetric complications, and determine if the healthcare facilities had the cadre of staff, equipment, drugs and supplies to deliver EMOC services. The research included all pregnant women who had complications for the previous year, and selected healthcare facilities providing both basic and comprehensive EMOC services, in the Lower ManyaKrobo municipality.

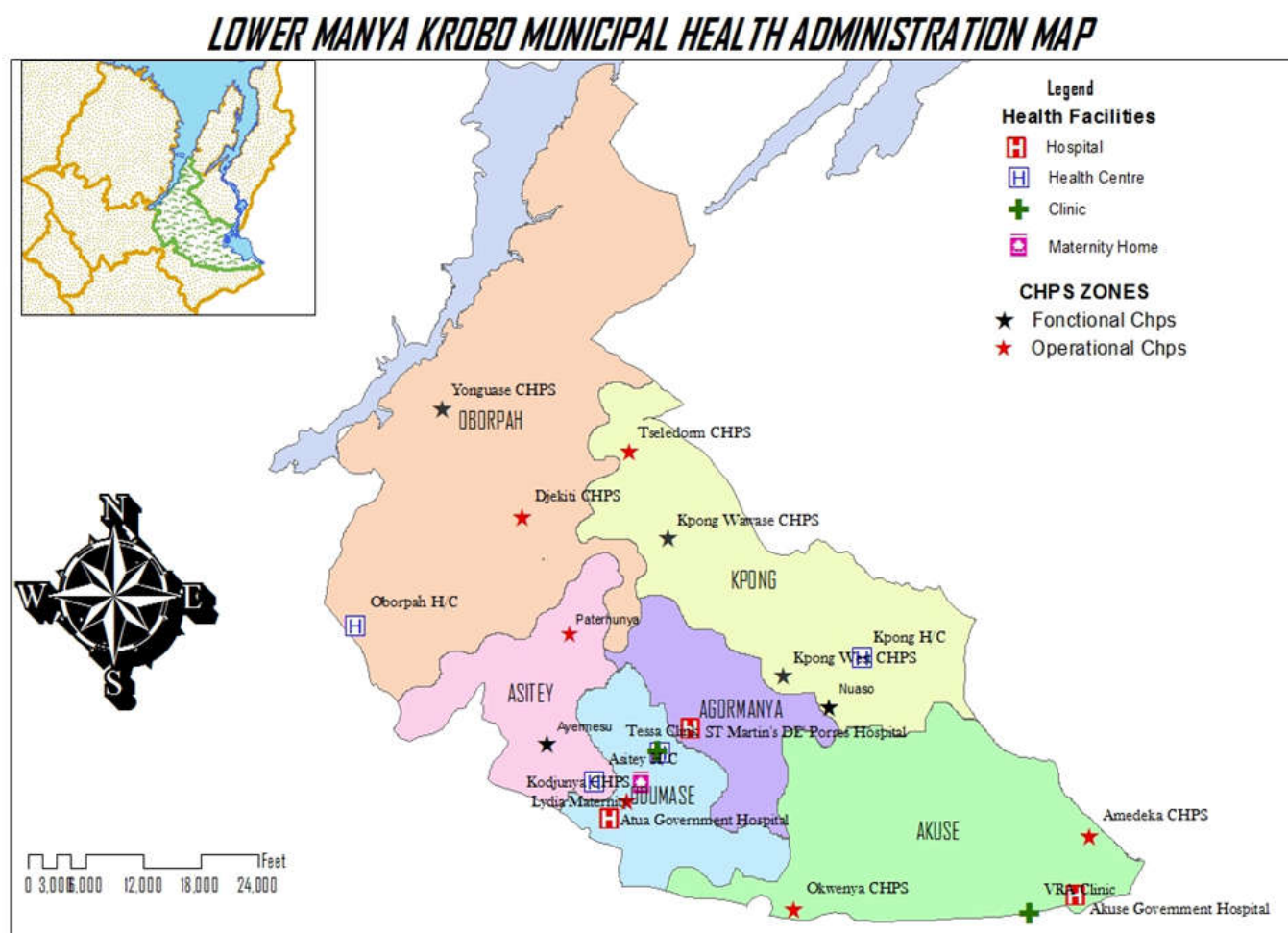


Figure 1.0 Lower ManyaKrobo Municipal Health Administration Map

Ethics

A letter of approval was taken from Ensign College of Public Health and given to the Regional health directorate, Municipal health directorate and the Lower ManyaKrobo Municipality to carry out the study in the area. A verbal and written consent was obtained from the study participants explaining the purpose of the study. Likewise, confidentiality and anonymity of the study was assured. During the administration of questionnaires, participants who will decide not to partake in the exercise again will have the liberty to do so at any time. Information provided by participants on the questionnaires will be handled with strict confidentiality thus name or personal identification information will not be published in any report. Information submitted will not be shared with anybody who is not part of the study. There was no compensation for participating in this study.

Data collection techniques and tools

Data was collected via record review using a checklist and an assessment tool for the healthcare facilities of all pregnant women who had complication, and structured questionnaires were given to healthcare providers. The assessment tool (a tool used for assessing preparedness for Emergency Obstetric Care) used was gotten from the Emergency Obstetric Care Handbook which was prepared by WHO, UNICEF and the Averting Maternal Death and Disability Program (AMDD) published in 2009 and Engender health emergency obstetric quality improvement assessment tool, which was modified and used for this study.

Study variables

The following were the variables that were investigated under the study:

1. Dependent variable – Quality Emergency Obstetric and Newborn Care
2. Independent variable(s) – Age, Obstetric Complication, Emergency Drugs, Equipment and Supplies, Cadre of Health workers and Performance of Signal Functions.

Sampling

Using the Cochran formula to calculate the sample size

$$(Cochran, 1977): n = \frac{z^2 \times pq}{e^2}$$

Where;

Sample Size (n)=?

The sampling Error (e) =5%

Critical Value (z) = 1.96

Prevalence of healthcare facilities which did not meet the EMOC criteria (P) = 80% or 0.8 (Kyei-Onanjiri, M., et al 2018)

Prevalence of healthcare facilities which meet the EMOC criteria (Q) = 1-P; 100-80= 20 or 0.2

Therefore;

$$n = \frac{(1.96)^2 \times 0.8 \times 0.2}{(0.05)^2} = 245.9 \approx 246.$$

A 10% non-response rate of the sample size will be 24.6. The actual sample size will be $246 + 24.6 = 270.6 \approx 271$. Therefore, the sample size that was used in this research was 271 obstetric complication cases.

A simple random sampling technique was used in selecting the two hundred and seventy-one (271) obstetric complications that occurred in the year 2019 from the three selected healthcare facilities. The sample frame used was obtained from records on all obstetric complications in the healthcare facilities. Also, folders and the HAMS software were reviewed for this study.

Proportional Allocation

The three healthcare facilities that were selected for this study were; St. Martins Catholic Hospital, Atua Government Hospital and Akuse Government Hospital. In 2019; St. Martins Catholic Hospital had four hundred and eighty-five (485) obstetric emergency cases, Atua Government Hospital had two hundred and twenty-five (225) obstetric emergency cases and Akuse Government Hospital had seventy-four (74) obstetric emergency cases. The total number of obstetric complication cases in the three selected facilities was Seven Hundred and Eighty-four (784).

Using proportional allocation formula: $ns = \frac{Ns}{N} \times n$

Where;

ns= Proportion of obstetric cases to be allocated for the selected healthcare facility

Ns= Total number of obstetric complication cases at the selected healthcare facility

N= Total number of obstetric complications in the three selected healthcare facilities

n= The sample size for this study

$$(1) \text{ For St. Martins Catholic Hospital: } \frac{485}{784} \times 271 = 168$$

$$(2) \text{ For Atua Government Hospital: } \frac{225}{784} \times 271 = 78$$

$$(3) \text{ For Akuse Government Hospital: } \frac{74}{784} \times 271 = 25$$

Pre-Testing

A pilot study is a small-scale study conducted before the main study on a limited number of subjects from the same population as intended for the study to test methodology (Burns and Grove (2005). A pre-testing was done at the Kpong Health Center to evaluate clarity of the questionnaires and do necessary amendments where applicable to the final questionnaires. The pre-testing helped in finding out how feasible the study will be, how valid the data collection tool is and how possible it would be to process and analyze the data collected.

Data analysis

Data was cleaned, coded and entered STATA® (version 14.0), a statistical package for data processing and analysis. Data was analyzed for both descriptive and inferential statistics using the STATA and Microsoft Excel. Descriptive statistics was used to analyze the inputs and process of service delivery.

Outcome

This study is expected to aid healthcare facilities to innovatively improve on their Emergency Obstetric and Neonatal Care (EmONC) to prevent maternal and neonatal mortality. To educate women of child bearing age, pregnant women and women who have just given birth on the importance of the regular antenatal care (ANC) visit.

RESULTS

Socio-demographic characteristics of health workers

St. Martins Catholic Hospital had the highest number of healthcare workers (38.81%), followed by Akuse Government Hospital (32.84%), and then Atua Government Hospital (28.36%) as shown in table 2. All the facilities had midwives; 38.60%, 35.09%, and 26.32% for St. Martins, Akuse Government Hospital and Atua Government Hospital, respectively. About 66.67% of health workers in St. Martin Catholic Hospital and 33.33% of health workers in Atua Government Hospital had 9 months or less experience in their current facilities. Also 35.90% of health workers from St Martins Catholic Hospital, 30.77% from Akuse Government Hospital, and 33.33% from Atua Government Hospital had about 1-5 years of experience, as seen in table 2. The three healthcare facilities also had Anaesthetists, and Laboratory Technician.

Table 1. Population Distribution by Sub-District

Community	Population
Odumase (28.1%)	30,362
Agormanya (28.4%)	30,686
Kpong (23.2%)	25,067
Asitey (5.4%)	5,835
Oborpa (5.9%)	6,375
Total	108,049

Table 2. Socio-Demographic Characteristics of Health Workers

Characteristic	St Martins Hospital N=26 (38.81%)	Akuse Government Hospital N=22 (32.84%)	Atua Government Hospital N=19 (28.36%)
Cadre			
Midwives	22(38.60%)	20(35.09%)	15(26.32)
Medical Officer	3(37.50%)	2(25.00%)	3(37.50%)
Principal Medical Officer	0(0.00%)	0(0.00%)	1(100%)
Specialist Surgeon	1(100%)	0(0.00%)	0(0.00%)
Age-group			
20-24 years	1(33.33%)	2(66.67%)	0(0.00%)
25-29 years	11(45.83%)	8(33.33%)	5(20.83%)
30-34 years	12(42.86%)	7(25.00%)	10(35.71%)
35-39 years	0(0.00%)	1(50.00%)	1(50.00%)
40 years and above	2(22.22%)	4(44.44%)	3(33.33%)

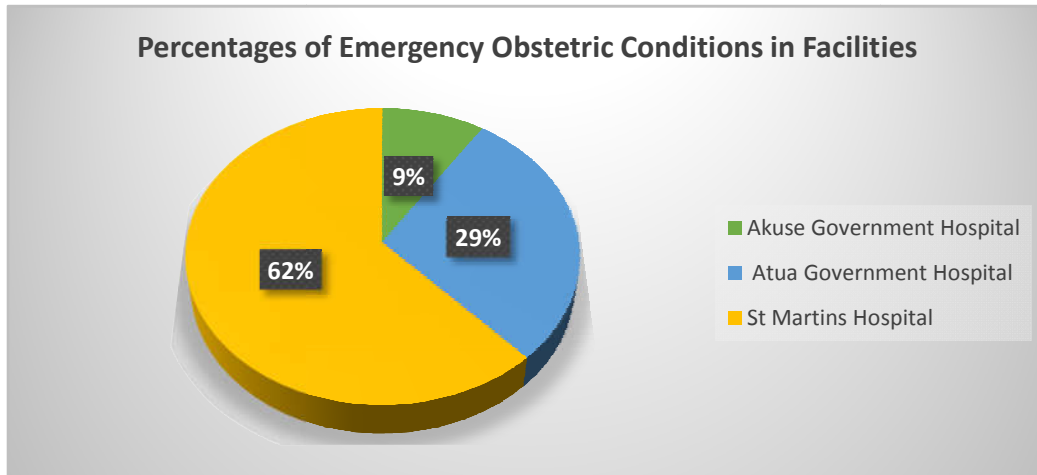


Figure 2. Percentages of Emergency Obstetric Conditions in Three Healthcare Facilities

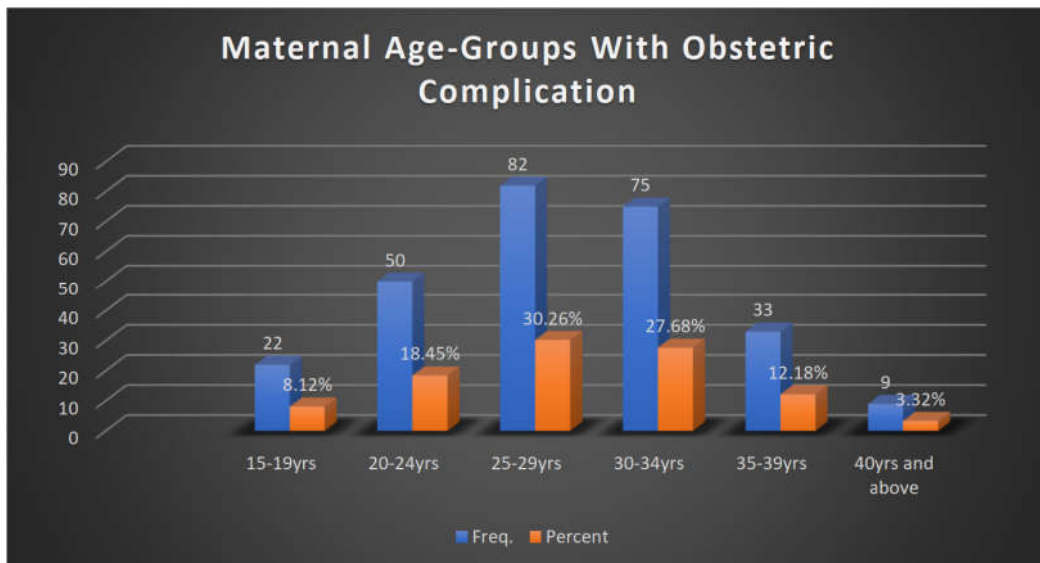


Figure 3.0 Percentages of Maternal Age-Groups with Obstetric Complication

Obstetric complications

St Martins Catholic hospital had the most of obstetric emergency cases about 61.99%, Atua government hospital had 28.78% and Akuse government hospital had 9.23% as shown in figure 2. In all the facilities, Fetal Distress was the most common obstetric complication gotten which was about 18.08%, followed by Previous C/S in Labour 13.28%, Pre-eclampsia and eclampsia 8.12%, and Cephalopelvic Disproportion 6.64% and Breech presentation in labour 6.64%. Also, some women presented to the facilities with two complications; Cephalopelvic Disproportion + Severe Pre-eclampsia (1.11%), Prolong Labour + Fetal Distress (0.37%),

Previous C/S in Labour + Contracted Pelvis (0.37%), Previous Myomectomy + Grand Multiparity (0.37%), Severe Pre-eclampsia + Unfavorable Cervix (0.37%), Malposition + Fetal Distress (0.37%), Perineal Tear + Birth Asphyxia (0.37%), Poor Progress of Labour + Fetal Distress (0.37%), Post Date + Failed Induction (0.37%), etc. as seen in table 3.

Maternal age-groups with obstetric complication

The maternal age-groups seen with Obstetric complications were; 15-19 years, 20-24years, 25-29years, 30-34years, 35-39years and 40 years and above as seen in figure 3.

Table 3. Obstetric Complications in Selected Healthcare Facilities

Obstetric Complication	N= 271	Percentage (100%)
Big Baby	3	1.11%
Post Date + Failed Induction	1	0.37%
Previous C/S + Fetal Distress	1	0.37%
Previous C/S in labour	36	13.28%
Anaemia + Fetal Distress	1	0.37%
Hemorrhage	8	2.95%
Big Abdomen	10	3.69%
Big Abdomen + Cephalopelvic Disproportion	1	0.37%
Breech Presentation in Labour	18	6.64%
Breech Secondary to Cord Prolapse	1	0.37%
Cephalopelvic Disproportion	18	6.64%
Cervical Dystocia	1	0.37%
Compound Presentation in Labour	1	0.37%
Contracted Pelvis	2	0.74%
Cord Prolapse	1	0.37%
Deep Transverse Arrest	3	1.11%
Delayed First Stage + Fetal Distress	1	0.37%
Prolong Labour	15	5.54%
Eclampsia & Preeclampsia	22	8.12%
Failed Induction	7	2.58%
Fetal Distress	49	18.08%
Fetal Distress + Pre-eclampsia	1	0.37%
Fetal Distress + Prolong Labour	1	0.37%
Gestational HPT + Unstable Lie	1	0.37%
High Risk Pregnancy	1	0.37%
Hypertension	1	0.37%
Hypertonic Uterus	1	0.37%
Late Term Pregnancy or Cyesis	7	2.58%
Malposition	1	0.37%
Malposition + Fetal Distress	1	0.37%
Malpresentation of Fetus	1	0.37%
Meconium-Stained Liquor	2	0.74%
Multi-Parity with Big Abdomen in Labour	1	0.37%
Non-reassuring Fetal Heart Rate	3	1.11%
Obstructed Labour	3	1.11%
PROM	1	0.37%
PROM + Pre-term Labour	1	0.37%
Pelvic Inadequacy	1	0.37%
Perineal Tear + Birth Asphyxia	1	0.37%
Poor Progress of Labour	9	3.32%
Poor Progress of Labour + Fetal Distress	1	0.37%
Post Date + Big Baby	1	0.37%
Post Date + Fetal Distress	1	0.37%
Post Date + Big Abdomen	3	1.11%
Pre-eclampsia + Previous C/S	1	0.37%
Pregnancy Induced Hypertension	1	0.37%
Pregnancy Induced Hypertension + PROM	1	0.37%
Previous C/S + Big Baby	3	1.11%
Previous C/S + Breech Presentation	1	0.37%
Previous C/S + Contracted Pelvis	1	0.37%
Previous C/S + Grand Multi-parity + Big Baby	1	0.37%
Previous C/S + Term PROM	2	0.74%
Previous C/S +Fetal Distress	1	0.37%
Previous C/S+ Poor Progress of Labour	1	0.37%
Previous Myomectomy + Grand Multiparty	1	0.37%
Retained 2nd Twin	1	0.37%
Septic Incomplete Abortion	1	0.37%
Severe Oligohydramnios	1	0.37%
Severe Pre-eclampsia + Cephalopelvic Disproportion	3	1.11%
Severe Pre-eclampsia + Failed Induction	1	0.37%
Severe Pre-eclampsia + Fetal Distress	1	0.37%
Severe Pre-eclampsia + Unfavourable Cervix	1	0.37%
Thick Meconium-Stained Liquor + Post-date	1	0.37%
Transverse Lie	1	0.37%
Transverse lie + Previous C/S	1	0.37%
Twin gestation + Transverse lie	1	0.37%

Within the ages of 15-19years, the most common obstetric complications seen were fetal heart distress (31.82%), and Pre-eclampsia and Eclampsia (18.19%) as seen in table 4. Amongst the ages of 20-24years, fetal distress (14%) and Breech presentation in labour (10%) were the most common as seen in table 5, within the age of 25-29years, previous C/S in labour (15.85%), fetal distress (15.85%), and Cephalopelvic disproportion (12.2%) were the most common as seen in table 6.

In age-group 30-34years, fetal distress (21.33%), Previous C/S in labour (14.67%) and Pre-eclampsia & Eclampsia (13.33%) as seen in table 7, Among age-group 35-39years obstetric complications common were Previous C/S in labour (27.27%), and fetal distress (12.12%) as seen in table 8. Also, in age-group 40 years and above the most common obstetric complications were Pre-eclampsia & Eclampsia (33.33%) and fetal distress (22.22%) as seen in table 9.

Table 4. Obstetric Complications Within Age-group 15-19years

Obstetric Complication	N = 22	Percentage (100%)
Big Abdomen	2	9.09
Breech Presentation in Labour	3	13.64
Cephalopelvic Disproportion	1	4.55
Pre-eclampsia & Eclampsia	4	18.19
Fetal Distress	7	31.82
Hypertonic Uterus	1	4.55
Post Date + Big Baby	1	4.55
Prolong Labour	1	4.55
Septic Incomplete Abortion	1	4.55
Previous C/S in Labour	1	4.55

Table 5 Obstetric Complication in Age-group 20-24years

Obstetric Complication	N =50	Percentage (100%)
Previous C/S in Labour	2	4
Previous C/S + Fetal Distress	2	4
Anaemia + Fetal Distress	1	2
Big Baby	1	2
Haemorrhage	3	6
Breech Presentation in Labour	5	10
Cephalopelvic Disproportion	2	4
Compound Presentation	1	2
Contracted Pelvis	1	2
Cord Prolapse	1	2
Deep Transverse Arrest	1	2
Failed Induction	2	4
Fetal Distress	7	14
Fetal Distress + Prolong Labour	2	4
Late Term Cyesis	3	6
Malposition + Fetal Distress	1	2
Multiparity with Breech Presentation	1	2
Non-reassuring Fetal Status	1	2
PROM	1	2
Poor Progress of Labour	3	6
Post Date	1	2
Post Date + Big Abdomen	2	4
Pre-eclampsia & Eclampsia	3	6
Pregnancy Induced Hypertension	1	2
Twin Gestation + Transverse Arrest	1	2
Prolong Labour	1	2

Table 6. Obstetric Complications within Age-group 25-29 years

Obstetric Complication	N =82	Percentage (100%)
Big Baby	1	1.22
Fetal Distress	13	15.85
Hemorrhage	3	3.66
Big Abdomen	3	3.66
Breech Presentation in Labour	5	6.1
Cephalopelvic Disproportion	10	12.2
Cervical Dystocia	1	1.22
Contracted pelvis	1	1.22
Deep Transverse Arrest	1	1.22
Prolong Labour	8	9.76
Failed Induction	1	1.22
Gestational Hypertension	1	1.22
Malposition	1	1.22
Meconium-Stained Liquor	2	2.44
Non-reassuring Fetal Heart Rate	1	1.22
PROM + Pre-term Labour	1	1.22
Pelvic Inadequacy Syndrome	1	1.22
Poor Progress of Labour	4	4.88
Post Date	1	1.22
Pre-eclampsia & Eclampsia	4	4.88
Previous C/S in Labour	13	15.85
Previous C/S + Big Abdomen	1	1.22
Previous C/S + Continuous	1	1.22
Previous Myomectomy	1	1.22
Thick Meconium-Stained Liquor	1	1.22
Transverse Lie + Previous C/S	1	1.22
Pre-eclampsia + Previous C/S	1	1.22

Table 7. Obstetric Complications within Age-group 30-34 years

Obstetric Complication	N=75	Percentage (100%)
Haemorrhage	1	1.33
Big Abdomen	3	4.00
Big Abdomen + Cephalopelvic Disproportion	1	1.33
Big Baby	1	1.33
Breech Presentation in Labour	3	4.00
Cephalopelvic Disproportion	4	5.33
Deep Transverse Arrest	1	1.33
Prolonged Labour	4	5.33
Eclampsia + Pre-eclampsia	10	13.33
Failed Induction	3	4.00
Fetal Distress	16	21.33
Malpresentation	1	1.33
Obstructed Labour	3	4.00
Perineal Tear + Birth Asphyxia	1	1.33
Poor Progress of Labour	2	2.67
Post Date	2	2.67
Post Date + Fetal Distress	1	1.33
Previous C/S in Labour	11	14.67
Previous C/S + Big Abdomen	2	2.67
Previous C/S + Term Gestation	1	1.33
Previous C/S + Poor Progress of Labour	1	1.33
Retained 2 nd Twin	1	1.33
Severe Oligohydramnios	1	1.33
Transverse Lie	1	1.33

Table 8. Obstetric Complication Within Age-group 35-39years

Obstetric Complication	N = 33	Percentage (100%)
Post Date + Failed Induction	1	3.03
Big Abdomen	2	6.06
Breech Presentation in Labour	3	9.09
Cephalopelvic Disproportion	1	3.03
Failed Induction	1	3.03
Fetal Distress	4	12.12
Hypertension	1	3.03
Non-reassuring fetal heart rate	1	3.03
Poor progress of Labour	1	3.03
Eclampsia & Pre-eclampsia	3	9.09
Pregnancy Induced Hypertension	1	3.03
Previous C/S in Labour	9	27.27
Previous C/S + Breech Presentation	1	3.03
Previous C/S + Grand-multiparity	1	3.03
Previous C/S + Term Pregnancy	1	3.03
Prolong Labour	2	6.06

Table 9. Obstetric Complication in Age-group 40 years and above

Obstetric Complication	N = 9	Percentages (100%)
Cephalopelvic Disproportion	1	11.11
Fetal Distress	2	22.22
High Risk Pregnancy	1	11.11
Haemorrhage	1	11.11
Post Date + Big Abdomen	1	11.11
Pre-eclampsia & Eclampsia	3	33.33

Also, Maternal age-group with the highest obstetric complications was 25-29years (30.26%), followed by 30-34years (27.68%), 20-24years (18.45%), 35-39years (12.18%), 15-19years (8.12%), and 40years and above (3.32%) as shown in figure 3.

EmONC interventions provided in the three healthcare facilities

All the three facilities provided both basic and comprehensive EmONC services 24 hours in a day and 7 days in a week as seen in table 10. Furthermore, 100% of obstetric complications at the facilities did not have any indications for providing Assisted Vagina Delivery Services to clients, 100% of obstetric complications at the facilities had an indication for providing parenteral antibiotics, and uterotonic.

About 98.52% of obstetric complication had an indication for Caesarean Section, 99.28% of obstetric complications presented at the facilities had indications for manual removal of placenta, 91.67% of obstetric complications had no indication for providing anti-convulsant for pre-eclampsia and eclampsia. About 99.28% of obstetric complications had no indication for the removal of retained products of conception, 99.64 of obstetric complications did not have any indication for providing Newborn Resuscitation, and also 96.38% of obstetric complications did not have any indication for providing blood transfusion services to clients.

Availability of emergency obstetric drugs, equipment and supplies

All the 3 healthcare facilities had most of the emergency obstetric drugs, but only St. Martins Catholic hospital had Ergometrine as shown in table 11.

Table 10. EmONC Interventions in the Three Healthcare Facilities

EmONC Intervention	Healthcare Facilities N=3	
Basic EmONC Comprehensive EmONC (Including all of the above)	Parenteral Antibiotic	3
	Parenteral Oxytocic	3
	Administering Magnesium Sulphate (MgSO4)	3
	Manual Removal of Placenta	3
	Removal of Retained Product of Conception	3
	Assisted Vagina Delivery	3
	Perform basic neonatal resuscitation	3
	Blood Transfusion	3
	Caesarean Section	3

Table 11. Emergency Obstetric Drugs

Emergency Obstetric Drugs	Healthcare facilities N=3
Antibiotics injection	3
Oxytocin injection	3
Diazepam injection	3
Adrenaline	3
Misoprostol	3
Ringer lactate	3
Dextrose	3
Normal Saline	3
Dexamethasone	3
Mannitol	3
Hydralazine	3
Labetalol	3
Ergometrine	1
Diazepam	3
Phenobarbitone	3
Methyldopa	3
Atropine	3
Ketamine	3
Valium	3

Table 12. Obstetric Equipment and Supply

Equipment and Supply	Healthcare facilities (N=3)
Artery forceps	3
Sponge forceps	3
Dissecting forceps	3
Cord-cutting scissors	3
Cord ties	3
Episiotomy scissors	3
Straight stich scissors	3
Gloves	3
Long gloves	3
Plastic sheeting	3
Gauze swabs	3
Flexible cannula	3
Mucus extractor	3
Ambu (ventilator) bag	3
Suction catheter	3
Endotracheal tubes	3
Infant face masks, sizes 0,1,2	3
Infant laryngoscope with spare bulb and batteries	0
Disposable uncuffed tracheal tubes	3
Vacuum aspirators/syringes	3
Suction aspirator (operated by foot or electrically)	3
Mucus trap for suction	3

The Antibiotics injections seen at the three facilities were; Ceftriaxone, Cefuroxime, Gentamycin, Ampicillin, Amoxicillin + Clavulanic Acid, Metronidazole, and Benzylpenicillin. All three facilities have most of the equipment and supplies, but not all had Infant Laryngoscope with spare bulb and batteries as seen in table 12.

DISCUSSION

Availability of qualified health workers

The first obstacle in the availability of EmONC services 24h/day, 7 days/week in most countries is the non-availability

of healthcare workers: i.e., midwives, anaesthetists, practitioner who can do surgery and laboratory technician (WHO et al 2009). From table 2 it was seen that all the three healthcare facilities had all the cadre of health workers available for the provision of EMOC services 24hours per day and 7 days per week.

Obstetric complications in the three healthcare facilities

The most common causes of maternal mortality are; Haemorrhage, Postpartum sepsis, pre-eclampsia and eclampsia, unsafe abortion, and complications from delivering. Most of the causes of these maternal deaths are entirely

avoidable and can be managed, the causes of maternal death could be present before pregnancy but is made severe during the pregnancy (World Health Organization 2020 b). One of the objectives was to identify the obstetric complications presented at the three facilities. The evidence generated showed that fetal distress (18.08%), Previous C/S in Labour (13.28%), Pre-eclampsia and eclampsia (8.12%), and Cephalopelvic Disproportion (6.64%) and Breech presentation in Labour (6.64%) had the highest number of percentages respectively. Also, some of the mothers presented with two obstetric complications simultaneously; Cephalopelvic Disproportion + Severe Pre-eclampsia (1.11%), Prolong Labour + Fetal Distress (0.37%), Previous C/S in Labour + Contracted Pelvis (0.37%), as seen in Table 3. Obstetric complications are higher amongst adolescents between the ages of 10-19 years as compared to women aged 20-24 years (World Health Organization 2020 b). Women who are between the ages of 35-44 years and 45 years and above are more likely to experience obstetric complications compared to women below the age of 35 years (Grotegut, et al 2014). From figure 2; it was seen that women between age-group 25-29 years had obstetric complications of about 30.26% more than any other age-groups. Women aged between the age 45 years and above have a greater chance of having these obstetric complications; Caesarean delivery, gestational diabetes, pre-eclampsia and pregnancy associated hypertensive disorders, multiple gestation, preterm labour, placental abruption, and fetal growth restriction (Grotegut, et al 2014). As seen in the findings of this study; 100% of women aged between 40 years and above had Caesarean delivery, and also the most common obstetric complications seen in this age-group were Pre-eclampsia and Eclampsia and fetal distress with 33.33% and 22.22% respectively. The rest of the complications seen in this age-group were Cephalopelvic Disproportion, High Risk Pregnancy, Hemorrhage and Post Date + Big Abdomen as shown in table 9.

Provision of EmONC interventions in the three facilities

In improving the accessibility of EmONC, maternal morbidity and direct maternal mortality can be decreased significantly with the right interventions (Kyei-Onanjiri *et al.*, 2018). To ensure equity and access, 100% of subnational areas is mandated to have the least acceptable numbers of EmONC facilities or minimum of five facilities, which should include at least a facility that gives comprehensive services per 500,000 population (WHO *et al.*, 2009). From the results it was seen that all the three healthcare facilities; St Martins Catholic Hospital, Atua Government Hospital and Akuse Government Hospital provided both Basic and Comprehensive EmONC services 24 hours in a day and 7 days in a week, to a population of about 108,049. This has met the standard stipulated for the availability of EmONC services in subnational areas. A key method for evaluating the availability or effectiveness of obstetric services is to examine their ability to respond to maternal health emergencies or give EmOC interventions (Kyei-Onanjiri *et al.*, 2018). In the three hospitals; 100% of obstetric complications had no indication for providing Assisted Vagina Delivery, 100% of obstetric complications had indications for giving parenteral antibiotics, and uterotonics. 98.52% of obstetric complication had an indication for Caesarean Section, 99.28% of obstetric complications had indications for manual removal of placenta, 91.67% had no indication for the administering Anti-

convulsant for pre-eclampsia and eclampsia, 99.28% of obstetric complications had no indication for the removal of retained products of conception, 99.64% of obstetric complications did not have any indication for providing Newborn Resuscitation, and also 96.38% of obstetric complications did not have indication for blood transfusion. This indicates that EmONC interventions were performed in the three healthcare facilities.

Availability of emergency obstetric drugs, equipment and supplies

Important medicine and supplies are one of the six fundamentals for health system building as suggested by the World Health Organization. Inability to meet the demands of essential medicines and supplies have a bad effect on solving any health problem, including maternal and new born health issues. Inability to access or unavailability of important medicines and supplies is an obstacle in ensuring quality emergency obstetric and newborn care (Pembe *et al* 2019). Averting those causes of maternal mortality means that there should be the availability of the necessary drugs, equipment and supplies. With the evidence generated from this work as seen from table 11 and table 12: all the three healthcare facilities had most of the emergency drugs and supplies for averting the causes of maternal mortality. But St Martins Catholic hospital was the only facility that had Ergometrine. Also, with the availability of equipment, it was seen that all the three facilities had most of the equipment, but did not have the Infant Laryngoscope with Spare Bulb and Batteries.

LIMITATION

They were poor documentations on some obstetric complications and how they were treated and managed at the healthcare facilities. Also, some of the facilities stopped using folder to document client's condition and management, but have started using a software called the HAMS software. Most of the obstetric complications found on the software couldn't give details on how some obstetric complications were managed and treated. Gathering data from the HAMS software was a challenge because most of the facilities only had few computers which were always being engaged by the health workers.

CONCLUSION

Availability of healthcare workers

The study showed that there is availability of qualified health workers in all the three facilities who provide EmONC services twenty-four hours in a day and Seven days in a week.

Obstetric complications in the three healthcare facilities

The most common obstetric complications identified in all the three health care facilities were; fetal distress, Previous C/S in Labour, Pre-eclampsia and eclampsia, and Cephalopelvic Disproportion and Breech presentation in Labour. Also, most women presented with two obstetric complications like; Cephalopelvic Disproportion + Severe Pre-eclampsia, Prolong Labour + Fetal Distress, Previous C/S in Labour + Contracted Pelvis, etc. The study shows that women between the age-

group 25-29years had the highest number of obstetric complications than any other age-group.

Provision of EmONC interventions in the three healthcare facilities

It was seen that all the three healthcare facilities provided both basic and comprehensive EmONC interventions to a population of about 108,049. Also, there were no indications for the provision of Assisted Vagina Delivery even in obstetric complications that required Assisted Vagina Delivery, such as prolonged Labour; Caesarean section services was provided.

Availability of emergency obstetric drugs, equipment and supplies

All the three facilities had the most of the emergency drugs, supplies and equipment but some lacked Ergometrine and all did not have Infant Laryngoscope with spare bulb and batteries.

Abbreviations

ARR - Annual Rate of Reduction
 CHPS - Community Based Health Planning and Services
 C/S - Caesarean Section
 EmONC - Emergency Obstetric and Newborn Care
 EmOC - Emergency Obstetric Care
 GHS - Ghana Health Service
 HPT - Hypertension
 MMR - Maternal Mortality Ratio
 PROM - Premature Rapture of Membrane
 SDG - Sustainable Development Goals
 TBA - Traditional Birth Attendant
 UNFPA - United Nations Population Fund
 UNICEF - United Nations Children's Fund
 USAID - United States Agency for International Development
 WHO - World Health Organization

Declarations

Ethics approval and consent to participate

A letter of approval was taken from Ensign College of Public Health and given to the Regional health directorate, Municipal health directorate and the Lower ManyaKrobo Municipality to carry out the study in the area. A verbal and written consent was obtained from the study participants explaining the purpose of the study. Likewise, confidentiality and anonymity of the study was assured. During the administration of questionnaires, participants who will decide not to partake in the exercise again will have the liberty to do so at any time. Information provided by participants on the questionnaires will be handled with strict confidentiality thus name or personal identification information will not be published in any report. Information submitted will not be shared with anybody who is not part of the study. There was no compensation for participating in this study.

Availability of data and material

The datasets generated during and analyzed during the current study are not publicly available due to protection against misuse of data, but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding

Financial support was provided by the Association of Accredited Public Health Programs (AAPHPs) Utah, USA. The funders had no role in this study.

Acknowledgements

I thank the almighty GOD for HIS divine guidance, protection and inspiration. Appreciation goes to the Senior Management of United Nations Population Fund (UNFPA) for giving me the opportunity to get a hands-on experience on issues relating to maternal and neonatal health, to my supervisor, and all the faculty members of Ensign College of Public Health to whom am much thankful and grateful for the daily critiquing, correcting and helping me conduct this research work. Sincere gratitude and appreciation go to the management and staff of St. Martins Catholic Hospital, Atua Government Hospital and Akuse Government Hospital for giving me the necessary support and advice for conducting this research.

Authors' contributions: HOU provided data acquisition, data analysis and interpretation, and primary drafting and editing of the article. RE supervised the research work and approved the final article. LO & IOO reviewed the manuscript

REFERENCES

- Burns, N., and Grove, S. K. 2005. *The Practice of Nursing Research: Conduct, Critique, and Utilization* (5th Ed.). St. Louis, Elsevier Saunders.
- Darmstadt, G. L., Bhutta, Z. A., Cousens, S., Adam, T., Walker, N., Bernis, D. L. 2005. 'Evidence-based, Cost-effective Interventions: How many newborns can we save?', *Lancet*, vol. 365, no. 9463, pp. 977-988
- Ghana, 2017. *Maternal Health Survey Key Findings*. Available at: <https://dhsprogram.com/pubs/pdf/SR251/SR251.pdf> (Accessed on 5th May, 2019)
- Grotegut, A. C., Chisholm, A. C., Johnson, N.C. L., Brown, L.H., Heine, R. P., and James H. A. 2014. *Medical and Obstetric Complications among Pregnant Women Aged 45 and Older*. Available at: <https://www.google.com/url?sa=t&source=web&rct=j&url=https://journals.plos.org/plosone/article%3Fid%3D10.1371/journal.pone.0096237&ved=2ahUKEWjOtMGj1eHpAhVi7eAKHWhmB1IQFjAAegQICB-AB&usq=AOvVaw2pv3YjVFf1C7cxcHuHsjpl> (Accessed 24th May, 2020).
- Kontoh, C. 2015. *Availability and Use of Essential Emergency Obstetric Care Services in the Bosomtwe District in Ashanti Region*. Available at: <http://ir.knust.edu.gh/bitstream/123456789/7969/1/FINAL%20THESIS.pdf> (Accessed 8th June, 2020)
- Kyei-Onanjiri, M., Carolan-Olah, M., and McCann, V. T. 2018. *Review of Emergency Obstetric Care Interventions in Health Facilities in the Upper East Region of Ghana: a questionnaire survey*. Available at: <https://bmchealthserv.es.biomedcentral.com/articles/10.1186/s12913-018-2980-6>
- Lower ManyaKrobo Health Directorate 2018 Annual Report
- Pembe, B. A., Sunguya, B., Mushy, S., Leshabari, S., Kiwango, G., Masaki, C., and Mlunde, B. L. 2019. *Essential Medicine and Equipment for Emergency Obstetric and Newborn Care in Zanzibar: Situation at a*

- Glance. Available at https://www.researchgate.net/publication/334049204_Essential_Medicine_and_Equipment_for_Emergency_Obstetric_and_Newborn_Care_in_Zanzibar_Situation_at_a_Glance_Essential_Medicine_and_Equipment_for_Emergency_Obstetric_and_Newborn_Care_in_Zanzibar_Situat (Accessed 1st June, 2020)
- Regional Office for Africa, 2020. Maternal Health. World Health Organization. Available at: <https://www.afro.who.int/fr/node/570> (Accessed 8th June, 2020)
- UNFPA 2006. Maternal and Neonatal Health in East and South-East Asia. Available at: https://www.unfpa.org/sites/default/files/pub-pdf/MaternalHealth_Asia.pdf (Accessed on 2nd May, 2019)
- UNICEF 2009. The State of the World's Children. Available at: https://www.unicef.org/publications/files/SOWC_Spec_Ed_CRC_Main_Report_EN_090409.pdf (Accessed 18th December, 2019)
- UNICEF, 2012. Committing to Child Survival: A promise renewed-Progress Report 2012. Available at: www.who.int/pmnch/topics/part_publications/essential_interventions_18_01_2012.pdf. (Accessed 4th May, 2020)
- UNIGME, 2017. 'Levels & Trends in Child Mortality: Report 2017, Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation.' United Nations Children's Fund. Available at: https://www.everywomaneverychild.org/wp-content/uploads/2017/10/Child_Mortality_Report_2017_UNICEF-WHO.pdf (Accessed 5th June, 2020)
- USAID 2015. Ending Preventable Maternal Mortality: USAID Maternal Health Vision for Action Evidence for Strategic Approaches. Available at: https://www.usaid.gov/sites/default/files/documents/1864/MH%20Strategy_web_red.pdf (Accessed on 5th April, 2019)
- USAID and Measure Evaluation PIMA 2016. Health Facility Readiness to Provide Emergency Obstetric and Newborn Care in Kenya. Available at: https://www.measureevaluation.org/resources/publications/tr-16-123/at_download/document (Accessed at 8th June, 2020)
- WHO and HRP, 2015. Strategies Toward Ending Preventable Maternal Mortality. Available at: https://www.healthynetwork.org/hnn-content/uploads/WHO_EPMM.pdf (Accessed on 27th April, 2019)
- WHO, 2014. Maternal Mortality: fact sheet: to improve maternal health, barriers that limit access to quality maternal health services must identified and addressed at all levels of the health system. World Health Organization. Available at: https://apps.who.int/iris/bitstream/handle/10665/112318/WHO_RHR_14.06_eng.pdf?sequence=5&isAllowed=y (Accessed 5th June, 2020).
- WHO, 2020. Maternal mortality ratio (per 100 000 live births). World Health Organization. Available at: <https://www.who.int/healthinfo/statistics/indmaternalmortality/en/#:~:text=Definition,from%20accidental%20or%20incidental%20causes.> (Accessed on 3rd May, 2020)
- WHO, UNFPA, UNICEF and AMDD 2009. Monitoring Emergency Obstetric Care, A Handbook. Available at: https://www.unfpa.org/sites/default/files/pub-pdf/obstetric_monitoring.pdf (Accessed on 12th October, 2019)
- World Bank Group, 2019. Maternal Mortality Ratio (modeled estimate, per 100,000 live births)-Ghana. Available at: <https://data.worldbank.org/indicator/SH.STA.MMRT?locations=GH> (Accessed on 16th January, 2020)
- World Health Organization, 2020 a. SDG 3: Ensure healthy lives and promote wellbeing for all at all ages. Available at: <https://www.who.int/sdg/targets/en/> (Accessed on 16th January, 2020)
- World Health Organization, 2020 b. Emergency and Essential Surgical care. World Health Organization. Available at: <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality> (Accessed 1st June, 2020)
- World Health Organization, UNICEF, United Nations Population Fund and The World Bank, 2015. Trends in Maternal Mortality: 1990 to 2015, WHO, Geneva.
