

The Relationship between Distance and Availability of Material Resources for Basic Emergency Obstetric Care in Primary Health Care Facilities in Homabay and Siaya Counties, Kenya

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Abstract

In Kenya, pregnancy and childbirth complications are among the leading causes of mortality among women, with an estimated 488 maternal deaths per 100,000 live births which is well above the millennium development goal (MDG) target of 147 per 100,000 by 2015. The perinatal mortality rate stands at 37/1000 live births. Nyanza region is among the county's leading with high MMR at 670/100,000 live births (KDHS, 2009) which is higher than the national average. The main objective of this study was to determine the relationship between distance of primary health care facilities from the distribution point and the availability of material resources for basic emergency obstetric care (BEmOC) in Siaya and Homabay counties in Kenya. Various studies have been conducted focusing on distance from the community to the health facility as a contributor to increased rates of maternal mortality and complications. A literature gap exists thus motivating the author to consider other possible causes including relationship between distance and availability of material resources in primary health care facilities from their point of distribution in-order to provide an understanding of the extent to which these factors affect the quality provision of basic emergency obstetric care towards reduction of maternal mortality and disability. The availability of material resources for basic EmOC is important in reducing maternal death and improving women's health in general. This can be achieved if primary health care facilities have equipment, supplies and drugs available. With the current initiative of beyond zero campaign by the first lady in Kenya on reducing maternal deaths, efforts should be made to ensure that these material resources are adequately available and accessible to women when they need them irrespective of the distance of health facilities from the distribution point. However, adequate drug financing from the government, flexible and supportive drug policies should be in place to achieve this goal.

Keywords: Kenya-Maternal Health-Basic Emergency Obstetric Care-Life saving-Primary Health Care.

1. Introduction

The Kenyan government has paid great attention to maternal health care including development of strategies to improve access to primary health care. Despite of these, maternal mortality ratio (MMR) still remains high. According to NCAPD (2010), the low ratio of EmOC facilities to population size (2.7/500,000), is below the recommended minimum of 5/500,000 (WHO, UNICEF, UNFPA and AMDD, 2009) suggesting that high maternal mortality in Kenya may result from limited access to life saving interventions for most pregnant women which could have led to high maternal morbidity and mortality rates. In Kenya, pregnancy and childbirth complications are among the leading causes of mortality among women, with an estimated 488 maternal deaths per 100,000 live births which is well above the MDG target of 147 per 100,000 by 2015. The perinatal mortality rate stands at 37/1000 live births. Nyanza region is among the county's leading with high MMR at 670/100,000 live births (KDHS, 2009) which is higher than the national average.

Globally, more than half a million women die every year due to pregnancy related causes. According to WHO (2014), complications of pregnancy and childbirth are still the leading cause of death and disability accounting for 287,000 deaths among women of reproductive age in developing countries. These among other causes are due to inadequate and poorly maintained health infrastructure, which is a major barrier for use of health services in rural areas primarily. The other key reason why women and newborn continue to die at unacceptably high numbers is the absence of adequate resources for EmOC in many countries (WHO and UNICEF, 2012). Improving provision of emergency obstetric care remains the cornerstone of maternal health strategy as well as global safe motherhood strategies. Although most obstetric complications -postpartum hemorrhage, sepsis, eclampsia, and obstructed labor that can cause maternal death cannot be predicted, the majority can be treated with timely provision of a package of evidence-based interventions known as emergency obstetric care (EmOC). The availability of EmOC is considered an indicator of how well a health system is prepared to manage conditions leading to acute maternal morbidity and mortality (WHO, 2010).

Availability of resources plays a bigger role in provision of EmOC in primary health care facilities. Primary health care facilities can only provide good quality EmOC if they have sufficient and skilled staff who have access to functioning equipment, sufficient drugs and supplies (WHO, 2010). Anticonvulsants are drugs that are vital for controlling/preventing seizures during the third stage of labour and include magnesium sulphate which is the recommended first line drug, phenytoin and diazepam (Abalos, et al, 2007). The commonly used

anti-convulsants magnesium sulphate which is effective and inexpensive drug for the management of severe pre-eclampsia and eclampsia. In a systematic review involving more than 11,000 women, magnesium sulphate was found to significantly (70%) reduce the risk of eclampsia among patients with severe pre-eclampsia than phenytoin and diazepam (Duley and Gulmezoglu, 2003). WHO estimates that use of magnesium sulphate can reduce deaths due to eclampsia by half (WHO, 2009).

2. Aim of the Study

The aim of the study is to assess the relationship between distance and availability of material resources in primary health care facilities from their point of distribution in-order to provide an understanding of the extent to which these factors affect the quality provision of basic emergency obstetric care towards reduction of maternal mortality and disability. Poor physical access to health facilities is a challenge facing many rural communities in Kenya. Concerns about distance, poor terrain, lack of affordable transport options, and seasonal challenges such as flooding or impassable roads contribute enormously to delays in seeking health services when maternal emergencies occur. It is estimated that 75% of maternal deaths could be prevented through timely access to essential health care. Transport and road infrastructure play a key role in accessing that care yet, in many cases, women spend considerable time waiting for transportation.

3. Materials and Methods

3.1 Study Design

The study was conducted using data from the project entitled "Community Health Strategy for Accelerated Maternal, Neonatal and Child Health in Siaya and Homabay Counties" in Kenya. This was a cross sectional study in which qualitative data was collected using a health facility check list. The data was purposively collected from selected health facilities which were linked to community units under the umbrella of community health strategy.

A multi stage stratified sampling design was applied in the health facility assessment. Simple random sampling method was employed to identify 71 health facilities offering delivery services using a sampling frame containing all districts, their divisions, sub locations and villages in the 2 counties. Three sub locations in each division were randomly selected using the lottery method then 5 villages were subsequently randomly selected from the sampled locations from each county. A total number of 71 health facilities offering both comprehensive and basic EmOC in Homabay (37) and Siaya (34) counties were surveyed. Out of the 71 health facilities, 66 of them offered basic EmOC while 5 facilities offered comprehensive EmOC. The sampling units comprised of level one health care facilities offering basic EmOC in Homabay and Siaya counties. This study sampled all the 66 primary health care facilities offering basic EmOC giving a total coverage of the study population.

3.2 Study Population

The study population constituted of primary health care facilities linked to functional community units in Siaya and Homabay counties in Kenya.

3.2.1 Inclusion Criteria

Primary health care facilities linked to community health units offering basic emergency obstetric care in Siaya and Homabay counties in Kenya.

3.2.2 Exclusion Criteria

Primary health care facilities linked to community units but not offering basic emergency obstetric care.

3.3 Selection and Training of Research Assistants

Research assistants were students from Great Lakes University of Kisumu who had been comprehensively trained on all the aspects of the study and how to administer the check list to the respondents in the health facilities.

3.4 Data Quality

Secondary unpublished data was used for this study. Records were obtained from GLUK Research Department data base. Before using the data, the researcher considered the suitability of data collected by considering the competency of the research assistants who collected the data and confirming their qualifications and experiences in quantitative data collection after which I found the secondary data reliable and suitable to be considered adequate for use. A health facility check list was therefore used to extract information on the availability of material resources for basic EmOC.

3.5 Data Analysis

The extracted data was cleaned, coded and fed to Statistical package for social sciences (SPSS) version 17. A password was created for protection purposes with authorized access to the researcher and the research assistant.

The data was cleaned again for inconsistencies and missing values. Descriptive analyses - means, standard deviations and variance was calculated for availability of drugs, equipment's and means of communication. Inferential statistics was used to show relationships between distance of primary health care facilities from the distribution point and availability of drugs and equipment's for basic EmOC. Significances were established within 95% confidence limits. Based on the findings, the results were presented in text, contingency tables and graphs.

Proportion as a measure of central tendency was used for nominal and interval variables (means of communication, drugs and equipment's) which assessed the frequency of its availability from all the extracted data. Pearson correlation co-efficient was used to analyze normally distributed data whereas correlation analysis was used to confirm the strength of relationship between the variables under study. P values less than 0.05 was considered statistically significant. Correlation coefficient was used to indicate the strength of relationships between variables under study. Logistic regression analysis was also used to indicate the probability of primary health care facilities having availability of drugs and equipments in relation to their distances from the distribution point.

3.6 Ethical Issues

The approval to conduct the study was obtained from the Institutional Research and Ethics Committee from Moi Teaching and Referral Hospital/ Moi University and Great Lakes University of Kisumu Institutional Ethical Committee. At the University, permission was obtained from the head of Research Department. Information collected during the study was kept safely for access by the researcher and the institution.

3.7 Information Dissemination

The document will be disseminated to the key stakeholders in the County government in a meeting where the information will be communicated to the county and sub county health management teams. Great Lakes University of Kisumu will also receive copies of the final report and finally publishing of the research article for wider circulation.

4 Results

4.1 Availability of essential drugs for basic EmOC.

This section describes the overall availability of essential drugs in all the 66 primary health care facilities assessed during the study. Oxytocin was the most available drug as majority of primary health care facilities (77%) had it whereas anti-hypertensives were the least available with only (31%) of health facilities having it as shown in Figure 4.1.

Figure 4.1 Availability of essential drugs for basic EmOC (N=66)

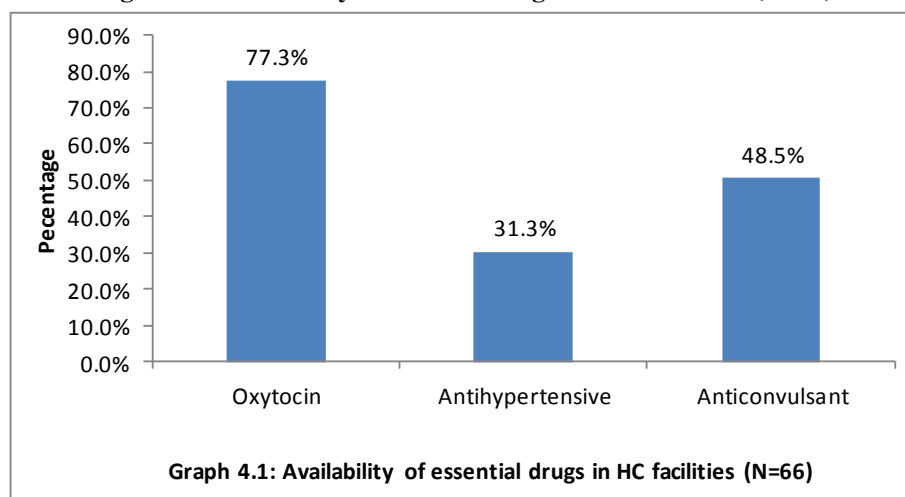
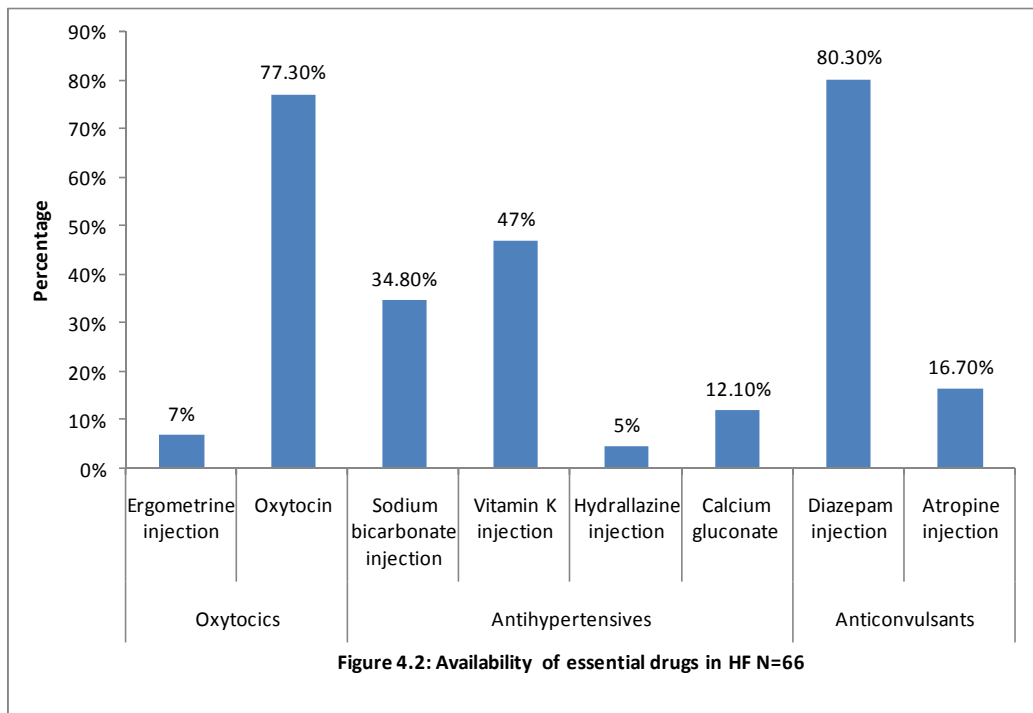


Figure 4.2: Availability of essential drugs for basic EmOC (N=66)

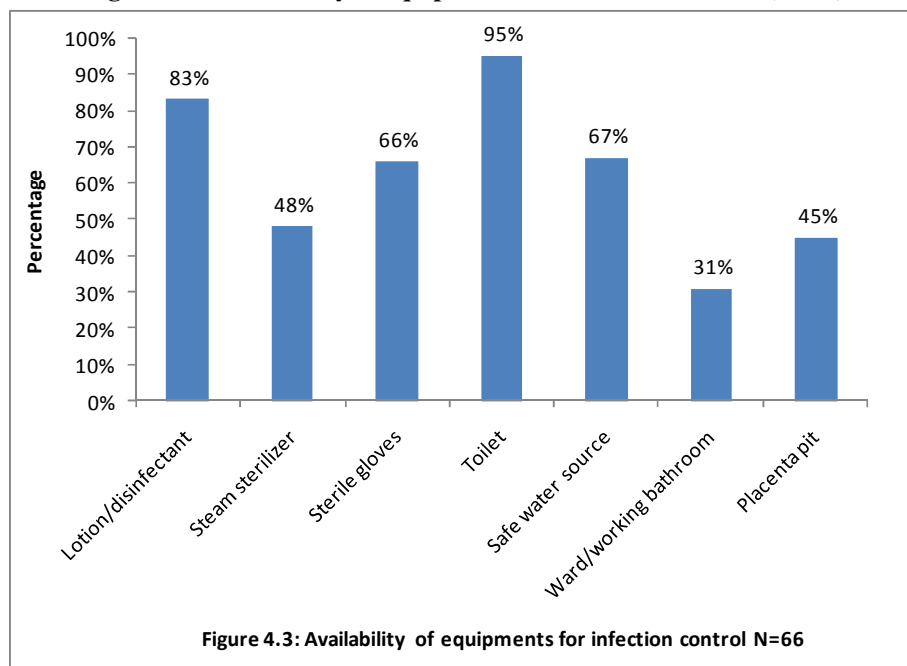


4.2 Availability of equipment's for basic EmOC

4.2.1 Equipment's for infection control

This section begins by describing the availability of equipment's for infection control and maternal care and then goes on to show the relationship between distances of primary health care facilities and availability of these equipment's. The results from the study indicate that only 67% of the primary health care facilities had safe water source with 31% having toilet/bathroom inside the maternity room. Majority (83%) of these health facilities had lotion /disinfectant and 95% facilities had toilets available as shown in Figure 4.3.

Figure 4.3: Availability of equipment's for infection control (N=66)



4.2.2 Equipment's for maternal care

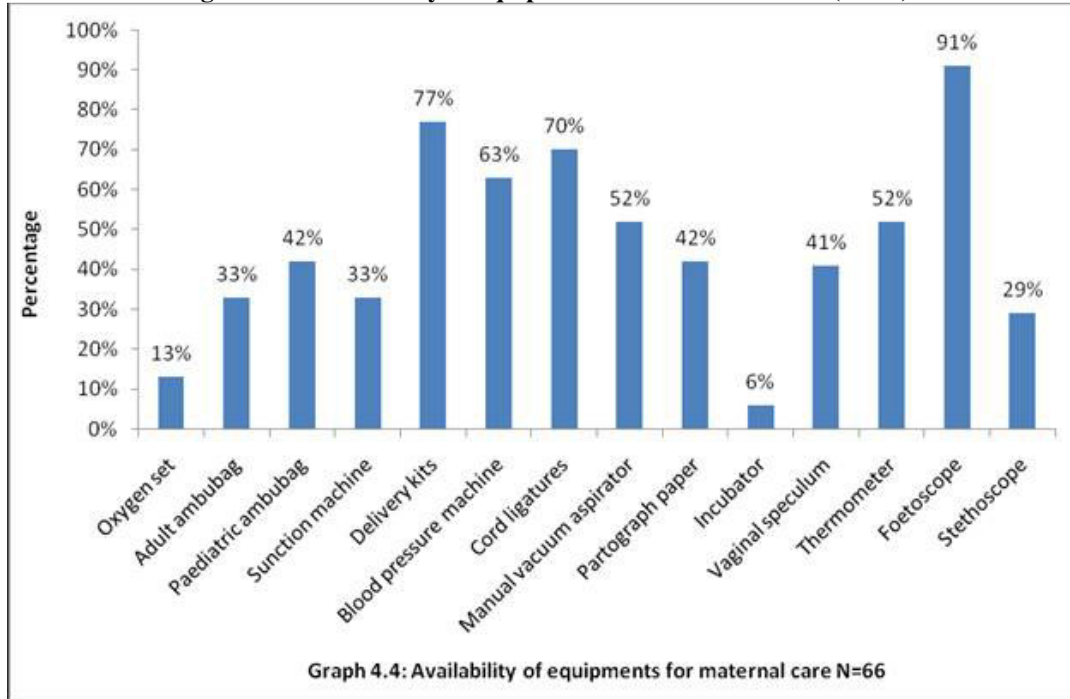
This section describes the availability of equipment's for maternal care. For the association, a score was made from a series of yes and no questions from the check list. Yes was given a higher score. Health facilities with a

score below the 50th percentile were classified under low availability whereas those with scores above the 50th percentile were classified under high availability.

Availability of maternal care equipment's

The results indicate that less than a half of primary health facilities had some of the key maternal care equipment's for basic EmOC like oxygen set 13%, incubator 6%, adult ambubag 33%, paediatric ambubag 42%. However, most facilities (77%) having delivery kits, foetoscope 91% and cord ligature 70% available as shown in Figure 4.4.

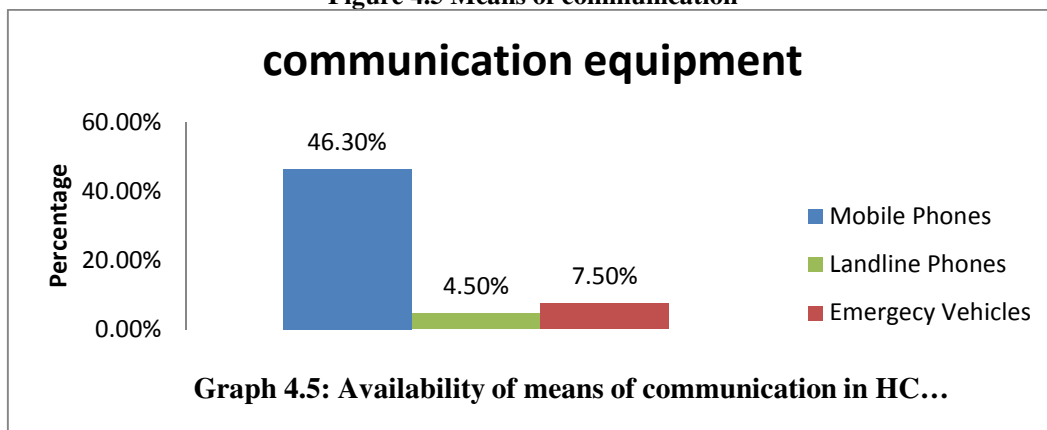
Figure 4.4: Availability of equipment's for maternal care (N=66)



4.3 Availability of means of communication for basic EmOC

Figure 4.5 below indicates that less than half of the primary healthcare facilities had active communication channels and only five facilities (8%) had functioning emergency vehicle.

Figure 4.5 Means of communication



4.4 Relationship between distance and availability of material resources for basic EmOC in primary health care facilities.

4.4.1 Distance and availability of essential drugs for basic EmOC

A score from the available options of essential drugs from the health facility checklist such as diazepam, oxytocin, vitamin K injection, sodium bicarbonate injection, calcium gluconate injection, hydrallazine injection and atropine injection was calculated. Those health facilities which fell below the 50th percentile were categorized to have low availability while those above the 50th percentile had high availability. The results indicated that 65% of the primary health care facilities had low availability of essential drugs for basic EmOC.

The findings also showed that 15 (65%) of primary health care facilities which were less than 96km from the distribution point had high availability of essential drugs as shown in Table 4.2. There was a significant association between distance of primary health care facilities from the distribution point and the availability of essential drugs (Pearson Chi-Square 3.640, $df=1$, $p=0.05$) as shown in Table 4.2. However, the correlation coefficient analysis showed existence of a weak negative relationship between distance and availability of drugs ($r=-.298$). The availability of drugs in health facilities decreased with increase from the distribution point. Binary logistic regression analysis showed that health facilities less than 96km from the distribution point were 1.861 times more likely to have essential drugs available for basic EmOC than health facilities whose distance was greater than 96km from the distribution point.

Table 4.2: Distance and Availability of essential drugs for basic EmOC (N=66)

			Distance between HF and distribution point		Total
			<96km	>96km	
Essential drugs	High availability	>50%	15 65.2%	9 34.8%	24 100.0%
	Low availability	<50%	17 40.5%	25 59.5%	42 100.0%
Total			32 49.2%	34 50.8%	66 100.0%

4.4.2 Distance and availability of equipment's for infection control

A score from the check list on equipment's for infection control sterile gloves, lotion/disinfect, running water, ward and working toilet bathroom was calculated. Low and high availability was calculated on the basis of the 50th percentile where facilities falling below the 50th percentile were classified under low availability and those above the 50th percentile classified under high availability. The results indicated that 70% of primary health care facilities had low availability of these equipment's with equal low proportions (50%) of availability in primary health care facilities whose distance was less than 96km and greater than 96km from the distribution point. There was no significant association between the distance of primary health care facilities from the distribution point and the availability of equipments for infection control (Pearson Chi-Square .140, $df=1$, $p=.709$) as shown in Table 4.3 below.

Table 4.3: Distance and Availability of equipment's for infection control

			Distance between HF and distribution point		Total
			<96km	>96km	
Equipment's for infection control	High availability	>50%	9 45.0%	11 55.0%	20 100.0%
	Low availability	<50%	23 50.0%	23 50.0%	46 100.0%
Total			32 48.5%	34 51.5%	66 100.0%

4.4.3 Distance and availability of equipment's for maternal care

The study results indicated that 62% of health care facilities which were less than 96km from the distribution point had high availability of maternal care equipment than those whose distance was greater than 96km. It also showed that 66% of facilities whose distance was more 96km had low availability of equipment's for maternal care. These results were statistically significant association (Pearson Chi-Square 4.951, $df=1$, $p=0.026$) as shown in Table 4.4 below. Though the correlation analysis indicated a weak negative relationship (-.243). This showed that availability of equipment's for maternal care decreased with increase in the distance of primary health care facilities from the distribution point.

Table 4.4: Distance and availability of equipment's for maternal care (N=66)

	Distance between HF and distribution point		Total
	<96km	>96km	
Equipment's for Low availability <50% maternal care	11 34.4%	21 65.6%	32 100.0%
High availability >50%	21 61.8%	13 38.2%	34 100.0%
Total	32 48.5%	34 51.5%	66 100.0%

5. Discussion

5.1 Availability of essential drugs for basic EmOC

Population Council (2009) highlights the maternal care standards in Kenya indicates that every pregnant woman seeking health care should be attended to by a skilled health care provider within 30 minutes of arrival at a health facility implying that all the supplies needed for emergencies should be readily available and calls for EmOC facilities to have an emergency tray of drugs available, with anticonvulsants, anti-hypertensives, and oxytocics, among others.

The study findings confirms that three quarter (77%) of primary health care facilities had parenteral oxytocin available which is used to decrease post-partum haemorrhage. This finding was close to other studies from Africa 79%, Frank K. *et al* (2010) in Kenya; 60%, Dr. Nahla (2010) from Sudan. A study from Dar e Salaam by Dickson AM *et al* (2014) showed a much lower proportion of oxytocin availability (28%); 20%, Dr. Nahla (2010) Gezira in Darfur than the rest of the studies. This difference may be due to frequent wars in Darfur hence interfering with the constant supply of the drug whereas in Tanzania, the authors reported frequent stock-outs and long supply process. The findings from the study revealed that ergometrine injection which is now not recommended for bleeding control was available in 7% health facilities. This proportion was lower to a study by Mkoka *et al* (2014) in Tanzania 39% and this could be attributed to the fact that it is no longer recommended for treatment.

Anti-hypertensives were only available in less than a half (31%) health facilities implying that women diagnosed with preeclampsia in a facility where anti-hypertensives were not available experienced delay in initiating treatment until when referred to a facility or failure to go to a referral facility the woman would be in danger for more complications. These findings were almost similar with findings from other descriptive studies where less than a half of the primary health care facilities had antihypertensive drugs available; Leonardo (2011) in Mozambique 49%; Luzango (2012) in Tanzania, 40%; Frank *et al*, (2010) in Kenya, where although pre-eclampsia/eclampsia is the second leading cause of maternal mortality in Kenya, 38% of the facilities stocked anti-hypertensives. A study from Ethiopia by Ashebir G (2011) however showed a much higher proportion of drug availability, 80%; Elisabeth (2012) in Tanzania 68%.

5.2 Distance and availability of Equipments for basic EmOC

Equipment's for infection control

Several life-saving interventions require the availability of equipment and supplies, in addition to training and skills among health workers. The study assessed the availability of equipment's for infection control and maternal care for basic EmOC.

Overall, 62% of the primary health care facilities had all essential equipment's for infection control available. Other descriptive studies showed almost similar levels of general availability of equipment's for infection control as follows: Albert *et al* (2013) in Africa 66%; Suzanne *et al*. (2013) 66%. The findings from this study were however lower compared to studies by; ministry of health in Botswana (2008), 92%, Ashebir *et al*. (2011) in Ethiopia, 80%, Leonardo *et al* (2011) in Mozambique, 80%. The difference between my study and scholars who had different findings could be as a result of the variety of equipment's that were being assessed and the scores used.

The study showed that 48% of facilities had steam sterilizer available which was slightly higher compared to a study by Abebaw G.W *et al* (2013) in Ethiopia where 33% of facilities had steam sterilizer. 66% of facilities had sterile gloves available which was close to 69% availability from a study by Manasyan MD *et al* (2013) in Africa. However, studies by Abebaw G.W *et al* (2013) in Ethiopia showed that 80% of facilities had

sterile gloves; Olumide *et al.*, (2008) in Nigeria showed 100% availability of sterile gloves.

The study results also indicated that 67% of facilities had safe water source and 95% facilities had toilet available. Similar results were shown by Abebaw G.W *et al.* (2013) in Ethiopia where 67% of facilities had water source but 58% had toilet facilities which is lower than findings from my study.

Equipment's for maternal care

The results showed that availability of essential equipment's for maternal care varied in health facilities-blood pressure monitoring machine was available in 63% of facilities. This finding is almost close to a study by Suzanne P. *et al.* (2013) in Tanzania 61%. Findings from Ziraba AK *et al.* (2009) in Nairobi showed higher availability of (88%) and 78% by Manasyan MD *et al.* (2013) in Africa. Partographs (a simple graphical tool) recommended to assess the progress of labor was only available in 42% of health facilities. This finding was almost similar to a study by Ziraba AK *et al.* (2009) in Nairobi, 48%; 47% Abebaw GW *et al.* (2013) in Ethiopia. Paediatric ambubag was available in 33% of facilities which was lower than findings from Abebaw GW *et al.* (2013) in Ethiopia 47%; Manasyan MD *et al.* (2013) in Asia 73%.

Manual vacuum aspirator was available in 52% of facilities which was higher than results from Ziraba AK *et al.* (2009) in Nairobi 33%. Almost similar results were shown by Knight *et al.* (2013), 57%; Abebaw *et al.* (2013) in Ethiopia 53%. Cord ligatures were available in 70% of facilities. The findings were lower from results by Suzzanne P. *et al.* (2013) in Tanzania which showed high of supplies cord ligature 100%; Leonardo *et al.* (2011) in Mozambique 80%.

Delivery kits were available in 77% of health facilities. These results were higher than findings from Abebaw *et al.* (2013) in Ethiopia, 41% which could be due to frequent recorded stock outs of essential drugs and supplies for maternal and new-born care.

5.3 Availability of means of communication

A functioning referral and communication system allows timely transfer of obstetric emergencies. This study showed that less than half (46%) and (4%) respectively of all the primary health care facilities had working telephones (mobile and landline) and only 5 (8%) health facilities had emergency vehicles for referral of obstetric emergencies. These results are almost similar to findings by Eduard *et al.* (2007) in Kenya, Ghana and India (12%). Though studies indicate that less than half of health facilities had emergency vehicles available, the proportions vary as follows; A study by Ziraba AK (2009) in Nairobi where 20% of the health facilities had emergency vehicles though all the facilities had working telephones. The difference could be as a result of these facilities being located in the urban area; Albert *et al.* (2013) 31% Africa and 25% Asia.

This however was not reflected by a study done by CDC-2014 in Zambia and Uganda whereby availability of mobile and landline phones was around 90% and 89% in primary health care facilities in Zambia and Uganda respectively. The high availability in Uganda and Zambia could be attributed to donations made by Saving Mothers Giving Life project in improving maternal health outcomes in terms of enhancing communication process between primary health care facilities and referral facilities.

6. Conclusion

Low availability of drugs and medical supplies in some primary health care facilities means delays in early interventions in obstetric emergencies, which contributes to maternal deaths at health facility level. A key factor that affected the availability of these resources was the distance from the distribution point given the poor road infrastructure in Kenya health facilities that are far from the distribution point might not have access to resources as the ones nearer the distribution point. To address obstetric emergencies, it is necessary to adequately equip health facilities to provide basic EmOC. Low availability of otoscope, obstetrical stethoscope, oxygen set, MVA and steam sterilizer were some of the essential equipment's that were lacking at the primary health care facilities. This interferes with effective functionality of any health care facility since it is almost impossible for health care providers to provide basic EmOC to women experiencing pregnancy complications.

It is generally agreed that in Kenya maternal health care has not improved significantly since the MDGs were set as indicated by the MMR (488/100,000) live births. Access to quality and timely emergency obstetric care is crucial as most obstetric complications - haemorrhage, hypertensive disorders and obstructed labor are unpredictable and yet life threatening. Although data from this study is from a small geographical area, it sheds light to the often forgotten sub-population of the rural folks who encounter barriers in accessing obstetric care in terms of ill equipped primary health care facilities. Poor physical access to health facilities is a challenge facing many rural communities in Kenya. Concerns about distance, poor terrain and seasonal challenges such as flooding or impassable roads contribute enormously to delays in distributing ordered material resources in various health facilities thus interfering with their availability when maternal emergencies occur.

The study rejected the null hypothesis which stated that there was no significant relationship between distance of primary health care facilities from the distribution point and the availability of material resources for basic EmOC. This does not agree with the results of this study which showed a significant relationship between

distance and availability of material. Distance mostly affected the availability of essential drugs and equipments for maternal care as indicated by declining availability with increase in distance of health facilities from the distribution point.

Previous studies focused on the relationship between distances of health facilities from the community in provision of EmOC citing the three delays (delay in making decision, seeking transportation and receiving care from the health facilities) as causes of increase in maternal mortality. This study however sought to find the relationship between health facilities and availability of material resources without looking at outcomes. This study provides new knowledge about the relationship between distance of primary health care facilities from the distribution point and the availability of material resources for basic EmOC in Kenya. Therefore, the study provided a unique contribution to the literature in relation to this aspect.

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