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What Impact Does the Ability to Access Healthcare Have on Maternal Outcomes in Africa?

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What impact does the ability to access healthcare have on maternal outcomes in Africa?

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NURS 4500: Nursing Research and Senior Thesis

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Abstract

Background: Maternal mortality rates reflect health inequities in access to obstetric care in some parts of the world including many African countries. Geographical barriers and limited number of skilled human resources have put women in rural areas at a significantly higher risk of maternal mortality.

Research Question: What impact does the ability to access healthcare have on maternal outcomes in African rural areas compared to urban cities?

Methods: A literature review was performed of credible databases. Six articles were reviewed extensively highlighting the purpose, strengths, and limitations of each study. Refer to Appendix A for the literature review table.

Findings: Rural African women are at a significantly higher risk of maternal mortality when compared to urban women. The odds of these women receiving obstetric care or skilled delivery services is decreased as the distance to a facility increases. Studies have also found that adequate access to quality health services can reduce preventable maternal deaths.

Proposal for Further Research: A mixed method study including a cluster randomized control trial and patient surveys. Interventions will include a two-year study with referrals to the Juba Teaching Hospital for prenatal care, delivery, and antenatal care. Community health nurses will also be deployed at local health facilities and clinics to perform basic maternal skills, patient education, and emergency obstetric care. This study will be approved by the World Health Organization, Juba Teaching Hospital, hospital board members and the Real Medicine Foundation and Medical Mission International.

Acknowledgements

I would like to dedicate this bachelor's dissertation to my parents, professors, coaches, and teammates that have contributed to my college experience. To my parents for the endless support and love in helping me achieve my dreams. To my Senior Thesis Research Professor, Dr. Harris, for her guidance throughout the creation and accomplishment of this paper. Lastly, to my coaches and teammates who have motivated me and molded me into the student athlete that I am today.

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Introduction

Women around the world are continuing to die from pregnancy related complications at a dangerous rate. According to the United Nations (UN), 295,000 women died in 2017 from pregnancy and childbirth complications (UNICEF, 2019, para. 3). These women die from complications before, during, or after pregnancy and delivery including hemorrhaging or infection. The World Health Organization (WHO), states that “Sub Saharan Africa and Southern Asia accounted for approximately 86% of the estimated global maternal deaths in 2017” (WHO, 2022, para 2).

The purpose of this literature review is to examine the factors affecting African mothers’ pregnancies and what interventions have been successful in decreasing maternal mortality. This research has also determined that women who live in rural areas are significantly more at risk of death due to geographical barriers to healthcare facilities. The World Health Organization (WHO), states that “Sub Saharan Africa alone accounted for roughly two thirds of global maternal deaths” (WHO, 2022, para 2). Other factors that affect rural women from accessing care include “poverty, long distance to facilities, lack of information, inadequate facilities, and cultural beliefs and practices” (WHO, 2022, para. 16). As healthcare professionals, it is important to identify these barriers and address the inequalities African mothers face in order to provide quality maternal care.

Problem Statement

It is imperative to find interventions that prevent rural African maternal deaths because the trend correlated to maternal mortality and at home births is highly alarming. The UN states that “over 800 women are dying each day from complications in pregnancy and childbirth”

(UNICEF, 2019, para. 3). The WHO further explains that the common complications these women face include “severe bleeding after childbirth, infections, and high blood pressure during pregnancy (preeclampsia and eclampsia)” (WHO, 2022, para. 8). Since these life-threatening complications require immediate medical attention, it is important for these mothers to deliver in a skilled healthcare facility to receive the needed timely interventions. Furthermore, with “about 1/3 of maternal deaths occurring during pregnancy, 1/3 happening at delivery or in the week after and the remaining third happening 1 week to 1 year postpartum” immediate access to medical care is necessary (CDC, 2019, para. 2).

This literature review will focus on the successful preventative nursing interventions that have decreased maternal mortality rates in African rural areas. Studies also examined the other factors affecting African mothers including culture, family dynamic, socioeconomic status, and access to a facility. Many of these women lack the proper education about safe deliveries and access to quality healthcare facilities with adequate skilled human resources. Addressing the geographical and healthcare access barriers that African mothers face is essential to increasing the use of skilled facilities and lowering maternal mortality rates. The UN also concluded that “for every woman that dies, approximately 20 others suffer serious injuries, infections, or disabilities” (UNICEF, 2019, para. 3). It is time for healthcare workers to put an end to maternal mortality.

Research Questions

What impact does the ability to access healthcare have on maternal outcomes in African rural areas compare to urban cities?

What impact does distance to a healthcare facility have on maternal outcomes in African rural areas compared to urban cities?

What interventions implemented by community health-based nursing impact maternal outcomes in African rural communities?

Literature Review

This research literature was researched with six original articles retrieved from the Dominican Library Databases including PubMed and Iceberg. These research articles focus on preventative nursing interventions to decrease infant and maternal mortality rates in Africa build this paper's literature review. The listed keywords and phrases were used to successfully locate the articles for this paper: access to health care, maternal and neonatal outcomes, African rural areas, interventions, maternal mortality, and impact of distance. All the articles reflect on how access to healthcare and services in rural Africa affect maternal and neonatal outcomes.

The literature review of this paper will be divided into three categories. First category consists of an article on maternal and neonatal mortality rates in Africa, the second category consists of articles on access to healthcare affecting maternal and neonatal outcomes, and the final category is interventions to increase births in skilled facilities. (Please see the literature review table in the Appendix for a summary of each study).

Maternal Mortality Rates in Africa

Alkema et al (2016) highlighted the levels and trends of global maternal mortality rates and created estimations until the year 2030. This study by the United Nations was conducted to estimate if the Sustainable Development Goal global target of less than 70 maternal deaths per 100,000 live births by 2030 could be attainable (Alkema et al, 2016). Data from 183 countries

including numerous from Africa were collected for the study between 1990-2015. Results showed that within the 25 years of the study, global maternal mortality rates decreased from 385 deaths per 100,000 live births to 216 deaths. When looking at the collected data more closely, it shows that in 2015 that the maternal mortality rate in sub-Saharan Africa was 546 deaths per 100,000 livebirths (Alkema et al, 2016). This statistic compared to maternal mortality rates in other countries is extremely high as it was stated that rates “ranged from 12 deaths per 100,000 live births in high income regions” (Alkema et al, 2016, p. 462).

This study can also serve as a guidance tool for countries with high death rates on what interventions have proven to be successful in decreasing preventable maternal mortality rates. Although this study demonstrated that there has been a steady decrease in global maternal mortality rates, interventions are still needed in multiple countries if the Sustainable Development Goal of 2030 is to be met. Refer to Appendix A for strengths and limitations of this reference.

Access to Healthcare Affecting Maternal Outcomes

Busumani and Mundagowa (2021) examined maternal and perinatal outcomes of pregnancy related referrals from rural health clinics to central hospitals. This was an open prospective descriptive study that used quantitative data from 10 different Zimbabwe provinces from December 2017 to February 2018. The researchers collected data from 44 district hospitals and 1429 primary health centers within the eight rural and two urban provinces of the study (Busumani, Mundagowa, 2021).

During the study, 206 participants “were referred to the two main hospitals from a rural health facility during the study period ... for management of complications of pregnancy, labor,

delivery, or puerperium” (Busumani, Mundagowa, 2021, p. 3). Of the number of referred mothers, “78.6% delivered at one of the two central hospitals, 16.5% delivered at a district facility, and 3.9% delivered at home” (Busumani, Mundagowa, 2021, p. 4). There were also nine maternal deaths recorded during the study making the case fatality rate 4.4%. These maternal deaths were due to the following complications: “post-partum hemorrhage (n=2), eclampsia (n=2), post-abortal sepsis (n=1), ectopic pregnancy (n=1), peri-abortal hemorrhage (n=1), ruptured uterus (n=1), and advanced breast cancer (n=1)” (Busumani, Mundagowa, 2021, p. 5). The fetal outcome results were comparable with “82.6% livebirths and 10.7% stillbirths” making the perinatal mortality rate 151 deaths per 1000 live births. The researchers also examined what delays could be affecting the high maternal and infant mortality rates including distance to healthcare facilities. Results displayed that two-thirds of referred patients traveled more than 100km to a central hospital while 24.3% of patients traveled more than two hours to a skilled facility (Busumani, Mundagowa, 2021). This study demonstrated that the women referred to the primary healthcare facilities still did not receive the highest level of obstetric care that they could have due to lack of skilled human resources and supplies. These researchers concluded that improving the level of obstetric care could also decrease the delays that women faced when referred to these primary healthcare facilities and therefore decrease maternal complications. Refer to Appendix A for strengths and limitations of this reference.

Gabrysch, Cousens, Cox, and Campbell (2011) explored how the impact of distance to healthcare effects the level of maternal care and outcomes and how it compares to other factors affecting delivery such as poverty and patient education in rural Zambian villages. It is important to consider all the factors surrounding the process of birth including the characteristics of the mother, family, economic status, education level, and access to healthcare. Geographic

information was collected from the Zambian Demographic and Health Survey of 2007. These researchers analyzed data from 3,682 rural births using a “multivariable multilevel logistic regression analysis to investigate whether distance to, and level of care at the closest delivery facility influence place of delivery” (Gabrysch, Cousens, Cox, Campbell, 2011, p. 12).

The results demonstrated that only one third of Zambian births were at a skilled facility location while the remainder were at home births. Furthermore, half of those facility births were by mothers living more than 25km from the facility and as the distance increased the odds of a facility delivery decreased by 29% per 25km (Gabrysch, Cousens, Cox, Campbell, 2011). These results suggest that lack of healthcare access related to distance is an influential factor as to why a significant number of Zambian births are still performed in the home setting without skilled care. This study clearly displayed that the lack of geographical access to emergency obstetric care is an influential factor in the high number of at home deliveries compared to births in skilled facilities. Refer to Appendix A for strengths and limitations of this reference.

Nesbitt et al (2016) investigated how geographical access to healthcare is an influential factor in the quality of delivery in rural Ghana. This study, along with the previous one, are some of the few studies that has considered the influence of distance simultaneously with place of delivery. Data was collected for 11,274 deliveries from 64 different facilities within the rural Brong Ahafo region. These facilities included 11 hospitals, 11 maternity homes, 34 health centers, and 8 clinics. A multivariable multilevel logistic regression was used to analyze the data and “assess the influence of distance and several quality dimensions on place of delivery” (Nesbitt et al, 2016, p. 1). Researchers found that “53% of the facilities provided “good quality” routine care while less than 20% provided basic or comprehensive emergency obstetric care and only 8% provided basic or comprehensive emergency newborn care” (Nesbitt et al, 2016, p. 2).

The results of this study demonstrated that of the total births, only 58% were recorded in a health facility. Furthermore, 79% of those facility births were by women who lived within 1km of a facility and 28% of those women lived more than 10km of the facility (Nesbitt et al, 2016, p. 5). The study also highlighted that “almost 85% of rural women in our study area lived within 10km of a delivery facility but that only 30% lived within 10km of one capable to provide emergency obstetric care” (Nesbitt et al, 2016, p. 5). Similarly, this study displayed that those women living farther than 10km from a facility had 90% lower odds of delivering in a facility than those who were 1km away (Nesbitt et al, 2016, p. 3). This study concluded that distance was an influential obstacle in women delivering in skilled facilities compared to in the home. Researchers found that women at further distances to healthcare facilities did not seek maternal care or were unable to access a facility before delivery. Refer to Appendix A for strengths and limitations of this reference.

Interventions to Increase Births in Skilled Facilities

Larson et. all (2019) analyzed the “impact of implementing a quality improvement project has on the utilization of childbirth in four rural districts in Tanzania” (Larson et al, 2019, p. 636). This was one of the first studies to examine the effect of facility interventions on women who have previously delivered at home. This study implemented The Maternal and Newborn Health Quality Improvement Project and implemented in in the following four rural districts: Bagamoyo, Kibaha Rural, Kisarawe, and Mkuranga. Within each of the four districts, only six hospitals with the highest delivery rates between January and June 2011 were selected. Then three of those facilities were randomly selected to receive the program interventions while the other three served as the control group. The intervention program by Larson et al (2019) began in June 2012 and included:

three components to improve facility quality: infrastructure improvement (facility upgrades and ensuring basic equipment and supplies), provider training and supervision (continuing medical education, supportive supervision and mentoring), and peer outreach to promote facility utilization for childbirth within the official catchment communities (p. 637).

The sample size included 6,083 observations and 5,992 women.

Results displayed a 10% increase of facility deliveries in the intervention areas compared to the control group. Researchers also found that the “effect of the intervention was stronger among the cohort of women who had delivered their last child at home, among whom the intervention led to an absolute increase in facility delivery of 18.3%” (Larson et al, 2019. P. 642). This study concluded that an increase in facility obstetric care led to lower maternal mortality rates and increased the quality of care that these mothers received compared to rural births. Refer to Appendix A for strengths and limitations of this reference.

Zerfu et al (2018) assessed if deploying community health nurses to rural communities in Ethiopia would increase skilled birth attendance rates. The study was conducted in three rural districts in Ethiopia from October 2014-November 2016 in 282 villages. The study design consisted of a random three-arm parallel group (one for each district). In Arm 1 community based reproductive health nurses (CORNS) were “deployed to health posts to provide skilled maternal and newborn care services” (Zerfu et al, 2018, p. 3). Similarly, in Arm 2 CORNS “provided similar services at positioned health centers” (Zerfu et al, 2018, p. 3). Lastly, Arm 3 served as the control group, so no interventions were performed. The interventions performed by the CORNS consisted of improved maternal, neonatal, and child health care beginning with educational services to mothers on facility deliveries during home visits.

Results demonstrated that just after just nine months into the interventions, birthing rates in skilled facilities increased by 81.1% in Arm 1 and 122.9% in Arm 2. The number of home deliveries also decreased by 21% in Arm 1 and 18% in Arm 2 when compared to the control group (Zerfu et al, 2018, p. 5). This study demonstrated that the deployment of trained health nurses and community health workers increased the use of obstetric care and facility deliveries. Refer to Appendix A for strengths and limitations of this reference.

Summary

The article under the first category “Maternal Mortality Rates in Africa” exhibits the numbers of the maternal mortality rate epidemic. It highlights that patterns and trends in various countries including the areas with the highest rates including Sub-Saharan Africa. These numbers were also used to calculate maternal mortality rate estimations for future years and to demonstrate how essential interventions are needed to reduce numbers globally. Similarly, the articles that fall under the second category of “Access to Healthcare Affecting Maternal and Neonatal Outcomes” focus on obstacles that have the potential to interfere with delivery with one of the most influential factors being distance. The studies demonstrated how the odds of facility delivery decreased significantly as the distance to a facility increased. Researchers highlighted the importance of addressing geographic and quality barriers increase perinatal and antenatal care and to decrease maternal mortality rates. Finally, the articles that fall under the last category of “Interventions to Increase Skilled Facility Births” demonstrate what researchers have tried to reduce the high maternal mortality rates in Africa. These studies also provided reasoning as to how many maternal deaths could be prevented if women have adequate access to quality health services.

Theoretical Framework

The theory that best fits for the topic of preventative community healthcare is Nola J. Pender's Health Promotion Model (Petiprin, 2020). Pender is an accomplished registered nurse and nursing professor. She attended Michigan State University to earn both her bachelor and master's degrees in 1964 and 1965. She then attained her Ph.D. from Northwestern University in 1969. She also received a Lifetime Achievement Award from the Midwest Nursing Research Society in 2005 and has many publications in texts and journals. Over the course of her practice in nursing, she focused on community health-based nursing, and she was convinced that patients could improve their well-being by preventative approaches to acute or chronic health problems. Her observations led her to develop the "Health Promotion Model" (Petiprin, 2020, para.1). This theoretical framework with the goal of healthcare providers focusing on understanding the major determinants of health behaviors (Petiprin, 2020).

The Health Promotion Model uses a multidimensional approach to evaluate a patient's well-being as they interact within their environment to pursue health. This model focuses on five main concepts: person, environment, nursing, health, and illness. This theoretical framework focuses on the role of nursing as a collaboration among patients, families, and communities to create the best conditions for optimal health and well-being.

Proposal for Further Study

Introduction

According to the World Health Organization (WHO), in 2017, approximately 810 women died every day from preventable causes of pregnancy and childbirth around the world (WHO, 2022, para.1). Many of these deaths occur in middle to low-income countries including many in

Africa. These countries have a limited amount of skilled human resources and facilities and are only available to offer basic levels of care mainly due to geographical barriers. Women living in rural areas are at a significantly higher risk of dying from pregnancy when compared to women in urban cities due to the lack of accessible, good quality obstetric healthcare. There is a wide range of factors that contribute to a woman's poor maternal health including education level, social status, lack of income, and distance to a facility. Addressing geographical and healthcare access barriers that African mothers face is essential to increasing the use of skilled facilities and lowering maternal mortality rates. Utilizing datasets for geographical information can improve future research because it can analyze the connection between distance and the quality of care a mother receives. This can help overcome the neglect of rural health care systems in both research and policy.

Finding effective interventions and ways for rural African mothers to overcome the geographical healthcare barriers to receive proper obstetric care will reduce maternal mortality rates. The research that was reviewed determined that there has been a significant decrease in worldwide maternal mortality rates since 1990, but more progress still needs to be made in rural countries.

The need for conducting a mixed method study to determine what exact interventions are successful in reducing maternal mortality rates in rural Africa is essential. There also needs to be research on maternal interventions being administered by community health nurses. Research articles included in the literature review have provided adequate data and results on this topic which will help strengthen the design of future research studies focusing on reducing maternal mortality rates in rural African countries.

Research Question and Study Design

The research question being studied is – what impact does the ability to access to healthcare have on maternal outcomes in African rural areas compare to urban cities?

I hypothesize that the group with more access to emergency obstetric care will exhibit more positive outcomes during the study than the control group. The purpose of this study is to identify the results of the mother's experiences in the intervention group and compare them to the control group as well as assess the quality of outcomes between the two groups. This study can also determine how influential access to healthcare is based on the likelihood of mothers delivering at home versus in a facility.

This study will be a longitudinal, observational study with a mixed method approach by implementing the use of a patient survey and referrals. Researchers will calculate the average distance to the main referred hospital, Juba Teaching Hospital in South Sudan, and measure the number of facility births delivered during the study period. This main hospital in Sub Saharan Africa, provides quality obstetric care so all participants will be referred by community health nurses for prenatal, delivery, and antenatal care. The patient survey will assess the mother's economic status, health literacy, distance to closest healthcare facility, and their anticipated place of delivery in the both groups. Please refer to Appendix B for a suggested survey to implement in study. Community health nurses will be deployed at local health posts and facilities to conduct research, conduct preliminary interviews, and refer mothers to healthcare facilities for deliveries.

Ethical Considerations

This study is designed to be implemented in rural South Sudan in Sub-Saharan Africa due to the consistent high maternal mortality rates. The main hospital located in the capital Juba, Central Equatoria State will serve as the main referral hospital for the study. This study will be approved by an internal review board from the Juba Teaching Hospital, hospital board members from the Real Medicine Foundation and Medical Mission International that fund the facility and the Medical Research Council of Sudan. All participants will be required to sign a consent form explaining the study and the rights to privacy prior to their participation. Participants will also be informed that all information will be treated with strict confidentiality.

Sample and Recruitment

Recruitment for this study will consist of identifying participants who meet specific criterion. Inclusion criteria would involve women who are pregnant (reported a positive pregnancy test upon completion of written consent), those who had a permanent residence within the study area for more than six months, and those willing to participate in the study. After participants are identified, the researchers will explain the study procedure, expected requirements, and hypothesized outcomes of the study to the mothers.

The study sample would include 100 pregnant mothers to receive interventions. The control group will receive maternal and delivery care as usual with no interventions. This is expected to be easily attained due to the large number of previous study samples that have been conducted in this area.

Methodology

Interventions will include a patient survey, access to community health nurses, referrals to the Juba Teaching Hospital, and patient education about delivering at skilled facilities. The study will be conducted from when the women consent to participate until one year after delivery. During the study, trained community health nurses will be deployed at all local health clinics and facilities, including the Juba Teaching Hospital, to conduct preliminary surveys and assist in patient education, basic maternal skills, and emergency obstetric care. Participating mothers will be referred to the Juba Teaching Hospital for prenatal care, delivery services, and antenatal care.

Nurses will also educate and counsel all participants regarding the benefits of a facility delivery during the preliminary survey. Patients will complete the suggested survey (Appendix B) with the guidance of the nurses as needed. Nurses will then review the patient answers and ask for additional explanation or ask questions regarding experiences as needed. This preliminary survey will be collected and used as baseline data for this study. This survey will also serve as an opportunity for the nurses to eliminate all misconceptions and information gaps regarding obstetric healthcare in a facility setting and refer them to the Juba Teaching Hospital for further care and delivery.

Once the intervention period is complete, community health nurses will collect all data from the study for analysis. Nurses will be able to determine the average distance that participants had to travel to the Juba Teaching Hospital. These nurses will also be able to compare maternal outcomes to the location in which the participants delivered, whether it was at home, in a clinic, or at the Juba Teaching Hospital. The data will then display if the deployment

of nurses, patient education, and referrals to a skilled facility improved maternal outcomes and decreased the overall maternal mortality rate during the time of the study.

Conclusion

With consistent high maternal mortality rates in Sub Saharan Africa, implementing medical interventions is of great significance. Referrals, patient education, and having access to emergency obstetric care are nursing interventions that can decrease the number of preventable maternal deaths. The reliability of the data collected demonstrated that there are interventions for nurses that have decreased rates but still more to be done. With the presented proposed study, learning what interventions successfully decrease maternal mortality rates can be analyzed further. It is imperative for community health and maternity nurses to understand these mothers' perspectives and the factors that may influence their pregnancy. After these areas are reviewed, medical staff can adapt intervention techniques to target the specific factors to increase births at skilled facilities to decrease maternal deaths during the delivery process.

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Appendix A – Literature Review Table

Authors/Citation	Purpose/Objective of Study	Sample - Population of interest, sample size	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller, A. B., Gemmill, A., Fat, D. M., Boerma, T., Temmerman, M., Mathers, C., Say, L., & United Nations Maternal Mortality Estimation Inter-Agency Group collaborators and technical advisory group (2016). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. <i>Lancet (London, England)</i> , 387 (10017), 462–474. https://doi.org/10.1016/S0140-6736(15)00838-7	Highlight accelerations and estimations in data regarding levels and trends in maternal mortality rates to accomplish the Sustainable Development Goal global target of less than 70 maternal deaths per 100,000 live births globally by 2030	Data from 183 countries studied over 25-year period. Sample size was determined by country.	Estimation and collection of data from 183 countries to assess levels and trends in maternal mortality between 1990-2015	Quantitative Scenario based projections	Global maternal mortality rates decreased from 385 deaths per 100,000 live births to 216 deaths in the 25 years of the study Maternal mortality rate in Sub Saharan Africa was 546 deaths per 100,000 live births.	Scenario based projections for 2030 Use of global statistics Large sample size	Estimating maternal mortality is challenging due to limited maternal mortality data available Analyses uses some incomprehensible language to describe results
Busumani, W., & Mundagowa, P. T. (2021). Outcomes of pregnancy-related referrals from rural health facilities to two central hospitals in	Determine the maternal and perinatal outcomes of pregnancy-related referrals from rural health facilities to central hospitals	163 women who were beyond 20 weeks pregnant and up to 6 weeks post delivery	Structured questionnaire used to extract information from patients registers and healthcare	Quantitative Open prospective study	There were 9 maternal deaths during the 3 months of the study period (very high frequency) 5.3% of mothers required ICU	This study used a questionnaire to gather patient information and that included the notes from the healthcare workers	This study only included women who were referred from rural facilities to hospitals and not those who failed to arrive at the hospital

Authors/Citation	Purpose/Objective of Study	Sample - Population of interest, sample size	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Harare, Zimbabwe: a prospective descriptive study. <i>BMC health services research</i> , 21(1), 276. https://doi.org/10.1186/s12913-021-06289-4			workers and data was then organized and Excel spreadsheet		admission for hemorrhage or hypertensive complications Mothers who travel more than 100km were more likely to not attend any antenatal visits and were more likely to need a blood transfusion due to complications	Written informed consent was sought from all participants and if the patient died, consent was received from living spouse Section for a definition of terms	
Gabrysch, S., Cousens, S., Cox, J., & Campbell, O. M. (2011). The influence of distance and level of care on delivery place in rural Zambia: a study of linked national data in a geographic information system. <i>PLoS medicine</i> , 8(1), e1000394. https://pubmed.ncbi.nlm.nih.gov/21283606/	Qualify the effects of distance to care and level of care on maternal care and compare data other important factors affecting pregnancy/delivery including poverty and education	Sample of 3,692 births in 203 sampling clusters	Compared national household data from the 2007 Zambia Demographic and Health Survey with national facility data and the distance between villages and health facilities	Quantitative Multilevel logistic regression analysis	Only 1/3 of rural Zambian births occurred at a health facility ½ of births were of mothers living more than 25km from a facility The odds of a facility delivery decreased by 29% as the distance increased (>25km)	The article provides a section with headers formed as questions to explain data before going into the formal research Includes national data of its detailed health facility information Data is well organized in tables and charts	Restricted number of facilities in a small study limited the sustainability for studying the effect of level of care The information gathered only at closest facilities to villages which may lead to misclassification of distance to delivery of care
Nesbitt, R., Lohela, T., Soremekun, S. <i>et al.</i> The influence of distance and quality of care on place of delivery in rural Ghana. <i>Sci Rep</i> 6, 30291 (2016). https://doi.org/10.1038/srep30291	Examining how geographical access to care is an influential factor in the quality of delivery.	This study looked at 64 facilities offering delivery care in the study area: 11 hospitals, 11 maternity homes, 34	This study looked at numerous health facilities and conducted a health facility assessment including the	Cluster randomized trial Study also includes a secondary data analysis of the Newhints	58% of the total 11,274 births were in a health facility. 79% of those women lived within 1 km of a facility and 28% lived more than 10km. Women living farther than 10km from a	The use of high-quality population surveillance data and no pregnancies were missed	Some of the pregnancies may not have been recorded due to common migration practices and distance to care was measured from an identification code

Authors/Citation	Purpose/Objective of Study	Sample - Population of interest, sample size	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
		health centers, and 8 clinics	topics of quality of routine delivery care, emergency obstetric care, and newborn care	cluster randomized trial with additional data	facility had 90% lower odds of delivering in a facility than those who were 1 km away.		given to the women during visits. Some women may not have been living at the same place where they were last visited.
Larson, E., Gage, A. D., Mbaruku, G. M., Mbatia, R., Haneuse, S., & Kruk, M. E. (2019). Effect of a maternal and newborn health system quality improvement project on the use of facilities for childbirth: a cluster-randomized study in rural Tanzania. <i>Tropical medicine & international health : TM & IH</i> , 24(5), 636–646. https://doi.org/10.1111/tmi.13220	Reducing maternal and newborn mortality rates in high quality facilities and the impact of a quality improvement project has on utilization of childbirth	Study took place in 4 rural districts in Tanzania and 12 primary care clinics	The 12 clinics acted as control groups as the study conducted a census of all deliveries within the 4 rural districts and used a difference-in-difference analysis to determine interventions . Then further secondary analysis was performed for at home births	Cluster randomized trial	An increase in use of clinics resulted in better maternal and neonatal outcomes. Increased utilization leads to lower maternal mortality rates and improvement of care	One of the first studies to examine effect of a facility quality intervention on women to delivered at home already	Only had 12 clinics so potential for imbalance between control groups This study used 24 health facilities that were not chosen at random, they were the most popular in area
Zerfu, T. A., Taddese, H., Nigatu, T., Tenkolu, G., Khan, D. N., Biadgilign, S., & Deribew, A. (2018). Is deployment of trained nurses to rural	Assessed if deploying community health nurses to rural communities in Ethiopia would increase skilled	282 villages included with each village having an estimated population of	Study conducted in three rural districts in Ethiopia from October	Cluster randomized trial	After 9 months of intervention successful birthing rates increased by 81.1%	All data collected is well organized into tables and charts Interventions increased health	Some families may have moved to other districts during the trial Financial constraints limited

Authors/Citation	Purpose/Objective of Study	Sample - Population of interest, sample size	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
<p>villages a remedy for the low skilled birth attendance in Ethiopia? A cluster randomized-controlled community trial. <i>PLoS one</i>, 13(10), e0204986. https://pubmed.ncbi.nlm.nih.gov/30312309/</p>	<p>birth attendance rates</p>	<p>350-400 people with an estimated 10-12 pregnant women Total of 2,147 women</p>	<p>2014 – November 2016 Three arm parallel groups were dispersed to the three districts -arm 1: provide skilled maternal and newborn care -arm 2: similar services provided -arm 3: no changes made</p>			<p>facility births from 8.76% to 25.25% within just nine months</p>	<p>the duration and depth of trial</p>

Appendix B – The Survey

Mixed Method Survey

(Likert Scale questions with some open-ended questions)

Link to Survey

The following survey intends to identify existing barriers that prevents mothers from accessing obstetric care. You are invited to complete this survey if you are at least 18 years of age, and you are a woman who has given birth, or you are currently pregnant.

Completion of the following survey is completely voluntary, and you may choose to not answer any question. You also may withdraw from the survey and stop answering survey questions at any time. Submission of this survey signifies your consent to participate in this research.

All answers will be kept anonymous and information from this survey will be treated with confidentiality.

1. Were you able to access obstetric care during your pregnancy?

Yes No

If yes, when? (Select all that apply.)

1st Trimester 2nd Trimester 3rd Trimester Delivery only

If yes, where?

2. Can you please describe your obstetric care or delivery experience?

3. Do you have a birth plan? Including place of delivery?

Yes No

If yes, please describe. Including location.

4. How essential is obstetric care for a healthy pregnancy and the delivery of a healthy baby? (With 1 being nonessential and 5 being extremely essential.)

1 2 3 4 5

5. How accessible is obstetric care for you in your community? (With 1 being inaccessible and 5 being extremely accessible.)

1 2 3 4 5

6. How significantly do the following barriers impact your access to obstetric care? (With 1 being no impact and 5 being extremely impactful.)

Income

1 2 3 4 5

Distance to Hospital or Facility

1 2 3 4 5

Transportation

1 2 3 4 5

Cultural Customs

1 2 3 4 5

Thank you for your time and participation in completing this survey!