

Multivariate Analysis of Maternal Mortality with Implications for Community Participatory Action Learning

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Abstract: Maternal mortality is a global public health issue that requires urgent multi-disciplinary action, especially ones that are designed with the determined commitment of the community itself. The data analyzed and reported in this paper consisted of responses from 20,467 women aged 15-49 years whose delivery occurred in the five years preceding the survey. Stata 12 computer software was applied in the data analyses, and at the multivariate level, using the Binary Logistic Regression and the Likelihood Ratio (LR) statistical test of significance. The binary logistic regression included all the six background variables with the two intervening variables, that is, "transport too far" and "facility cost too much". Results showed that women who confirmed not being able to visit healthcare facility due to lack of transportation coupled with the fact that health facility costs are less likely to seek the assistance of healthcare professionals for the delivery of their babies. On the other hand, there were mothers who responded "No", that is, the cost was not too much and the health facility not too far respectively yielded a statistical value of 0.8 and 0.9, $P > 0.195$ and 0.533 . The likelihood ratio (LR) test to determine the extent to which availability of transport and facility cost helped to explain the effect of the background variables on assistance received yielded a highly significant result (chi-square = 737 on 2 degrees of freedom, $P < 0.001$). This means that both availability of transport and facility cost are important proximate determinants through which socioeconomic, demographic and cultural factors influence maternal mortality risk in Nigeria. Based on these findings, we conclude that policies and programs targeted at mobilizing communities to identify danger signs and activate emergency transport systems and the introduction of creating innovative digital health tools can help providers deliver higher quality services more effectively. And these can be effectively strengthened by including sufficient measures of community participatory action learning on a large scale.

Keywords: Delivery, healthcare facility, maternal mortality risk, perceived problem proximate, determinants, underlying factors

Introduction

Globally, maternal mortality estimates are extremely and excessively high, especially in sub-Saharan Africa. Every year, more than half a million mothers in low and middle-income countries die while giving birth, more than 9 million suffer pregnancy-related illnesses, and 10 to 20 million of them develop long term disabilities as a result of complications related to delivery and poor obstetric management (Roser 2019; Sara, Haji, and Gebretsadik 2019; WHO 2019; UNICEF, WHO 2015; Alkema et al., 2016; Filippi et al., 2006). And as at March, 2019, the World Health Organization (WHO) has reported that death by cesarean sections have risen 100 times, especially in developing areas, and that maternal mortality is far from being checked (WHO 2019).

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Generally, about 830 women die from pregnancy-related complications around the world every day; and, on that basis, it was estimated that roughly 303 000 women died each year from complications of pregnancy and childbirth as at 2015 (Alkema et al. 2016). Almost all of these deaths occurred in low-income countries. Sadly enough, advances in medical research and care and community learning and actions in the health sector should have helped in preventing maternal mortality. Available statistical data on maternal mortality keep revealing huge disparities between the richest and poorest countries. The lifetime risk of maternal death in high-income countries is 1 in 3,300, compared to 1 in 41 in low-income (WHO et al., 2015; Alkema et al. 2016). A good number of low-income countries, particularly in sub-Saharan Africa, have not made sufficient progress in terms of meeting the Millennium Development Goals (MDG 5a). The post-2015 agenda was intended to replace the Millennium Development Goals (MDGs) upon their expiration in 2015. The effort aimed at achieving a world of prosperity, equity, freedom, dignity and ensure peace would continue unabated, and with a new agenda focusing on absolute reduction in maternal mortality (UNITED NATIONS 2015; Abouzahr 1999; Gilmore and Camhe Gebreyesus 2012; Bustreo et al. 2013). To achieve this goal, researchers must be able determine the strengths and patterns of the associated variables that are indicated in this phenomenon, and place increased emphasis on multi-disciplinary approach to reducing the incidents of maternal mortality.

Background to the Problem

Maternal mortality has been defined and applied in this paper as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity in all matters relating to women of reproductive age; or death occurring within 42 days after pregnancy, irrespective of the duration or the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (WHO 2019; 2010; UNICEF 2015). It is a global public issue that has remained endemic for a long a time now.

It has been openly acknowledged that there are many more people today who are living healthier lives than had been the case in the past decade. Nevertheless, people are still suffering needlessly from preventable diseases, and too many of them are dying prematurely. Overcoming disease and ill health would require concerted and sustained efforts, focusing on population groups and regions that have been neglected (UN-SDG 2018). One of such sustained efforts should have included massive and effective community based participatory health learning and actions. That is yet to happen in many sub-Saharan countries with the result that many people see the solution to maternal mortality mainly from the points of view of medicine and fiscal provisions. However, the fact needs to be re-stated that ignorance can only be conquered by available, accessible and quality education as the primary base for community based participatory learning action arising from research.

Globally, one of the public health problems challenging the medical community in the developing world is maternal mortality (WHO 2019, 2015 & Hadi 2007). This is underlined by the continuing occurrence of more than half a million deaths of women yearly due to pregnancy-related complications in the world. Developing countries account for 99% of maternal deaths; and, indeed, maternal mortality (abbreviated as MM) appears to be particularly common in sub-Sahara Africa and South Asia (WHO 2019, 2015a &

Hadi 2007). Indonesia ranks fourth in the list of the highest maternal death rate in the connotation of Southeast Asian countries.

In spite of the reduction in the maternal death rate from 442 per 100,000 live births in 1990 to 126 per 100,000 live births in 2015, it is suspected that many countries are not making remarkable improvement to reduce the sad incidences of maternal mortality. For example, whilst Indonesia is seemingly making sufficient efforts towards achieving the set target of the Sustainable Development Goals of 102 per 100,000 live births (2015), Nigeria is still ranking as one of the countries with the highest maternal mortality ratio. Currently, Nigeria has been estimated to be having a maternal mortality ratio of 814 per 100,000 live births (WHO 2015). Estimates by the World Health Organization (hereinafter WHO) indicated that not only did the country fail to achieve Goal-5 of the Millennium Development Goals that sought to reduce maternal mortality ratio by 75% by 2015, but it has also witnessed a substantial increase in maternal deaths (Alkema et al. 2015). This is probably due to the fact that over the last 10 years, the intermediate indicators (that is, age, parity, and distance to facility, media exposure, and use of family planning) for achieving safe motherhood have not changed in the country. Nigeria's contraceptive prevalence rate has remained low at 10% (Alkema et al. 2013), and the rate of antenatal attendance by pregnant women in Nigeria remained at 64%, (NDHS, 2013; NPC, et al., 2014). Nigeria's skilled birth attendance of 33% is one of the lowest in sub-Saharan Africa, also implying that the nation is still contending with the challenge of maternal mortality (Mallick et al. 2016). With these appalling indicators of maternal health care, it is not surprising that no substantial achievements have been made over the past decade in reducing maternal mortality in Nigeria.

Studies by Navaneetham & Dharmalingam (2000), Mekonnen & Mekonnen (2002), Babalola & Fatusi (2009), Kassebaum, (2014) and Adamson (2012) found that improved maternal and neonatal outcomes have been associated with the utilization of maternal healthcare services (MHCS). Other studies by Bhatia (1993), Babalola & Fatusi (2009) and WHO (2015) have also found that the majority of maternal deaths can be prevented through early and timely access to and utilization of quality maternal healthcare services. However, many women in developing countries do not have access to maternal healthcare services (MHCS), and it was reported that the use of such services remain low in sub-Saharan Africa (Mekonnen & Mekonnen, 2002; Mpembeni, 2007). Galadanci, Ejembi, Iliyasu, Alagh and Umar (2007) and Babalola & Fatusi (2009) have reported that in Nigeria only 58 per cent of women have attended at least one antenatal clinic during pregnancy, 39 per cent of births are attended to by a skilled professional, 35 per cent of deliveries are taken in a health facility and 43.7 per cent receive postnatal care (National Population Commission, 2009).

Perceived problems of using modern healthcare facilities in Nigeria could be a major challenge. Rosentock (1974) has argued that a combination of perceived susceptibility and severity provide motivation for action. Perceiving the susceptibility that a woman can die during child delivery if attended to by non-health practitioners and the severity of delivery complications motivate people to consult health practitioners during pregnancy. Rosentock (1974) noted that there are challenges (for example, money, proximity, and environment) that influence people's decisions. Rosenstock

(1974) indicated that these perceived challenges could be suppressed when the knowledge of the strictness of not complying outweighs the benefit. This may account for why many women in the rural areas who may not have formal education do not access modern maternal healthcare services in Nigeria. The inability of most Nigerian women to pay for maternal health services, and the poor knowledge of the effects of not using these services might compel them to use other non-orthodox services. This may also explain why more than 50 per cent of them deliver at home, thus overlooking the advantages of delivery at modern healthcare facilities (National Population Commission, 2009).

Most maternal deaths seem to occur between the third trimester and first week after delivery. As a result, skilled attendance at the time of delivery and access to emergency obstetric care remain the most effective measures to reduce morbidity and mortality (De Bernis et al. 2003 & EC/UNFPA 2000). Improved maternal health is achieved through skilled care at every birth and adequate management of pregnancy during childbirth and the post-partum period (Abrahams, et al. 2001; Camacho, et al 2006; Yakoob et al. 2011). But there could be other complicated variable factors.

It has been observed that the use of health facilities during delivery by pregnant mothers is still very low and maternal mortality remain a public health problem in Nigeria (Khalid 2006). This may be influenced by many factors including demographic, socio-economic, cultural, and obstetric and health system factors (Khalid 2006). Available evidence suggests that these factors determine women status which in turn affects maternal mortality.

There have been changes in these factors over time. For example, age at marriage appears to have increased, though minimally when viewed at the national level. Use of modern contraception has increased, and improved education, especially of women, appears to have gradually eroded some of the traditional values placed on child bearing. But research is thin on the type of education that can be helpful in this case. The purpose of the study reported in this paper, therefore, was to understand the influence of women's status in terms of education, rural and urban, and wealth index on maternal mortality risk, and to use the outcomes of the analysis in informing a participatory learning strategy that would help in mitigating this challenge to a greater extent. It is hoped that the results emerging therefrom would improve policy makers' understanding of the determinants of maternal mortality at risk, and serve as an important tool for any possible intervention aimed at improving the low utilization of maternal health care services. Since ignorance and illiteracy can jointly contribute to the problem, we attempted proposing a community based participatory educational action that could be useful in the context studied.

Statement of the Problem

The issue of maternal mortality is of great concern to scholars, especially in the field of adult and lifelong learning, researchers, policy makers and politicians. High maternal mortality rates can be attributed to a lack of family planning in the developing world. Many countries with high maternal mortality have a very high unmet need for family planning and its community education component, particularly among adolescents. This unmet need leads to high numbers of unwanted pregnancies. With each pregnancy, a woman's chance of dying increases. But the responsible factors have not been too clearly disaggregated,

and the necessary widespread community learning and actions every nation needs to design and implement remain seemingly paltry and ineffective.

Poor women in remote areas are the least likely to receive adequate health care, and this is further complicated by the high rate of female adult illiteracy in the context of this study. Furthermore, regions with low numbers of skilled health workers and health workers with very limited knowledge of community mobilization and adult learning principles and techniques are most likely to achieve effective and widespread outcomes in terms of reducing maternal mortality. It may not be just enough to know that complications exist before pregnancy, and that they get worsened during pregnancy, especially if not managed as part of the woman's care. It may not be enough to know that major complications accounting for nearly 75% of all maternal mortality are severe bleeding, infections, high blood pressure during pregnancy, complications from delivery and unsafe abortion, malaria, and HIV and AIDS (Say et al. 2014 & Cross, *et al.*, 2010). What is most critical, in the contexts of this paper is how effectively we can really engage the community in understanding these complications and how they can be avoided by putting effect all the community cultural institutions.

The maternal mortality ratio in developing countries in 2015 was put at 239 per 100, 000 live births versus 12 per 100 000 live births in developed countries. There are large disparities between countries, but also within countries, and between women with high and low income and those women living in rural versus urban areas (Conde-Agudelo, et al., 2004 and Patton, et al., 2009). However, the literature on the extraordinary non-medical strategies that might complement what is being done presently in public remain rather thin, especially in the contexts of Africa and other developing areas.

It is generally recognized today that antenatal care in itself can only help, to a limited extent, in reducing maternal mortality. A cohort study from Bangladesh underlines the fact that detecting current complications is more important during antenatal care than finding high risk (Vanneste, et al., 2000). Although, most of these causes of maternal deaths are preventable, if proper care and prompt attention paid during pregnancy are weak or non-existent and complicated by ignorance and illiteracy, it is possible that the lives of pregnant women remain endangered. We are of the view that the panacea for mitigating maternal mortality should not only come by way of fiscal policies and provisions, but these should be made more cost-effective by articulating the collaboration of the people, using the necessary community based participatory actions that they should be able to own as theirs. In this endeavor, we need to seek also for the collaboration of both the public and private stakeholders with interest in community health. So far, we have not come across a research based literature on how best this could be done using the strategy we are proposing in this paper.

This study, therefore, firstly seeks to disaggregate the strengths and patterns of variables linked to maternal mortality in order to inform the strategy being proposed for consideration by developing areas in the search for much better ways of reducing or possibly eliminating maternal mortality. The study reported in this paper becomes very valuable because other studies on maternal mortality have been largely modelled on deciphering one dependent variable. This is a highly inadequate approach to

understanding the phenomenon of maternal mortality which is a complex life issue that should normally encompass several variables. This is the reason why a multivariate analysis of more than one variable would be needed to provide us with information from many sources simultaneously in the attempt to determine the strength and patterns of variables comprising the relationships in maternal mortality (Olkin, 2001). This would also help us in proposing the extant strategy that should help us in putting the sad incidents of maternal mortality in check.

Objectives of the study

The main objective of this study is to examine the strengths and patterns of relationships of the variables that are implicated in maternal mortality with implications for community participatory action learning.

This will be achieved through the following specific objectives:

- (i) An assessment of the relative importance of the proximate (intervening) factors on maternal mortality; and
- (ii) Based on this assessment, suggest a community learning and actions program that could help in mitigating the huge problem of illiteracy and ignorance in developing contexts.

Research Questions

The study provides answers to the following research questions:

- (i) Is maternal mortality influenced by the socio-economic status, culture and demographic factors of pregnant women in terms of strengths and patterns of the relationships among the variables?
- (ii) What should be the best community learning and action strategy that can be applied in mitigating the challenges posed by maternal mortality?

Significance of the Study

Reducing maternal mortality is critical. In most developing countries of the world, especially in a country like Nigeria, data on maternal mortality are scarce, and most estimates are based on hospital records which tend to cater for more high-risk women and emergency admissions. Furthermore, a high proportion of rural women do not have ready access to hospitals, which tend to be strong in urban areas while the majority of deliveries occur at home and are conducted by traditional birth attendants (TBAs) with no links to the formal health care system (WHO, 2007).

Three quarters of maternal deaths in developing countries are attributable to direct obstetric causes such as postpartum haemorrhage, postpartum sepsis, eclampsia, obstructed labour, and complications of unsafe abortion (WHO, 2019; Sara, 2019; WHO, 2015). Therefore, in view of the highlighted points, the government, various agencies, and communities should be sensitized to make enough contributions to the development of knowledge about the causes of maternal mortality among pregnant women. It had been recommended that pregnant women should be encouraged to utilize constant antenatal care so as to reduce the risk of maternal mortality. But this has not turned to be the case for many developing countries. Community learning and action could help in reversing this attitude.

Public policies and actions such as taking a decisive action on own health, obtaining money for treatment, distance to health facility and having to take transport are some of the many difficulties stated by women in describing difficulty with accessing healthcare do not appear to have made serious impacts. This paper becomes valuable if it can shed more light on the strengths and patterns of the relationships among variables indicated for maternal mortality.

Research Design

The ex-post facto study based on the quantitative multivariate analysis of variables, and the qualitative constructive and transformative orientations examined the outcome effects of maternal mortality with implications for community participatory action learning. It is constructivists because it is not shedding light on the phenomenon but attempts, in reality, to indicate the particular strengths and patterns of the variables associated with it. The transformative aspects will come out in terms of integrating with the community what actions need to be undertaken to check the problem.

Method

The study utilized secondary data extracted from the 2013 Nigerian Demographic and Health Survey (NDHS). The 2013 NDHS provided information on population and health indicators at the national, zonal and state levels. It is a nationally representative sample designed to elicit information from women aged 15-49 years in randomly selected households across all the states in Nigeria including the Federal Capital Territory (FCT).

The sample design used in the collection of the NDHS data was multi-stage cluster sampling technique. The stages involved the division of the country into state; division of each state into Local Government Areas (LGAs) and the division of local government areas into different census enumeration areas (EAs). Each enumeration area was further classified into rural or urban areas, and households were randomly selected and interviewed from each location (National Population Commission and ICF Macro International, 2014). In all, a total sample of 38,948 women aged 15-49 years was interviewed using a structured questionnaire.

For the purpose of this study, a sub-sample of 20,467 (weighted) population consisting women aged 15-49 years whose recent delivery occurred in the five years preceding the survey was utilized based on the focus of the study. This represents a total number of women (aged 15 to 49 years) in the reproductive age group as at the time of the study, that had given birth. Mothers were asked to indicate whether or not they experienced maternal mortality risk, and also if they delivered their last babies at a healthcare facility or outside the healthcare facility. Questions in the questionnaire sought to know the kind of assistance received during pregnancy and delivery, the source of drinking water, and the socio-economic and demographic characteristics of the women. The regions and their constituent states covered in the DHS data collection exercise are displayed in Table 1 (Appendix 1).

The data were analyzed using Stata 12 computer software. The level of analysis involved multivariate analysis. We used the multivariate analysis for the simple reason that whilst the univariate analysis of variance, otherwise known as ANOVA does serve as a good tool for the statistical test of factors and their interactions, it may not serve our purpose well because we are dealing with multiples of factors in complex ecological systems with natural temporal and spatial variability (Anderson, 2001). This study spans multiples of factors and spatial spaces with immense variability, and we assumed that partitioning such as the one made possible in multivariate analysis would better serve our purpose.

Our assumption is based on the reality that the data we have on hand conform to a multivariate normal distribution which may not be highly aggregated or skewed much in line with the classical ideas that informed MANOVA (Hotelling, 1931; Wilks, 1932; Fisher, 1936; Bartlett, 1939; Lawley, 1939; and Pillai, 1955). For all intents and purposes, we assume that a natural multivariate analogue would be obtained by adding up the sums of squares across all the variables and then construct an F-ratio before arriving at the multivariate levels of analysis.

Therefore, in line with these propositions and due to the dichotomous nature of the outcome variable (i.e., whether the woman received professional assistance or not; coded as (1, 0), the multivariate analysis technique applied here involved Binary Logistic Regression, and the Likelihood Ratio (LR) statistical test of the significance was applied.

Description of Binary Logistic Regression Model

The binary logistic model was employed in order to examine and predict the probability of women dying due to pregnancy complications (maternal mortality risk). The outcome variable was dichotomized into Yes (1) or No (2). The model allows for the prediction of likelihood of mortality risk among women with a live birth in the five years preceding the survey.

The description of logistic regression model used for the study was:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

From the equation above, p is the probability that measures the occurrence of mortality risk across the different values of X while $1-P$ of occurrence of mortality risk (probability of non-occurrence). X_1 through X_n are the independent variables which include socioeconomic variables such as age, wealth index, religion, education, urban/rural; β_1 through β_n are the regression coefficients, α is the regression constant. Binary regression was used in this study to predict the odds of the occurrence of maternal mortality risk among women with a live birth in the five years preceding the survey, controlling for the effect of mothers socio-economic and demographic variables.

We proceeded to set a model that explains the conceptual inter-relationships between variables in the form of equations. The model specification which tests for the “remnant” effects of the background variables after adjusting for the proximate determinants is given below. The relationship between the

outcome variable “Y” on one hand and the background and proximate variables on the other was measured. The outcome variable ‘Y’ is maternal risk measured by whether or not a woman received professional assistance during delivery of her last baby in a modern healthcare facility (HCF). If “Y” depends on the background variables (G) and the proximate variables (H), then that relationship can be expressed as:

$$Y = f(G, H)$$

Where:

Y: Received assistance during delivery in Modern Healthcare Facility (i.e., dependent or outcome variable)

G: Socio-economic and Cultural Variables (i.e., background variables)

H: Proximate Variables (i.e. proximate determinants)

The set of G and H are vectors of variables where components are as stated in equations below:

$$Y = f(G, H)$$

$$Y = f(MTA, REG, RELPOR, EDU, WIN, DST, TRP)$$

Where,

MTA=Maternal Age

REG= Region

REL= Religion

POR=place of residence

EDU= Education

WIN= Wealth Index

DST= Distance

TRP= Transport

In logistic model format it becomes:

$$Y = \log_e \frac{p}{1-p} = \beta_0 + \sum_{i=1}^n \beta_i X_i + \varepsilon_n$$

Also, the equation above can be expressed in its explicit form as follows:

$$Y = \alpha_0 + \alpha_1 MTA_1 + \alpha_2 MTA_2 + \alpha_3 REG_1 + \alpha_4 REG_2 + \alpha_5 REG_3 + \alpha_6 REG_4 + \alpha_7 REG_5 + \alpha_8 REL_1 + \alpha_9 REL_2 + \alpha_{10} REL_3 + \alpha_{11} POR_1 + \alpha_{12} EDU_1 + \alpha_{13} EDU_2 + \alpha_{14} EDU_3 + \alpha_{15} WIN_1 + \alpha_{16} WIN_2 + \alpha_{18} WIN_3 + \alpha_{19} DST_1 + \alpha_{20} TRP_1$$

Where α_0, α_1 are the regression coefficients, ε_n is the residual or random error term. Here, also, the equation, having established the presence of the proximate variables, tends to show if the background variables still demonstrate significant association (indirect effects) with the outcome variable.

Results

Table 1 shows the results from multivariate analyses adjusted for the variables described in the study methodology, that is, assistance received during delivery controlling for selected background characteristics and Perceived Problems (Cost and Transport).

Table 1: Binary Logistic Regression Model for Assistance Received During Delivery Controlling for Selected Background Characteristics and Perceived Problems (Cost and Transport)

Variables	Odds Ratio	P- Value	Std. Error	Confidence Interval (95%)
Current Age				
15-19	R.C			
20-24	0.934	0.778	0.225	(0.583 , 1.498)
25-29	0.978	0.924	0.229	(0.618 , 1.547)
30-34	1.351	0.201	0.318	(0.852 , 2.144)
35-39	1.264	0.340	0.311	(0.781 , 2.047)
40-44	1.043	0.881	0.297	(0.597 , 1.824)
45-49	1.249	0.526	0.439	(0.628 , 2.486)
Region				
North central	R.C			
North east	0.707	0.041	0.120	(0.507 , 0.986)
North west	0.437	0.001	0.106	(0.272 , 0.702)
South east	1.662	0.016	0.350	(1.100 , 2.510)
South south	0.522	0.000	0.092	(0.369 , 0.738)
South west	0.922	0.648	0.165	(0.649 , 1.309)
Place of residence				
Urban	R.C			
Rural	0.427	0.000	0.051	(0.338 , 0.539)
Highest Educational Level				
No education	R.C			
Primary	1.203	0.231	0.185	(0.889 , 1.627)
Secondary	2.367	0.000	0.368	(1.745 , 3.211)
Higher	4.304	0.000	1.188	(2.506 , 7.392)
Wealth Index				
Poor	R.C			
Middle	2.441	0.000	0.358	(1.830 , 3.255)
Rich	2.834	0.000	0.462	(2.060 , 3.900)
Religion				
Christianity	R.C			
Islam	0.794	0.132	0.122	(0.588 , 1.072)
Traditionalist	0.118	0.036	0.120	(0.016 , 0.866)
Non Response	0.828	0.801	0.620	(0.191 , 3.589)
Too Far or No Transport				
No	R.C			
Yes	0.912	0.533	0.135	(0.682 , 1.219)
Facility Cost Too Much				

No	R.C			
Yes	0.815	0.195	0.129	(0.598 , 1.111)
Number of obs = 12136 LR chi2 (25) = 736.87 Prob > chi2 = 0.000 Log likelihood = -1630.0349				

Pseudo R2 = 0.1844

Source: Computed by the researcher from the 2013 NDHS (2019)

It was revealed in Table 1 that older women within the age group 30-49, are more likely to seek the assistance of healthcare professionals than their counterparts in the younger groups (20-29). Only women in the South East Nigeria make an attempt in the entire six geo-political regions to deliver and seek the assistance of healthcare professionals with an OR of 1.662 (95% CI 1.10-2.51). Data on educational levels revealed a positive relationship on the assistance received during delivery. The higher the educational level, the more women tend to deliver in a healthcare facility with qualified healthcare personnel. The wealth index across the region has a positive influence on their place of delivery and the kind of assistance sought with an OR of 2.44 and 2.83 (95% CI 1.83-3.26 and 2.06-3.90) respectively.

Religion on the other hand does not help to determine the place of delivery and the kind of healthcare personnel sought. Only women in the Christian community who are in the reference category were able to take a decisive decision and seek the assistance of healthcare professionals. Finally, the likelihood of assistance among women with perceived problems, that is facility too far and cost decreased with the groups of women in the two challenges (OR = 0.91 and 0.82 respectively).

Discussion

The main objective of the study was to examine influence of women's status on maternal mortality risk. Secondly, we aimed at assessing the relative importance of women's status with regards to the reproductive health decision in taking a decisive action in the household which predicts the uptake of maternal health care services across the regions in the country. And then, we attempted to suggest a community based participatory learning and actions program that could help in mitigating the huge problems of cost, transportation, illiteracy and ignorance in developing contexts. It has been confirmed by Omoruyi (2008) that more than 70 percent of maternal deaths could be attributed to five major complications: hemorrhage, infection, unsafe abortion, hypertensive disease of pregnancy and obstructed labour. On the other hand, poor access to and utilization of quality reproductive health services contribute significantly to the high maternal mortality levels.

The World Health Organization reports that for women to benefit from the cost-effective interventions, they must have adequate antenatal care in pregnancy, and in childbirth they must be attended to by skilled health providers and they need support in the weeks after the delivery (WHO, 2008). Whereas in many developed countries almost all pregnant women receive antenatal and postnatal care and are attended by a midwife and/doctor at childbirth, available data show that less than two thirds receive similar services in developing countries. Many pregnant women in Nigeria do not receive the care they need either because

there are no services where they live, or they cannot afford the services because they are too expensive or getting to them might have been too costly.

Furthermore, the poor socio-economic status of respondents is worrisome in a place like Nigeria, where it retards access to health care services among these categories of women and promotes 'dependency syndrome' of wives according to previous study leading to increase chance of maternal mortality as validated by such other earlier studies (Oni and Fasina, 2017, NPC, 2014) particularly among those women who had low educational background (Ayotunde et al., 2015).

The proximate determinant used significantly helped to explain the indirect effects of the background variables on assistance received during delivery. Mothers who have adequate education with improved income status tended to have delivered their babies in healthcare facilities as well as seek the assistance of healthcare professionals in spite of the distance and cost of the healthcare facility.

Proposed Community Learning and Action Strategy

In order to significantly reduce maternal mortality, it is critical to increase the level and number of assistance of healthcare professionals to for safe delivery. It would make much sense to have policies and programs that are formulated and implemented to deal with the challenges posed by maternal mortality. The policies should target appropriately and promptly those identified groups with low utilization of health facilities. These include young women, women with no education, high parity, poor wealth status, non-Christians and women in the North-East, North-West, South-South and South-West.

There is need to assess the effectiveness of a community-based health information system designed for a low-literacy community health volunteer program and implemented at a high scale. This should help to improve maternal health care behavior and practices of mothers in the local community. It should also help in improving the strategy to provide maternal health services and maintain the community health information system.

Policies and programs that strengthen reproductive health are essential in a largely rural and illiterate adult population. But of greater importance to us in this context is the need for us to ensure that these programs are designed and implemented in collaboration with the community stakeholders that are indicated in dealing with the issues.

In many instances, it would seem to us that an acceptable level of youth and adult literacy become a sine-qua-non for effective healthcare services in the context of this study. Again, family planning policies and improved planning and resource allocation must be put in place. This includes communication programs that enlighten women on the need to seek assistance from healthcare professionals for safe delivery. The community learning and action strategy would put this into consideration.

The community learning and action program should feature stakeholders who would ensure the availability of reliable services by placing special focus on those categories of women who had been

identified in this study as very deficient in their attitude towards seeking for health professionals. They include rural mothers, very young mothers (i.e., under 20 years old), mothers with little or no education, poor women, women of high parity, unmarried mothers, and women who reside in the northern regions of the country, particularly the northeast and the northwest.

The educational experiments carried out by the famous Brazilian educator, Paulo Freire, have proved that getting those affected by dire problems ultimately involved in understanding the issues at stake will empower them in coming up with lasting solutions. This is the case in this instance. This is where a community based participatory learning and action becomes very handle. Using this educational initiative would require us to get together all the stakeholders in an atmosphere where objective dialogue is promoted. Using this strategy demands that the initiators of this process must never attempt to take it over. Doing so would be counter-productive because the external participants may not have sufficient understanding of the issues surrounding the non-utilization of healthcare facilities. Thus, it becomes rather critical to allow those mostly affected by the challenge to own the process of finding solutions in an atmosphere of give and take.

Conclusion

Based on the outcomes of this study, we share the view that both costs and the distance to healthcare facilities are important proximate factors through which the socioeconomic, demographic and cultural factors influence assistance received by mothers during delivery. Hence, policies that are targeted at ensuring a significant reduction in cost and creating good accessibility for pregnant women on their healthcare services utilization would go a long way in increasing the level of utilization of healthcare facilities for delivery in Nigeria. However, more critical in the contexts of this study is the issue of the awareness and utilization of knowledge of the health facilities that are available to assist the women. Towards achieving this critical goal, we have proposed in this paper the participatory learning and action strategy that could help in making the communities own the educational platform needed for more rapid acceptance and utilization of whatever public campaigns that had been launched presumably with fanfare but have yielded paltry results.

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Appendix One

Table 1: List of the six geopolitical zones of Nigeria and the respective states

Political Zones	States	
North Central	Benue, Federal Capital Territory (FCT), Kogi, Kwara, Nassarawa, Niger, Plateau	
North East	Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe	
North West	Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, Zamfara	
South East	Abia, Anambra, Ebonyi, Enugu, Imo	
South South	Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Rivers	
South West	Ekiti, Lagos, Ogun, Ondo, Osun, Oyo	
	Number Interviewed	Response Rate
Households	38,522	98%

19	Women 15-	38,948	98%
	Men 15-19	17,359	95%

Source: Author's Compilation (2019) from NDHS 2013