

Risk Factors for Maternal Mortality in Nigeria.

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ABSTRACT

Maternal mortality has been described as one of the foremost and most neglected health problems and human rights abused in the world. Maternal mortality is the probability or percentage of mothers dying as a result of pregnancy related complications or post-delivery complications every year.

In this paper, effort was made to determine the risk factors (maternal education, maternal age at birth, and antenatal care visit) associated with maternal mortality at the Federal Medical Center Katsina from 1999 to 2014. The specific objectives were to determine the relationship between maternal education, maternal age at birth, and antenatal care visit on maternal mortality. The logistic regression model was fitted because it allows the estimation of the occurrence of a binary outcome due to the effect of several explanatory factors. The analysis examined the relationship between the selected risk factors and maternal survival status; this was done through the interpretation of odds ratios from logistic regression.

The model showed that high maternal mortality is associated with low maternal education, extreme maternal age at birth, and low antenatal visits. Therefore in order to reduce maternal mortality the government and community have to support girl/child education by making free education to girls in the state, discourage early pregnancy or marriage and pregnancy 40 years of age and above, with the help of traditional rules in the state, and finally the government and the community has to sensitized mothers on the importance of antenatal care visits by making free health services and welfare of the mothers so as

to reduce the rate of maternal mortality in the state.

(Keywords: maternal, mortality, age at birth, education, antenatal care)

INTRODUCTION

Maternal mortality remains a serious concern in Nigeria, especially in the northern region and in the rural south. In 2005, the estimated total of global maternal deaths recorded was 536,000; developing countries, such as Nigeria, accounted for over 99 percent or 533,000 of the recorded deaths (WHO 2007). While having only 2 percent of the world's total population, Nigeria accounted for 10 percent of the world's total maternal deaths in 2010. Nigeria's maternal mortality rate exceeds 1,000 deaths per 100,000 live births and is much higher than the African continent average of 800 deaths per 100,000 live births (Zozulya, 2010).

Improving maternal health is one of the MDG goals (Goal 5), and the target is to reduce maternal mortality ratio by three-quarters between 1990 and 2015. In the MDG framework, two indicators have been specified for monitoring progress towards the maternal health goal namely, the maternal mortality ratio and the proportion of deliveries with a skilled health care provider.

Globally, the total number of maternal deaths decreased by 45% from 523,000 in 1990 to 289,000 in 2013. Similarly, global MMR declined by 45% from 380 maternal deaths per 100,000 live births in 1990 to 210 in 2013 yielding an average annual decline of 2.6%. Worldwide MMR declined annually by 3.3 % between 2005 and 2013, faster than the 2.2% average annual

decline observed between 1990 and 2005 (WHO, 2006).

LITERATURE REVIEW

Socio-economic situation plays an important role in determining lifestyle behaviors and health status. Mothers who live in poverty experience much higher rates of maternal mortality. UNICEF found that that “the risk of dying during or shortly after birth is 20 to 50 percent higher for the poorest of 20 percent of households than for the richest quintile”. There are many factors that play into the connection between maternal health and poverty level. The most direct connection is that women are unable to afford the antenatal care they need during their pregnancy. However, there are also a multitude of indirect factors caused by poverty, such as psychological stress, gender dynamics, social standing, self-esteem, ethnicity, and race that also have an influence on the rates of maternal mortality in a community (Ronsman, 2006 & Dayal, 2013).

Tuberculosis, malaria, syphilis, worm infestations, Chlamydia, gonorrhea and HIV are challenging problems in Nigeria that contribute to high maternal mortality (Okereke, et al., 2005). These infections account for 27 percent of the total maternal deaths in Nigeria. However, the majority of maternal mortality occurs in rural communities in developing countries. Sometimes even if there is an existing healthcare infrastructure that provides quality care to these communities, these women do not have the mobility or resources to access it. This is one of the three delays which have been often documented by maternal mortality studies in recent years. These delays are “delay in decision to seek care, delay in reaching care, and delay in receiving adequate care” (Smith-Fawzi, 2011).

The delay to seek care often stems from cultural traditions. In countries, such as India, women traditionally give birth in the home with female family members or local midwives attending. Although these local attendants are generally able to deliver the baby, they are not equipped to handle any complications. When a complication occurs with the mother, the midwife or family members often try to resolve the bleeding or infection. However, it is only when the problem becomes serious that professional medical help is sought. This is the first delay that leads to maternal mortality.

The second delay relates to reaching a health care institution with skilled providers. The barriers that cause this delay may include “road conditions, lack of transportation, or location” (Nour, 2008). Most women who live in rural communities in developing countries live in more isolated areas, farther away from cities and health care centers. When a woman experiences a complication during pregnancy, she needs immediate medical care. However, families living in these remote communities have a long journey to these medical centers and cannot bring these mothers to the clinics in time. Additionally, the method of transportation and the roads also present problems. In areas that are more geographically inaccessible, roads may not be paved and may be difficult to traverse quickly (Nour, 2008). Additionally, unless the family has private transportation, they must depend on public transportation or the help of their neighbors. All of these factors contribute to the second delay.

Finally, the third delay involves receiving quality healthcare. This is more complex than it may seem at first glance. Even when the mother arrives at the health care facility, there may still be a delay in providing quality healthcare. In many instances, there is a lack of resources to properly fund the healthcare infrastructure in developing countries. This need for resources is manifested by the fact that many community clinics and hospitals do not have sufficient funding to provide a high level of care for patients. “Shortages of qualified staff, essential drugs and supplies, coupled with administrative delays and clinical mismanagement, become documentable contributors to maternal deaths” (Thaddeus and Maine, 1994). Thus, if a mother is unable to receive the necessary medicines or tests in a certain time frame, she may not survive even in a health care facility. The three delays of maternal mortality illustrate how the social determinants of access to healthcare, cultural traditions, and location affect maternal mortality rates (Dayal, 2013).

In a recent systematic review conducted by the WHO, maternal mortality was compared across the regions of the world (Khan et al., 2006). Maternal deaths in Latin America and the Caribbean accounted for 31.5% of all maternal deaths in the countries from which the data were analyzed. Approximately 22,000 maternal deaths occur in this Latin America and the Caribbean annually (Abou Zahr, 2003).

According to Adindu, et al. (2012), true community participation is essential to achieving the kind of change that governments and organizations seek and for programmed to successfully and sustainably achieves their goals (Adindu, Ndep and Peter, 2012).

Opoku (2007) researched on utilization of maternal care services in Ghana by region found that half the births occurring in the 2 years prior to the Multiple Indicator Cluster Survey (MICS) were delivered by skilled personnel. This percentage was highest in the greater Accra Region (83 %) and Ashanti Region (60%) with seven of the regions below 50% (Western, Central, Volta, Eastern, Northern, Upper East, and Upper West). The Upper West shows the lowest percentage of any skilled attendance (29.1%).

According to Anthony (2013), maternal education is an important indicator of how women view healthcare, whether they follow treatment regimens, whether they make important decisions in their households, and multiple other factors. In a cross-sectional WHO global study, it was found that lack of maternal education is related to maternal mortality and leads to a greater likelihood of negative pregnancy outcomes (Karlsen, 2011). The importance of maternal education reflects the importance of the mother on the entire family's well-being.

A more educated mother is likely to practice healthy lifestyle behaviors, such as good nutrition. Additionally, mothers that are more educated are likely to visit the doctor, be more confident in asking healthcare questions, and understand the potential risks during their pregnancies. Educated mothers will also apply these healthy behaviors in their families and pass on these ideas about good nutrition, exercise, and other health related issues (Dayal, 2013).

Every year at least two million women under the age of 19 die from complications resulting from unsafe abortions in the developing world (WHO, 2006). Globally, 72 percent of all deaths in women under age 19 are attributed to complications of unsafe abortions with complications such as cervical tearing, hemorrhage, pelvic infection, infertility, and death (Zabin and Kiragu, 1998).

Objectives of the Study

This paper was guided by the following objectives:

1. Determine the relationship between maternal education and maternal mortality.
2. Ascertain the level of impact between maternal age at birth and maternal mortality.
3. Find out the influence between antenatal care attendance and maternal mortality.

Research Hypotheses

The following hypotheses were used:

- (i) There is no significant relationship between maternal mortality and maternal education.
- (ii) There is no significant impact of maternal mortality on maternal age at birth.
- (iii) There is no significant influence of maternal mortality on antenatal care attendance.

MATERIAL AND METHODS

This study used research made question which were filled by the researcher on those who attended antenatal at the federal medical center Katsina, in the record department. The hospital directed the researcher to the record office for the collection of the data. Data on deliveries were given to the researcher since it contained all the required information. The researcher filled all the questions for each of the patient.

The data analysis procedures involved analyzing all variables in all categories using logistic regression to compare odds. Some variables were categorized before analyzed. Age of mother at birth were categorized into four age groups less than 20, 20-29, 30-39, and 40 and above. The age of mother less than 20 years category was used to capture the prevalence of teenage pregnancy.

Maternal education was categorized into No education, primary, secondary and tertiary for literacy rates among mothers and antenatal care attendance for no visit, once, twice, thrice and at least 4 visits for pregnant mothers. The logistic regression model shall be fitted because it allows the estimation of the occurrence of probability of an outcome due to the effect of several explanatory factors. This technique enables adjusting for many explanatory factors and controlling for many confounders at the same time as it enables easy detection of interactions between explanatory factors. It is flexible, easy to use and usually gives meaningful interpretation by giving the magnitude and the direction of the association between explanatory and outcome variables.

The logistic analysis examined the relationship between the selected risk factors and the maternal survival status. This was done through the interpretation of the odd ratios from logistic regression model. Logistic regression will accept quantitative, binary, or categorical predictors and will code the letters two in various ways. Linear logistic regression method was used to identify risk factors and predict the probability of success, say probability of death.

Suppose there are 'n' individuals, some Dead (success) and others Alive (failures), then:

$Y_i = 1$, if the i th individual died and 0 if the i th individual is alive

Suppose also for each individual, there are n independent variables:

$$x_1, x_2, x_3, \dots, x_n$$

Then the probability of death is represented by the logistic regression method given as Equations (1) and (2):

$$pi = \frac{e^{bjxi}}{1 + e^{bjxi}} \quad (1)$$

and

$$1 - pi = \frac{1}{1 + e^{bjxi}} \quad (2)$$

where bj are unknown coefficients.

The log-odds of pi and $1 - pi$ gives the linear logistic model expressed as Equation (3):

$$\text{Log}\left(\frac{pi}{1 - pi}\right) \quad (3)$$

RESULTS

Maternal Education and Maternal Mortality

Table 1: Omnibus Tests of Model Coefficients.

| Model | | Chi-square | Df | Sig. |
|--------|-------|------------|----|------|
| Step 1 | Step | 3050.25 | 3 | 0 |
| | Block | 3050.25 | 3 | 0 |
| | Model | 3050.25 | 3 | 0 |

The Omnibus test in Table 1 shows the significance of the model, block and the step as being identical since the p- values are less than 0.05. The chi square value shows that all the variables included in the model are significant in explaining maternal mortality.

H_0 : There is no significant relationship between maternal mortality and maternal education.

Results in Table 2 reveal that maternal education is significantly related to maternal mortality (P-value<0.05). Maternal mortality increases with decrease in the level of education. This implies that the likelihood of highly educated mothers to experience maternal mortality is low compared to their counterparts who are not educated. In terms of odd, mothers who had attained tertiary education had the risk of maternal mortality reduced by 1-0.011 which is 98.9% related to mothers in reference category (none educated mothers).

Secondary educated mothers reduces the risk of maternal mortality by 95% compared to mothers reference category (none educated mothers). While primary educated mothers reduces the risk of maternal mortality by 53% compared to the mothers in reference category (no education). This implies that the likelihood of mothers experiencing maternal mortality increases with lower education level.

Table 2: Variables in the Equation.

| Risk factors | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|--------|------|---------|----|------|--------|
| Step 1 ^a | MATERNAL_EDUCATION (None education) | | | 1.930E3 | 3 | .000 | |
| | MATERNAL_EDUCATION (Tertiary education) | -4.535 | .140 | 1.044E3 | 1 | .000 | .011 |
| | MATERNAL_EDUCATION (Secondary education) | -2.937 | .135 | 475.073 | 1 | .000 | .053 |
| | MATERNAL_EDUCATION(prima ry education) | -.760 | .144 | 27.928 | 1 | .000 | .467 |
| | Constant | 3.009 | .123 | 595.528 | 1 | .000 | 20.275 |
| a. Variable(s) entered on step 1: MATERNAL_EDUCATION. | | | | | | | |

Maternal Age at Birth and Maternal Mortality

Table 3: Omnibus Tests of Model Coefficients

| Model | | Chi-square | Df | Sig. |
|--------|-------|------------|----|------|
| Step 1 | Step | 1827.174 | 3 | .000 |
| | Block | 1827.174 | 3 | .000 |
| | Model | 1827.174 | 3 | .000 |

The Omnibus test in Table 3 shows the significance of the model, block and the step as being identical since the p- values are less than 0.05. The chi square value shows that all the variables included in the model are significant in explaining maternal mortality.

Results in Table 3 reveal that maternal age at birth is significantly related to maternal mortality (P-value<0.05). Maternal mortality increases with the decrease in maternal age.it also explained that when the age of mothers is above 40, maternal mortality also increases. This is an indication that as the age of the mothers increase or as the mother grows older; their likelihood to experience maternal mortality is high at extreme age categories (below 20 and above 40). This could be as a result complications during pregnancy due to under developed reproductive body systems and weak body system due to age respectively.

In terms of odds. Maternal age at 40 and above reduces maternal mortality by 1-0.26 which is 74% related to mothers in the reference category (maternal age less than 20 years). The odds of maternal age of (30-39) years of age is 4.987 times the odds of maternal age in the reference category (below 20 years of age). The odds of maternal age of (20-29) years of age is 6.227

times the odds of maternal age in the reference category (below 20 years of age).This implies that the likelihood of mothers experiencing maternal mortality decreases with extreme maternal age at birth.

Antenatal Visit and Maternal Mortality

The Omnibus test in the Table 5 shows the significance of the model, block and the step as being identical since the p- values are less than 0.05. The chi square value shows that all the variables included in the model are significant in explaining maternal mortality.

Results in Table 6 reveal that antenatal care visit is significantly related to maternal mortality (P-value <0.05). Maternal mortality decreases with increase in the number of antenatal visits. This implies that the likelihood of mothers experiencing maternal mortality reduces with number of visits. In terms of odds. The odds of mother with four or more visits reduces the risk of maternal mortality by 99.7% compared to odds of mothers in the reference category (no visit).

The odds of mother with thrice visits reduces the risk of maternal mortality by 98.8% compared to odds of mothers in the reference category (no visit). The odds of mother with two visits reduces the risk of maternal mortality by 93.2% compared to odds of mothers in the reference category (no visit).

The odds of mother with one visit reduces the risk of maternal mortality by 72.4% compared to odds of mothers in the reference category (no visit).This implies that the likelihood of mothers experiencing maternal mortality reduces with number of visits.

Table 4: Coefficients Determination.

| Risk factors | | B | S.E. | Wald | Df | Sig. | Exp(B) |
|---|--------------------------------------|--------|------|---------|----|------|--------|
| Step 1 ^a | MATERNAL_AGE (Below 20 years of age) | | | 1.397E3 | 3 | .000 | |
| | MATERNAL_AGE (40 and above) | -1.345 | .113 | 141.729 | 1 | .000 | .260 |
| | MATERNAL_AGE (30-39) | 1.607 | .094 | 291.364 | 1 | .000 | 4.987 |
| | MATERNAL_AGE (20-29) | 1.829 | .104 | 309.501 | 1 | .000 | 6.227 |
| | Constant | -.220 | .082 | 7.207 | 1 | .007 | .802 |
| a. Variable(s) entered on step 1: MATERNAL_AGE. | | | | | | | |

Table 5: Omnibus Test of Model Coefficients.

| Model | | Chi-square | Df | Sig. |
|--------|-------|------------|----|------|
| Step 1 | Step | 3494.077 | 4 | .000 |
| | Block | 3494.077 | 4 | .000 |
| | Model | 3494.077 | 4 | .000 |

Table 6: Variables in the Equation.

| Risk Factor | | B | S.E. | Wald | Df | Sig. | Exp(B) |
|---------------------|---|--------|------|---------|----|------|--------|
| Step 1 ^a | ANTENATAL_VISIT(four or more visits) Reference Category | | | 1.941E3 | 4 | .000 | |
| | ANTENATAL_VISIT(three visits) | -5.822 | .208 | 780.502 | 1 | .000 | .003 |
| | ANTENATAL_VISIT(twice visits) | -4.465 | .195 | 522.269 | 1 | .000 | .012 |
| | ANTENATAL_VISIT(one visit) | -2.689 | .197 | 186.596 | 1 | .000 | .068 |
| | ANTENATAL_VISIT(no visit) | -1.288 | .204 | 39.722 | 1 | .000 | .276 |
| | Constant | 3.753 | .185 | 412.786 | 1 | .000 | 42.633 |

The Omnibus test in Table 7 shows the significance of the model, block and the step as being identical since the p- values are less than 0.05. The chi square value shows that all the variables included in the model are significant in explaining maternal mortality.

Table 7: Omnibus Tests of Model Coefficients.

| Model | | Chi-square | Df | Sig. |
|--------|-------|------------|----|------|
| Step 1 | Step | 4899.194 | 10 | .000 |
| | Block | 4899.194 | 10 | .000 |
| | Model | 4899.194 | 10 | .000 |

In general, Table 8 shows that maternal mortality increases with the decrease in the level of education, maternal mortality also increases with lower and higher maternal age at birth and maternal mortality decreases with the number of antenatal visits.

DISCUSSION OF FINDINGS

The findings on the relationship between maternal education and maternal mortality were significant. This implies that the likelihood of highly educated mothers to experience maternal mortality is low compared to their counterparts who are not educated.

We found out that maternal mortality decreases with maternal age at birth; this is an indication that as the age of the mothers increase or as the mother grows older; their likelihood to experience maternal mortality is low. This shows that at extreme age below 20 and above 40. This could be as a result complications during pregnancy due to under developed reproductive body systems and weak body system due to age, respectively.

The quality of antenatal services also matters a lot in determining mother's attitudes, attendance and faith in health care services which in the end impacts on the control pregnancy, post-delivery complications in other to reducing maternal mortality. Thus, the higher the number of visit, the lower the likelihood of maternal mortality.

Table 8: Variables in the Equation.

| Variable | B | S.E. | Wald | df | Sig. | Exp(B) |
|--|--------|------|---------|----|------|--------|
| Step 1 ^a | | | 551.451 | 3 | .000 | |
| MATERNAL_EDUCATION (None education) | | | | | | |
| MATERNAL_EDUCATION (Tertiary education) | -2.949 | .171 | 296.338 | 1 | .000 | .052 |
| MATERNAL_EDUCATION (Secondary education) | -1.587 | .167 | 90.141 | 1 | .000 | .205 |
| MATERNAL_EDUCATION (Primary education) | -.265 | .171 | 2.402 | 1 | .121 | .767 |
| MATERNAL_AGE (Below 20 years of age) | | | 506.127 | 3 | .000 | |
| MATERNAL_AGE (40 and above years of age) | .170 | .167 | 1.034 | 1 | .309 | 1.185 |
| MATERNAL_AGE (30-39) | 2.312 | .147 | 246.914 | 1 | .000 | 10.093 |
| MATERNAL_AGE (20-29) | 2.366 | .158 | 224.665 | 1 | .000 | 10.655 |
| ANTENANTAL_VISIT (No visits) | | | 809.824 | 4 | .000 | |
| ANTENANTAL_VISIT (four or more visits) | -4.617 | .236 | 382.546 | 1 | .000 | .010 |
| ANTENANTAL_VISIT (Thrice visits) | -3.428 | .223 | 237.231 | 1 | .000 | .032 |
| ANTENANTAL_VISIT (Twice visits) | -1.896 | .223 | 72.521 | 1 | .000 | .150 |
| ANTENANTAL_VISIT (One visit) | -1.162 | .226 | 26.309 | 1 | .000 | .313 |
| Constant | 2.811 | .238 | 138.951 | 1 | .000 | 16.620 |

a. Variable(s) entered on step 1: MATERNAL_EDUCATION, MATERNAL_AGE, and ANTENANTAL_VISIT.

CONCLUSION

The objective of the study was to determine the relationship between maternal education, maternal age at birth, antenatal visits and maternal mortality, using the logistic linear regression model. The researcher found out that, the likelihood of maternal mortality decreases with maternal education, implying that highly educated mothers have low chance of experiencing maternal mortality. Maternal mortality decreases with maternal age at birth. This is an indication that as mothers grows older; their chance of experiencing maternal death is low. And finally, it was found that the more mothers attend antenatal care services, the less they are likely to experience maternal death. This is due to the fact that any complications on risk can be detected during these visits than when mothers do not come for antenatal visits.

RECOMMENDATIONS

Based on the findings of this study, it was recommended that:

- (i) Girl/child education should be encouraged by governments in other to reduce maternal mortality by making free education to girls in the state.
- (ii) The government and the community should discouraged extreme age pregnancies. That is,

pregnancy below 20 years of age and above 40 years of age with the help of traditional rules in the state.

- (iii) There should be sensitization on the importance of the antenatal visit by making free health services and welfare of the mothers so as to reduce rate of maternal mortality.

REFERENCES

1. Karlson, S. 2011: "The Relationship Between Maternal Education And Mortality Among Women Giving Birth In Health Care Institutions: Analysis of the Cross Sectional WHO Global Survey on Maternal and Perinatal Health." *BMC Public Health*. 606-615.
2. Dayal, M. 2013. "Unraveling the Web of Maternal Mortality". Unpublished thesis. University of North Carolina: Chapel Hill, NC.
3. Nour, N.M. 2008. "An Introduction to Maternal Mortality". *Reviews in Ob Gyn*. 1(3):1784-1849.
4. Zabin, L. and K. Kiragu. 1998."The Health Consequences of Adolescent Sexual and Fertility Behavior in Sub-Saharan Africa". *Studies in Family Planning*. 2(1):210-232.
5. Zozulya, M. 2010. "Maternal Mortality in Nigeria: An Indicator of Women's Status". http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=358:maternal-mortality-in-nigeria-an

indicator-of-womensstatus & catid=59:gender-issues-
discussion-papers&Itemid=267.

6. Sundari, T.K. 1992. "The Untold Story: How the Health Care Systems is Developing". *American Journal of Health Sciences*. 3(1):104 – 107.
7. National Population Commission. 2013. "Nigerian Demographical Health Survey Report". NPC: Abuja, Nigeria.
8. Smith, F. 2011. "Mortality Ratio". *Journal of Women's Health*. 6(2):67 – 73.
9. McCarthy, J. and D. Maine. 1967. "A Framework for Analyzing the Determinants of Maternal Mortality": *Implications for Research and Programs*.
10. Mitali, D. 2013."Unraveling the Web of Maternal Mortality". Unpublished Thesis, University of North Carolina: Capel Hill, NC.
11. Filippi, V., C. Ronsmans, and O. Campbell. 2006. "Maternal Health in Poor Countries: The Broader Context and a Call for Action". *Lancet*. 368 (9546). 2(1): 535–541
12. Okereke, H., I. Kanu, N. Nwachukwu, E. Anyanwu, J. Ehiri, and J. Merrick. 2005.. "Maternal and Child Health Prospects in Nigeria". *Internet Journal of Nursing Science*. 4(2):45 – 48.

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