

# On the Effects of Maternal Mortality on Infant Mortality in Toro Local Government of Bauchi State

Musa Usman Bawa<sup>1</sup>; Hamza Yusuf Adam; Tisloh Israel

Department of Mathematics,  
 Abubakar Tafawa Balewa University, Bauchi, Nigeria.  
 E-mail: musausmanbawa@gmail.com<sup>1</sup>

**Abstract** — This study examines the effect of maternal mortality on infant mortality rate for the period of 2012-2018 in Toro local government, Bauchi state of Nigeria. Data were obtained from the Bauchi State Bureau of Statistics. The research design used was an expos-facto design. The empirical analysis has found out that maternal mortality has a significant effect on infant mortality. The trend analysis also indicates an increasing trend for both maternal and infant mortality rates. Hence, we concluded that maternal mortality has an impact on infant mortality. Simple regression was then applied to identify the effect of maternal mortality on infant mortality. Reducing maternal and child mortality needs a concerted effort that must involve all and sundry. Some notable key interventions that have proved successful in curbing maternal and child mortality globally include, Government and community leaders should inform, educate and sensitize people on maternal health through the mass media. Government should assist by providing skilled health professionals, improving healthcare facilities and promoting awareness of the importance of antenatal care. Finally, education must be given top priority and must be properly funded, especially women education.

**Keywords:** Maternal mortality, infant mortality, regressions analysis, trend, and expos-facto design.

## 1. INTRODUCTION

Maternal and infant mortalities are not uncommon events in several parts of the developing world including Nigeria. Mothers and children are at highest risk of diseases and death. While motherhood is often a positive and fulfilling experience, for too many women, it is associated with ill-health and even death (Olatoye, 2009). The death of a woman during pregnancy or labor is a tragedy that carries a

huge burden of grief and pain, and has been described as a major public health problem in developing countries.

Women have an enormous impact on their families' welfare. Deaths of infants/children under five are peculiar and closely related to maternal health. One million children die each year because their mother has died, and the risk of death of children less than five years doubles if mothers die in childbirth.

More than 25,000 children die every day and every minute a woman dies in child birth. Worldwide, every year about 500,000 women die due to child birth and over 9 million children under age five die mostly from preventable and treatable diseases (WHO, 2010).

Monitoring maternal mortality is difficult due to poor reporting and lack of proper methods to measure actual death rates. Estimating the real figure is difficult as only 31% women deliver in health facilities (Lindros and Lukkainen, 2004).

Under-5 mortality rate is a leading indicator of the level of child health and overall development in any country. Nigeria has witnessed a high trend of childhood mortality due mainly to infectious and parasitic but preventable diseases such as diarrhea, malaria, acute respiratory infections and measles etc.

Maternal mortality is a multi-dimensional problem which does not only affect the family involved but has a great effect on the society as a whole. When a mother dies, the children's chances of reaching adult life is slim. This is majorly due to lack of everyday care and security. The young children may have to take care of themselves and this may in turn affect their school attendance. Lack of proper education may in turn weaken the child's chances of reaching better life standards. (Ogunjimi et al)

This study seeks to ascertain the effect of maternal mortality on infant mortality and determine the trend of maternal and infant mortality rates in Toro Local Government of Bauchi State, Nigeria.

## II. LITERATURE REVIEW

### 2.1 Infant Mortality

The infant and child mortality rates are considered to be sensitive indicators of socio-economic and health conditions prevailing in a community. They are often used to reflect the state of public health, environmental sanitation, socio-economic development and the people's attitude towards the value of human life itself in a country.

The study of infant mortality has been attracting nationwide attention because of considerable depletion of population during the stage of infancy, which has a major contribution of reducing life expectancy of the population. Mahadevan et al. (1986) argue that the bio familial factors are the predominant causes of infant mortality and familio-environmental factors are the important causes of child mortality and also classified the determinants of infant mortality under 12 groups.

Bhattacharya (1999) discussed about the socio-economic factors, which influence child survival in less developed countries, which include the proximate determinants, like infection, food intake, nutritional status, disease control, maternal factors and in Jury.

### 2.2 Maternal Mortality

Different analytical frameworks have been used in studies on maternal mortality. Mojekwu (2005) categorized the causes of maternal deaths into medical factors, health factors, reproductive factors, unwanted pregnancy and socioeconomic factors. Ibe (2008) employed a multistage sampling technique while Okaro et al. (2001) carried out retrospective comparative analysis of maternal deaths for two ten-year periods.

Okonofua, Abejide, and Makanjuola (1992) examined the background factors that predisposed women to maternal mortality at the Obafemi Awolowo University hospital in Nigeria. The study investigated their sociodemographic characteristics, their use of prenatal care, and the incidence of delay in clinical management. The results showed that the maternal deaths involved women who were younger and of poorer socioeconomic status than the women in the control group. Both groups showed an equal lack of prenatal care. However, a higher incidence of delayed treatment was found in the management of the cases of maternal deaths. The study also found that maternal mortality in the study population can be reduced through improved transportation and institutional management, and, on a long-term basis, through the adoption of measures to improve the socioeconomic status of women.

Ujah et al. (2005), in a seventeen-year review of factors contributing to maternal mortality in North-Central

Nigeria found a bimodal pattern of maternal deaths occurring at both extremes of the reproductive age range. They found that the greatest risk of maternal death was among early teenagers and older women. They also found that ethnic group of the women was also an important risk factor for maternal mortality.

Abe and Omo-Aghoja (2008) in a ten year retrospective study of maternal mortality at the central hospital in Benin City, Nigeria documented the number and pattern of obstetric deaths at the Central Hospital, Benin City, over a ten year period and identified common causes of maternal deaths. The leading direct causes of maternal deaths were sepsis, hemorrhage, obstructed labor and pre eclampsia/eclampsia, while the major indirect causes are institutional difficulties and anaemia. The study also found that low literacy, high poverty levels, extremes of parity and non-utilization of maternity services were associated with maternal mortality. The overall maternal mortality ratio (MMR) was 518/100,000. MMR was 30 times higher in unbooked as compared to the booked patients, while 60% of maternal deaths occurred within 24 hours of admission.

### 2.3 Relationship between MMR and IMR

Ogunjimi et al (2012) without healthy mothers, you cannot have healthy children. The issue of maternal health actually begins with the conception of the girl child in the mother's womb. The health of the baby within the mother, the circumstances and events of her birth, her early infancy, childhood, adolescence, early adulthood, her experiences as regards nutrition, child care, education, physical, mental, intellectual and emotional development; all have vital and interdependent roles to play in what we term maternal health. Also children who are raised in physical and emotional nurturing environment will be more likely to survive and less likely to succumb to illness and disease.

Data for this work are collected from secondary sources, which include; relevant textbooks, journals, internet, National Bureau of Statistics (NBS) bulletin and the National Population Commission (NPC).

## III. MATERIALS AND METHODS

### A. Data Description

The data consist of two variables – the maternal mortality ratio (MMR) and the infant mortality ratio (IMR). As stated above, the maternal mortality is a death of a mother that occurred within 42 days of childbirth. Likewise, the expanded definition of late maternal death includes deaths occurring up to 365 days of postpartum, and that

classification is adopted here. In this manuscript, the two types of death are referred to as maternal mortality without any preferred delineation.

Although, deaths during pregnancy are usually included in the ICD-10 definitions of maternal mortality, such deaths were not included here. This is because of the fact that these kinds of events and their timing would be subject to recall and measuring bias.

Infant mortality measures mortality between 0 and 1 year of age. The infant mortality rate will be expressed as the number infant deaths in a given period of 1000 live births during the same period. The total calendar year mortality rate for all infant under 1 year can be separated to ages at death. In this analysis, the infant mortality comprises of all its forms – the perinatal, neonatal and post neonatal mortalities.

### B. Methodology

To establish the relationship between the variables of interest, i.e infant mortality and the maternal mortality, a simple linear regression model is adopted. This is because the model is adequate in determining the effect of maternal mortality (MMR) on infant mortality (IMR).

The general simple linear regression model is of the form:

$$y = \alpha + \beta x + e \quad \dots (1)$$

Where y is called the dependent variable (which in case is taken as the infant mortality) and x the explanatory variable (maternal mortality). The constant  $\beta$  gives the amount, in average value, of the change in y as a result of a unit change in x (Gujarati, 2013).

### IV. ANALYSIS AND RESULTS

To examine the empirical link between a maternal death and infant mortality, we first outline the descriptive breakdown of the two variables used, thereafter, the nature of the relationship existing between them is explored.

**Table 1:** Descriptive Statistics

	<i>n</i>	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
<i>MMR</i>	5	950	1075	1012.80	21.432	47.924
<i>IMR</i>	5	41	75	60.20	6.078	13.590

**Table 2:** Regression Results

Parameter	Least Squares Estimate	Standard Error	t Statistic	P-Value
Intercept	-200.4420	69.7226	-2.8748	0.0638
Slope	0.2573	0.0688	3.7416	0.0333

Correlation Coefficient = 0.907483; R-squared = 82.4%; R-squared (adjusted for d.f.) = 76.5%  
 Standard Error of Est. = 6.5924

**Table 3:** Analysis of Variance showing the effect of maternal mortality on infant mortality.

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	608.421	1	608.421	14.00	0.0333
Residual	130.379	3	43.4597		
Total (Corr.)	738.8	4			

The Regression results in Table 2 shows the results of fitting a linear model to describe the relationship between IMR and MMR. The equation of the fitted model is

$$IMR = -200.442 + 0.257347MMR \quad \dots (2)$$

The R-Squared statistic indicates that the model fitted explains 82.3526% of the variability in IMR. The correlation coefficient equals 0.907483, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 6.5924.

Also, Since the P-value in the ANOVA results in Table 3 is less than 0.05, the Maternal mortality (MMR) has a statistical significant effect on Infant Mortality (IMR) at 95.0% confidence level.

## V. CONCLUSION

The empirical analysis has found out that maternal mortality has a significant effect on infant mortality. The trend analysis also indicates an increasing trend for both maternal and infant mortality rate. Hence we conclude that maternal mortality has an impact on infant mortality.

It can be concluded that, reducing maternal and child mortality needs a concerted effort that must involve all and sundry. Some notable key interventions that have proved successful in curbing maternal and child mortality globally include:

- ❖ Government and community leaders should inform, educate and sensitize people on maternal health through the mass media.
- ❖ Government should assist by providing skilled health professionals, improving healthcare facilities and promoting awareness of the importance of antenatal care.
- ❖ Above all, education must be given top priority and must be properly funded, especially education of women.

## REFERENCES

1. National Bureau of statistics, Nigeria (2017). GeoHive – Nigeria Population Statistics, [www.xist.org](http://www.xist.org) retrieved on 18/03/2018
2. Onumere O (2010). Averting maternal mortality in Nigeria. *thewillnigeria.com*. Retrieved on 19/04/2018.
3. Ogbonaya R, Aminu M (2009). Nigeria: North-West Battling Malnutrition, Child and Maternal Mortality.
4. Pathfinder International (2006). Reproductive Health Knowledge and Practices in Northern Nigeria: Challenging Misconceptions. Abuja Pathfinder International.
5. Pitterson L (2010). Making maternal mortality in Nigeria compelling enough. Media Global voice of the global south.
6. Prata N, Gessesew A, Abaha AK, Holston M, Potts M (2008). Prevention of Post Partum Haemorrhage: Option for Home Births in Rural Ethiopia. *Afr. J. Reprod. Health*, 13(2): 87-95.
7. Saraki T (2008). Nigeria: Maternal Health – More Than Just Reproductive Health. *This Day*. [allafrica.com](http://allafrica.com). Retrieved on 07/04/2018.
8. Shettima K (2007). Nigeria: Motherhood Kills. *This Day*. [allafrica.com](http://allafrica.com). Retrieved on 07/04/2018.
9. Udofia I, Okonofua F (2008) preventing primary post partum hemorrhage in unskilled births in Africa. *Afr. J. Reprod. Health*, 12(1): 7-9.
10. World Health Organization (2010): WHO Proposes Survival for African children. Retrieved from Wikipedia, the free encyclopedia.