Comparative Analysis of Maternal Mortality in Some Hospitals in Enugu State of Nigeria: A Demographic Study

Chinelo Mercy Igwenagu (Ph.D)

Department of Industrial Mathematics/ Applied Statistics, Enugu State University of Science and Technology, Nigeria.

E-Mail: chineloigwenagu@yahoo.com

Abstract: Maternal mortality is one of the major health challenges facing the developing countries like Nigeria, yet families cannot do without childbearing. This paper has carried out a study to determine if mortality depends on type of hospital attended by pregnant mothers. Hospitals were categorized into three; Federal, State and Private owned. Three different categories of hospitals, based on Federal Government, State Government and Private organisation owned, were selected and their average maternal mortality calculated. Using the Analysis of variance statistical tool, P-value of 0.479 (P-value > 0.05) revealed that maternal mortality was the same in the three categories of hospitals. This study therefore suggests that action should be geared towards improving on the available health services irrespective of who owns the hospital, as this will go a long way in improving the health status of mothers.

Keywords: Government owned, Health, Hospitals, Maternal mortality, pregnant mothers, Private owned and variation,

1. INTRODUCTION

Mother and child death is an issue of global concern; as such every individual in every nation is expected to join hands in the fight against this worrisome situation especially in our local communities. To most women, child bearing is a cherished experience which brings with it the joy of being a mother, though the route to child bearing may become associated with scary experiences that make would-be mothers feel frightened the moment they conceive. The scariest of these experiences are maternal mortality and child mortality and these two leave us with pain, regrets and sorrow. As at 2012 Nigeria's maternal mortality ratio was reportedly put at 630/100,000 live birth, making it the 10th worst country in the world (Erewuba, 2013).For many women in Nigeria; a country with one of the highest maternal death rates in the world, the prospect of giving birth can be scary (Elijah, 2012) Having babies in developing nations may be life threatening. Literally every minute, a woman dies from avoidable complications caused by pregnancy, this adds up to approximately half a million fatalities per year. In Nigeria alone, maternal mortality rate reaches up to 3,200 women (number of mothers per 100,000 births dying within 42 days after the childbirth);

According to the U.N. children's organization, UNICEF, more than 150 women die every day in pregnancy-related cases in Nigeria; this gives rise to an average of one death every 10 minutes (UNICEF, 2013). Often times, maternal mortality are said to depend on the type of hospital attended during pregnancy. Some argue that it is better to attend federal government owned hospital, claiming that it is more equipped than the others and can readily handle unforeseen complications. The fact remains that Federal government owned hospitals are not evenly distributed and cannot be enough for the ever growing population of pregnant women who need the facility. Therefore women are left with no other option than to make use of the available facility around them. However, the causes of maternal mortality have been linked to hemorrhage, infections, unsafe abortion, eclampsia and obstructed labour. Studies have shown that 47 per cent of global maternal mortality occurs in Africa with the highest rate in sub-Saharan countries. 85 per cent of all maternal death is direct results of complications arising during pregnancy delivery or puerperium. Another possible cause is the issue of home delivery, which is over 60 per cent available and utilized in the rural areas without skilled attendants. Statistics provided by specialized organization has it that the chances of a woman dying from complications of pregnancy, delivery or puerperium are stated in the world in the following ratios: African is 1:15, Europe is 1:1895, North America is 1:3750 etc. From these statistics, the chance of survival in Africa is thin when compared to other countries (LELIA,1992). This could be attributed to socio-economic conditions and the three delays to provide obstetrical care such as acceptability, accessibility and availability. Maternal mortality really has a multi-dimensional causative, some of which are basically socio-economically determined. The effect could also be multi-facetted, ranging from psychological to pathological or even physical. Following the UNICEF publication titled 'The State of the World's children (UNICEF, opcit). They observed that neonatal mortality accounts for almost 40 per cent of estimated 9.7 million children under-five years deaths and for nearly 60 per cent of infant (under-one year) deaths. This means that a child is about 500 times more likely to die in the first day of life than at one month of age. The largest absolute number of newborn deaths occurs in South Asia; India contributes a quarter of the world total, but the highest national rates of neonatal mortality occur in sub-Saharan Africa. The situation is not different in Nigeria. The World Health Organisation (WHO) and Nigeria government have made progress with the introduction of some programs aimed at reducing mortality, one of such is Expanded Program on Immunization (EPI) now known as National Program on Immunization (NPI) (Abouzahr et al, 1991).This program focuses on immunizing all infants and mothers, to improve their health condition. A common factor in these deaths is the health of the mother. Each year more than 500,000 women die in childbirth or from complications during pregnancy. Awareness has shown that babies whose mothers have died during childbirth have a much greater chance of dying in their first year than those whose mothers remain alive. Ninety nine percent (99 per cent), of maternal and newborn mortality occurs in the developing world, where more than 50 per cent of women still deliver without the assistance of skilled health personnel. This is a powerful statement about inequity and access to quality care (Harrison, 1988). Considering causes of death, Malaria is considered as the highest cause of death all over Nigeria, therefore considering the health of mothers and their new born in Nigeria, it is important to mention that racial differences play a significant role towards immunity to disease. Eighty percent of

maternal deaths are caused by direct obstetric causes such as hemorrhaged, infection, hypertensive disorders of pregnancy and complications of unsafe abortion. And for every woman who die from complications related to childbirth, approximately 20 more suffer injuries, infections and disabilities that are usually untreated and ignored, and that can result in life-long pain and social and economic exclusion. Most of these complications cannot be predicted and prevented (Ogunniyi et al, 1996). All pregnant women are at risk and can develop complications at any time during pregnancy, delivery and after delivery. However, women and families can learn how to avoid unplanned pregnancies, and if pregnant, they can learn the importance of receiving antenatal care, how to identify danger signs, plan for emergency referrals, and choose safe birthing options. When problems arise, and referral is timely, complications can be treated in health facilities that are adequately equipped, and fully staffed with competent health workers. This can only be achieved if pregnant mothers attend good hospitals; therefore it becomes pertinent to look at the category of hospitals that can carry out this important task. Where maternal mortality is relatively high, the excess is likely to be due to a high mortality associated with hemorrhage and infection; therefore reductions in maternal mortality are most likely to come from reductions in occurrence of these complications. Evidence from both developed and developing countries suggests that deaths associated with hypertensive disorders of pregnancy are the most difficult to prevent. More rigorous assessment of interventions designed to prevent these deaths is urgently required. During the past decade, UNICEF has taken a holistic and rights based view of maternal health. To this end, UNICEF has been working to enhance the role of women, prevent child marriage, increase girls' education, educate and abolish Female Genital Mutilation/Cutting and support the development of adolescent life skills. UNICEF supports improved antenatal care (Tetanus Toxoid, Insecticide treated nets, Intermittent Presumptive Treatment, nutrition), Prevention of Mother to Child Transmission of HIV (PMTCT), increased women's access to HIV treatment. Depending on country needs, UNICEF also supports training of skilled birth attendants (SBA), Emergency Obstetric Care programmes and more recently, improved newborn and post natal care initiatives. Recent evidence, highlighted in the Lancet series on child survival (2003), newborn survival (2005), maternal survival (2006) and on reproductive health (2006), reveal that a package of interventions, if implemented at scale, could substantially reduce both newborn and maternal mortality. Some of these interventions, particularly for saving mothers lives, need to take place in a Basic or Comprehensive Emergency Obstetric Care (BEmOC /CEmOC) facility, many, can take place in the home by a community health worker or visiting nurse. A study in Matlab, Bangladesh, has provided evidence favouring a community-based maternity-care delivery system. 3 years of this programme coincided with a significant reduction in direct obstetric mortality compared with the 3 years before the programme, showing that intervention can also be done through awareness campaign (Ronsmans et al, 1997). Being aware of these, should maternal mortality still be linked with the category of hospital attended to by pregnant mothers? To answer this question, this study is designed to take a look at the number of pregnant mother admitted to deliver in these categories of hospital respectively and the mortality recorded in each of the hospitals.

2. METHODOLOGY

Since the study is comparing the mortality variation in the three categories of hospital in Enugu State, Analysis of variance statistical tool is considered appropriate. Hence, it becomes pertinent to look at the assumptions of this tool. As is discussed by Hogg and Ledolter, (Hogg, et al, 1987); the assumptions that underpin the ANOVA procedure are:
(1) The values for each level follow a Normal (a.k.a. Gaussian) distribution, and
(2) The variances are the same for each level (Homogeneity of Variance).
(3) The observations must be independent. (Anderson et, 2003).
Considering Central Limit Theorem, the sample size in each of the three hospitals is greater than thirty; therefore it could be assumed that the sample size is adequate for the assumption of normality. To carry out this research in Enugu State of Nigeria; the state has one Federal government owned hospital, one State owned hospital and several other hospitals owned by private organisations and individuals, therefore it becomes imperative to consider one hospital from each of the categories. Considering three different hospitals; Federal government owned hospital, University of Nigeria Teaching Hospital (UNTH), State government owned hospital, Enugu State University Teaching Hospital, Parklane (EUTH) and private owned hospital Annunciation Specialist Hospital (ASH). Data on the number of patients who were admitted and delivered and number of maternal deaths were recorded for a period of ten years from 1999- 2008. The records were as shown on the Tables 1 and 2 below;

TABLE 1
MATERNAL MORTALITY FROM THREE DIFFERENT HOSPITALS FROM 1999-2008

Year	UNTH	ETH	ASH
1999	21	-	6
2000	13	-	14
2001	19	1	8
2002	23	-	8
2003	10	3	9
2004	23	16	11
2005	10	-	10
2006	15	7	13
2007	12	8	6
2008	-	7	19
Total	146	42	104
Average (μ)	14.6	4.2	10.4

TABLE 2
NUMBER OF ADMITTED PREGNANT PATIENTS IN THE THREE HOSPITALS FROM 1999-2008

Year	UNTH	ETH	ASH
1999	648	-	177
2000	867	-	192
2001	952	774	190
2002	917	798	193
2003	579	1040	202
2004	686	1271	201
2005	690	1233	206
2006	600	1349	247
2007	842	1515	261
2008	-	2233	408
Total	6781	10213	2277
Average (μ)	678.1	1021.3	227.7

To compare the variation in the average maternal mortality in the three different hospitals, using Analysis of variance tool;
The hypothesis is stated thus;

$H_0 : \mu_1 = \mu_2 = \mu_3$ (implying that the average mortality in the three hospitals are the same)

Vs

$H_A : \mu_1 \neq \mu_2 \neq \mu_3$ (implying that the average mortality in the three hospitals are not the same)

TABLE 3
ONE WAY ANOVA FOR MATERNAL MORTALITY

variables	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1363.572	2	681.786	.764	.475
Within Groups	24995.897	28	892.711		
Total	26359.468	30			

Table 3 above shows the SPSS output which indicates F – test of 0.764 with P-value of 0.479 showing that the average mortality in the three hospitals is the same.

3. ANALYSIS

From table 1 above, the average mortality from the three hospitals stands at 14.6, 4.2 and 10.4 respectively. From table 2, the average number of mothers who were admitted and delivered in the three hospitals was 678.1, 1021.3 and 227.7 respectively. Comparing the data on tables 1 and 2, it was observed that out of approximately 678 mothers who delivered in the federal government owned hospital, 15 of them died, also out of approximately 1021 mothers who delivered in the State government owned hospital, approximately 4 of them died. Finally out of approximately 228 mothers who delivered in the Private owned hospital, approximately 10 of them died. Table 3 shows that the test is significance with p-value of 0.479, this leads to the acceptance of the null hypothesis, that the average mortality in the three hospitals are the same. Therefore there is no need for multiple comparison of the average mortality in the three hospitals.

4. CONCLUSION

From the data on tables 1 and 2 above it can be observed that out of an average of 678 pregnant mothers who were admitted and delivered in the federal government hospital approximately 15 of them died, out of an average of 1021 pregnant mothers who delivered in the State government hospital approximately 4 of them died and out of approximately 228 mothers who delivered in the Private owned hospital, approximately 10 of them died. Clear observation will reveal that mortality does not depend on the number of women who are exposed to pregnancies. The result of the analysis based on this study has shown that maternal mortality is independent of the hospital from which services are received. Based on these findings, it is recommended that improved services be provided for mothers irrespective of where they seek for medical/ antenatal care.

REFERENCES

[1] P.I. Erewuba.Doctors-raise-alarm-over-high-maternal-mortality.www.nigerianpilot .*com.* Accessed 21st August, 2013.
[2] S. Elijah. Nigeria Tackles Maternal Mortality. http://www.voanews.com/content/nigeria-tackles-maternal-mortality/1534984.html accessed 10th march 2013

[3] UNICEF. Maternal *Health in* Nigeria. *http://www.maternal*

health.org/nigeria/maternal-health-in-nigeria/index.html. Accessed 21st August, 2013.

[4] D. LELIA. Maternal mortality associated with hypertensive disorders of pregnancy in Africa, Asia, Latin America and the Caribbean BJOG: *An International Journal of Obstetrics & Gynaecology 99(7) 1992,547–553,*

[5] C Abouzahr, E. Royston. *Maternal mortality*: A global fact book. Geneva; World Health Organisation**,** 1991.

[6] K.A Harrison. Maternal mortality-a sphaper focus on a major issue of our time. *Trop J.Obstet Gynaecol ,1,9-13,* 1988.

[7] S.O Ogunniyi , B .L Falayemi. Trend in maternal deaths in Illesa, Nigeria from1977-1988 *West African J Med 10, 1996, 400-404*

[8] C .Ronsmans , A.M. Vanneste , J Chakraborty and J van Ginneken. Decline in maternal mortality in Matlab, Bangladesh: a cautionary tale. *Lancet , 350(9094), 1997, 1810-1814*

[9] R.V. Hogg and J. Ledolter. Applied Statistics for Engineers and Physical Scientists. Macmillan Publishing Company, NY. 1987.

[10] D.R Anderson, D.J Sweeney and T.A. Williams. *Modern Business Statistics with Microsoft Excel.* First edition, published by Melissa Acuna. pp 508-521, 2003