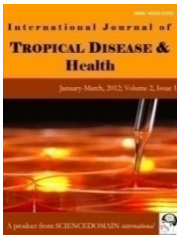

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Pattern of Neonatal Mortality in a Teritiary Health Facility in Umuahia, South East, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author ECB conceived of the study, participated in the design of the study, was the main responsible for collection and drafting of the manuscript. Author EUO was involved in the study design and co- collected the data. Statistical analysis was done by authors CBF, KFC, CJM, CN and UIK were involved in the revising of the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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ABSTRACT

Background: Neonatal mortality rates are highest in Sub-Saharan Africa, with Nigeria inclusive. And so the aim of the current study was to audit the pattern of neonatal deaths.
Study Design: A cross sectional retrospective descriptive study was undertaken.
Place and Duration of Study: The study was carried out at the Newborn Special Care Unit (NBSCU) of Federal Medical Centre (FMC), Umuahia with a review of the admissions and mortality register between 2000 and 2010.
Methods: A review of the admissions and mortality register of the NBSCU between 2000 and 2010 was undertaken. Data extracted from the register included socio-demographic variables, birth weight, diagnosis/cause of death, duration of hospitalization, place of delivery (inborn/out-born), source of referral.

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Results: Total admission over the period was 2,756 comprising 1541 (55.9%) males and 1215 (44.1%) females. Total deaths was 440, comprising 235 (53.4%) males and 205 (46.6%) females. An overall case fatality rate of 16.0% was reported in the current study with mean age at death being 4.7± 6.0 days (0.01- 28 days).
Majority of the dead cases were out-born, 263/440 (59.8%) compared to in-born, 177/440 (40.2%).
Forty two percent (185 cases) of the deaths occurred with 24 hours of hospitalization while 25.9% (114 cases) passed on after 72 hours of admission.
The leading probable direct causes of neonatal deaths were birth asphyxia (141), preterm delivery (133), neonatal sepsis (58), severe neonatal Jaundice (41), and neonatal tetanus (14).
Most deaths (42.0%) occurred in the first 24hours irrespective of the cause of death.
Conclusion: High rate of neonatal mortality, most of which are largely preventable as observed in the index study still abound in our locale.
High cost effective maternal and newborn interventions could be applied even at community levels where most of the deliveries occur to save lives of the newborns.

Keywords: Neonate; mortality rate; pattern.

1. INTRODUCTION

Neonatal mortality is increasingly important because the proportion of under - five deaths that occur during the neonatal period is increasing as under five mortality declines [1].

Every minute seven newborn babies die worldwide (415 newborn babies every hour) [2].

Nearly 4.7 million mothers, newborns and children die each year in Sub-Saharan Africa; [1] 1,208,000 babies die before they reach one month of age [3]. The vast majority of neonatal deaths occur in South Asia and Sub-Saharan Africa [4,5]. Half of the 3.3million neonatal deaths in year 2009 were in five countries: India, Nigeria, Pakistan, China and Democratic Republic of Congo.

Overall neonatal mortality constitutes about 40% of under– 5mortality and approximately 57 percent of infant mortality [4]. The neonatal mortality rate in Nigeria is 40 per 1000 live births and about 33 per 1000 live births overall in Africa [6].

Various case - fatality rates have been reported by different researchers in Nigeria ranging from 19.4 percentage [7] to 37.6 percentage [8] among hospitalized newborns (audit) and in a rural community respectively.

The fourth millennium development goal (MDG 4) aims to reduce mortality rate in children under the age of 5years (U5MR) by two thirds between 1990 and 2015. Infants less than 1 month old account for about 40% of deaths of children under the age of 5years globally [9]. Achieving MDG4 will therefore need to include reducing deaths during the neonatal period [10].

With less than 2 years left to achieve the United Nations Millennium Development Goals (MDGs) for maternal and child health, most African countries are currently unlikely to meet their MDG targets.

The three main causes accounting for 88% of newborn deaths in the region include: Infections (including sepsis/pneumonia, tetanus and diarrhoea); intra-partum related conditions (birth asphyxia); and preterm births [4]. Up to 90% of newborns who die are low birth weights (less than 2500grams) including preterm babies who have the greatest risk of deaths.

It is unfortunate that most of these deaths are preventable with such simple actions/care like warmth, feeding, hygiene and early treatment of infections [11]. Worldwide, birth asphyxia, birth trauma, infections, prematurity, and malformations, are the major causes of early neonatal deaths while sepsis, pneumonia, meningitis, diarrhoeal disease and tetanus account for most of the mortality during the rest of the neonatal period [5].

High neonatal mortality rate remains a problem in developing countries including Nigeria where the economic situation and poor planning of health services have led to little appreciable advancement in neonatal care [12]. Neonatal mortality is therefore a reflection of the effectiveness of obstetric and neonatal services in any particular community [13].

Adequate training and retraining of personnel involved in deliveries with provisions of equipment required for neonatal resuscitation of newborns with intra-partum asphyxia has shown a significant decrease in deaths attributable to birth asphyxia [10,14,15].

Evidence from several observational studies shows that facility – based basic neonatal resuscitation may avert 30% of intrapartum- related neonatal deaths [16].

However, other interventions to reduce neonatal deaths should include improvements in obstetric care and immediate care of the newborn afterbirth [17]. It has been reported that basic emergency obstetric care (providing antibiotics, oxytocics, anticonvulsants, removal of placenta and retained products, assisted vaginal delivery and newborn care in healthcare centres) and comprehensive emergency obstetric care (blood transfusion caesarean sections, care to sick and low birth weight newborns in district hospitals) and skilled birth care can reduce intra-partum deaths by 25 – 85% [17,18].

It is pertinent therefore that periodic audit of neonatal admissions and deaths be carried out to determine the impact of current preventive measures and newer challenges to neonatal survival, so that effective preventive measures could be applied.

The aim of the current study was to audit the neonatal deaths at the newborn special care unit, of Federal Medical Centre, Umuahia over a ten year period, so that priority areas requiring improved planning of neonatal services could be identified.

2. MATERIALS AND METHODS

This study was undertaken in the newborn special care unit (NBSCU) of Federal Medical Centre, Umuahia, Abia State, South East, Nigeria.

The Centre serves as a major referral centre for patients from within Abia State and also some surrounding states of Imo and Rivers. The newborn babies basically are referred in house from the Department of Obstetrics and Gynaecology and out-born (those babies born before arrival to the hospital). The NBSCU has three sections: for inborn (delivered in FMC, Umuahia), out-born (referrals) and an isolation section for very ill-newborns all geared

towards reduction of cross infection within the nursery. About 1500 deliveries are recorded annually in the Centre.

It is a hospital- based audit analyses of neonatal admissions outcome.

Data on newborns that died during the period under review (from 1st January, 2001 to 31st December, 2010) were extracted from the admissions/mortality register.

Data extracted from the case record files included: age on admission (in hours), gender, place of delivery (inborn/out-born), diagnosis(es) at presentation, cause of death, duration of hospitalization and age at death.

The disease conditions were categorized according to the 2000 Global Burden of diseases.[19] Subsequently the following case definitions were employed to classify the different causes of death: babies born before 37completed weeks of gestation are generally regarded as preterm delivery while birth asphyxia is defined as history of failure or delayed onset of spontaneous respiration after birth or 5 minutes Apgar score < 7, or history of delayed cry or need for resuscitation for > 10minutes in full term babies [18,20]. A case for definition of neonatal tetanus was a neonate with normal ability to suck and cry during the first 2days of life and who between 3 and 28 days of age becomes stiff or has spasms [21], severe anaemia: haemoglobin levels (g/L) of <80% [22]; and clinical significant hyperbilirubinaemia in the neonatal period has been defined as total serum bilirubin levels >95th percentile for age in hours [23]. Neonatal sepsis was as defined by Zaidi andcolleagues [24], while criteria for diagnosis of neonatal meningitis was as advanced by Hristeva et al. [25] Case definition for pneumonia was as applied by Rieterer et al. [26].

Usually the registrar on duty admits and first assesses the presenting newborn and is subsequently reviewed by a senior registrar and the supervising consultant.

Socioeconomic classification of the study population was not ascertained as most of the case record files did not capture information on parental educational backgrounds and occupation/employment status.

Ethical clearance for the study was sought from Research and Ethics Committee of Federal Medical Centre, Umuahia.

The data retrieved were collected with the aid of a structured study proforma and entered into a personal computer and analyzed wing SPSS Version 18. Data were arranged in contingency tables and associations were tested for statistical significance using chi- square. The level of significance was set at 5%.

3. RESULTS

Total number of neonatal admissions over the period was 2,756 comprising 1541 (55.9%) males and 1215 (44.1%) females.

Total number of deaths was 440, comprising 235 (53.4%) males and 205 (46.6%) females. The neonatal case - fatality rate during the period of review was therefore 16.0 percent

Mean age at death was 4.7 ±6.0 days (0.01-28 days). One hundred and eighty five (42.0%) of the deaths occurred within the first 24 hours, 141 (32.1%) died after 24 hours, but within 72 hours while 144 (25.9%) died after 72 hours, but within 28 days.

Two hundred and sixty three (59.8%) were out-born indicating that place of confinement of the mothers had a significant effect on outcome of delivery $(x^2 = 55.33, p < 0.01)\ as$ shown in Table 1.

One hundred and forty one (53.6%) of the out born patients who died were delivered in secondary health facilities including private hospitals, 69 (26.2%) were born in primary health centres and maternity homes, 31 (11.8%) were delivered at home while 2 (0.8%) were delivered in prayer houses. More than half of the babies (294) who died were delivered through spontaneous vertex delivery, 97 by emergency caesarean section, while 26 had no record of method of delivery as shown Table 1.

Out of the 440 neonates that died, 400 had their birth weight recorded of whom 52.8% (211) were low birth weight.

Table 1 shows the demographic characteristics of neonates during the period of review.

Table 1. Outcome by demographic and other parameters among 2756 neonates admitted at the Federal Medical Center, Umuahia, South East Nigeria

Parameters	Survived N = 2316	Died N = 440	Total	P – value
Birth weight category *:				
< 2500g	683	211	894	< 0.01
≥ 2500g	1532	189	1721	< 0.01
Sex:				
Male	1306	235	1541	< 0.01
Female	1010	205	1215	< 0.01
Facility of delivery:		31	31	
Home		69	69	
PHC		141	141	
SHC		174	174	
THC		2	2	
Prayer House		23	23	
Others				
Duration of hospitalization:				
< 24 hours		185	185	
> 24 hours		255	255	

*KEY: *Babies whose birth weights were not available were excluded.*

The leading probable direct causes of neonatal deaths were complication of birth asphyxia (141), preterm delivery (133), neonatal sepsis (58), severe neonatal jaundice (41), and neonatal tetanus (14) (Table 2).

As shown, most of the deaths (42.0%) occurred in the first 24 hours of life irrespective of the cause of death. Sixty five (46.1%) of the 141 deaths due to complication of birth asphyxia occurred within the first 24 hours of life so also 51 (38.3%) of the 133 deaths due to preterm delivery.

Table 2. Probable direct causes of death by time of death among 440 neonates admitted at the Federal Medical Center, Umuahia, South-east Nigeria

Probable direct cause of death	<24 hours	≥24 hours	Total (% of grand total)
Complications of birth asphyxia	65	76	141 (32.0)
Preterm birth	51	82	133 (30.2)
Neonatal sepsis	23	35	58 (13.2)
Severe neonatal jaundice	20	21	41 (9.3)
Tetanus	5	9	14 (3.2)
Neonatal meningitis	5	7	12 (2.7)
Meconium aspiration syndrome	6	2	8 (1.8)
Surgical conditions	5	3	8 (1.8)
Multiple congenital malformations	2	5	7 (1.7)
Pneumonia	1	4	5 (1.1)
Severe anaemia	1	2	3 (0.7)
*Miscellaneous	3	7	10 (2.3)
Grand total	187	253	440

**= Haemorrhagic disease of the newborn, cyanotic congenital heart disease, HIV-related illness, Birth trauma*

4. DISCUSSION

The overall neonatal case fatality rate of 16.0% observed in the current study is quite high. It is however, higher than the, 13.0% [27] reported in Ilesha, South-West Nigeria and lower than 19.4% [7] in a similar study in Nnewi, South-East Nigeria. All three studies are hospital based and do not represent the actual magnitude of the problem in the general population. However, the emphasis of the current study is to highlight the pattern of neonatal mortality in our locale from a tertiary hospital point of view and sensitize the authority to review the existing facilities and program linked with newborn services for optimal service to save newborn lives.

Majority of the cases occurred among the males, in conformity to other similar reports [7, 28,29,30].

It is likely that the higher risk of mortality in male neonates may be due to large proportions of neonatal deaths occurring in the first week of life, which is the time when gender differences in neonatal mortality are more pronounced [31]. The biological factors that have been implicated with this increased risk of neonatal deaths in male infants include immunodeficiency [30]. increasing the risks of infectious diseases in males, late maturity[21] resulting in a high prevalence of respiratory diseases in males, and congenital malformations of the urogenital system [32].

Case fatality rate was lower among babies delivered in the hospital (inborn) compared to the out-born (born before arrivals, or referred babies) confirming previous reports by other workers [7,33].

Some of the babies could have been transported from rural areas with challenges of hypothermia and contamination before getting to the Facility and hence increasing mortality in them.

In the current study it was observed that some of the mothers had the deliveries of their babies conducted either at homes or prayer houses by traditional birth attendants and in some cases by auxiliary nurses/midwives. This practice has been associated with increased morbidity and mortality in the newborns [34]. The practice could either be due to poverty or failure of the health system. Birth weight has been shown to be a strong predicator of newborn survival/outcome. In the current study low birth weight was associated with higher mortality as in other similar studies [7.8,33].

The leading probable direct causes of neonatal deaths in our series included birth asphyxia, preterm delivery, sepsis, jaundice and tetanus and mirror other reported pattern of neonatal mortality elsewhere in Nigeria [7,27,34,35] and indeed Sub-Saharan Africa [36].

Most of these causes are largely preventable with simple actions/care. It was observed that most of the mortality occurred within 24hours of hospitalization, majority of which were due to perinatal asphyxia. It has been shown that basic training on newborn resuscitation skills and proper newborn resuscitation immediately after birth has proved to reduce mortality among babies born with asphyxia by up to 40% [14,15,16,37].

However, there was no significant statistical difference in the age at death with respect to the probable cause of death.

Also, prematurity was found to be the second most important cause of death in the current study. Management of premature babies requires highly specialized equipment, highly trained personnel and financial support [38,39]. Despite the challenges of meeting these in our environment, some specific and simple measures have been identified which could be implemented to reduce deaths related to low birth weight and prematurity in low income countries [40,41,42] among others. These include prophylactic use of steroids during premature labour, antibiotics for premature rupture of membranes, early breastfeeding, treatment of infections, Kangaroo mother care, prevention of hypothermia. All these if effectively implemented and sustained will help in reducing the neonatal mortality rate in our setting.

Globally, neonatal tetanus accounts for 7% of neonatal deaths but accounts for up to 20% in Nigeria, one of the 27 countries that account for 90% of the global burden of the disease [9,43,44]. It is not surprising therefore that some babies in our series passed on as a result of neonatal tetanus.

Neonatal tetanus has been identified as a disease of poverty, the uneducated and adverse social and environmental circumstances [45]. All these variables for propagation of tetanus infection are in operation in our locale, and hence the need to highlight it and ensure that effective tetanus vaccination and early and appropriate prophylaxis of at risk neonates is the rule. We noted with interest that 3.8% of 400 who born by elective CS died. Though we could not get the records to actually ascertain the cause of death, however in Nigeria most elective caesarean section due to a maternal secondary indicators such as Diabetes mellitus, hypertension in pregnancy, twin pregnancy are carried out at 37-38 weeks were associated with significantly higher rates of admission to the neonatal care unit. This could lead to increased morbidity and mortality in the newborns [46]. Okeke et al in Nigeria noted that elective caesarean delivery should be advised at or after 39 weeks of gestation unless there is evidence of fetal lung maturity. This is because At 39 completed weeks of gestation, elective caesarean delivery is associated with better fetal outcomes than at 37-38 weeks of completed gestation [46].

Furthermore we noted from this study that 73.5% of 400 who were born by SVD died. This institution serves as a referral centre to all the health centers to surrounding villages and towns with poorly developed road networks and inadequate transport system. Some of the babies could have been transported from rural areas with challenges of hypothermia and contamination before getting to the Facility and hence increasing mortality in them.

5. LIMITATION

We were unable to retrieve data from case record files of the subjects that survived.

Medical Record keeping had been a serious issue in some hospitals in Nigeria. For instance Afolabi [47] noted that record management practice in Nigeria has a number of problems which may include insufficient skilled and experienced record management personnel and possibly, low priority of record management in the scheme of things. This was corroborated by Awe [48] who viewed the problems of record management from the perspective of governments, hospital management and the staff as their action and activities can lead to effective or ineffective records management. Hospitals are information intensive enterprises; hospital managers must understand that only those with a strong information management system can have a smooth running of the enterprise [49].

In health care organizations, medical record is the principal repository of a patient's health care information, so every health organization needs a medical records department that is organized and staffed to provide adequate information [49].

5. CONCLUSION

Neonatal deaths resulting mainly from preventable causes namely birth asphyxia, neonatal infectious including tetanus, prematurity/low birth weight among others are still the leading causes of neonatal mortality in our setting. Neonatal mortality rate is a critical index of under 5 mortality [4]. And significant reduction in neonatal mortality will go a long was in ensuring that Nigeria meets the MDG 4 for child health. Knowledge of the existing pattern of neonatal mortality is key to determining which measures to be applied to reverse the unacceptable trend of newborn deaths in our setting.

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CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. UNICEF. State of the World's children: Levels and trends in child mortality. Report 2011: Estimates developed by the UN Inter – Agency Group for child mortality estimation. Available @: http://www.childinfo.org/files/child mortality_Report_2011.pdf. Accessed 8 August, 2013.
2. Stanton C, Lawn JE, Rahaman H, Hill K. Still birth rate: delivering estimates in 190 Countries. Lancet. 2006;377:1487–14994.
3. Bryce J, Requejo JH, editors. Tracking progress in maternal, newborn and child survival: The 2010 Report. New York: UNICEF.
4. Black RE, Cousen S, Johnson HL, Lawn JE, Rudon L, Bassani DG…. Mather C, Global, regional, and national causes of child mortality in 2008: A systematic analysis. Lancet. 2010;9730:1969-1987.
5. WHO. (20IIB). Indicator compendium. http://www.who.int/whosis/indicators/en).
6. The state of the World's children. United Nations Children's Fund: neonatal mortality rate. Last updated in UN Data: 9 April, 2012.
7. Ezechukwu CC, Ugochukwu EF, Egbuonu I, Chukwuka JO. Risk factors for neonatal mortality in a regional tertiary hospital in Nigeria. Nigerian Journal of Clinical Practice 2004;7(2):50–52.
8. Lawoyin TO. Risk factors for infant mortality in a rural community in Nigeria. The Journal of the Royal Society for the Provision of Health 2001;121:114–118.
9. Lawn JE, Cousen S, Zubpanj. 4 Million neonatal deaths: when? where? why? Lancet. 2005;365:891–900.
10. Velaphi S, Rhoda N. Reducing neonatal deaths in South Africa- are we there yet, and what can be done? SA Journal of Child Health. 2012;6(3):67 – 71.
11. Lawn JE, Wilczynska – ketende K, Cousens SN. Estimating the causes of 4 million neonatal deaths in the year 2000. Int J Epdiemiol. 2006;35:706–718.
12. World Health Organization. Maternal and newborn health/safe motherhood estimates. Geneva: World Health Organization; 1997.
13. World Health Organization. Perinatal mortality; a listing of available information. Geneva: World Health Organization; 1996. FRH/MSM/96.7.
14. Carlo WA, McClure EM, Chomba E, Chakraborty H, Hartwell T, Harris H, Lincetto O, Wright LL. Newborn care training for midwives and neonatal and perinatal mortality rate in a developing country. Pediatrics. 2010;126(5):e1064-e1071.
15. Perlman JM, Wyllie J, Kattwinkel J, Atkins DL, Chameldes L, Hazinski MF, Morley C, Richmond S, Simon WM, Singhal N, Szyld E, Tamura M, Velaphi S. Neonatal resuscitation. International Consensus on cardiopulmonary Resuscitation and emergency cardiovascular Care Science with Treatment recommendation. 2013copyright, American Academy of Pediatrics; 2010.

16. Wall SN, Lee ACC, [..], Lawn JE. Neonatal resuscitation in low- resource settings: what, who, and how to overcome challenges to scale up? Int J Gynaecol Obstet. 2009;107(suppl I):S47-S64.
17. Lee AC, Cousen S, Darmstadt G, etal. Care during labour and birth for the prevention of intrapartum-related neonatal deaths: a systematic review and Delphic estimate of mortality effect. BMC Public Health. 2011;11(Suppl 3):S10.
18. Memon S, Shaikh S, Bibi S. To compare the outcome (early) of neonates with birth asphyxia in relation to place of delivery and age at time of admission. Journal of Pakistan Medical Association. 2012;62:1277-1281.
19. WHO: National Burden of Diseases Studies. A practical Guide. 2nd Edition; 2001. WHO Geneva – Table 4.1: GBD cause categories: 18- 19.
20. Shreen N, Nghar N, Mollah AH. Risk factors and short term outcome of birth asphyxiated babies in Dharka Medical College Hospital 2009; 33(3):83-89.
21. WHO – Recommended Standards for Surveillance of selected vaccine – preventable diseases. WHO/V & B/03.01. Geneva: WHO;2003.Available @: http://www.who.int/vaccines-documents/DOCSPDF06/843.pdf. Accessed: August 9th, 2013.
22. Rastogi T, Mathers C. Global burden of iron deficiency anaemia in year 2000.
23. Bhutani VK, Johnson I, Sivieri EM. Predictive ability of a predischarge hour- specific serum bilirubin for subsequent significant hyperbilirubinemia in healthy term and near-term newborns. Pediatrics. 1999;103:6-14.
24. Zaidi AKM, Ganata HA, Syed S, Cousens S, Lee ACC, Black R, Bhutta ZA, Lawn JE. Effect of case management on neonatal mortality due to sepsis and pneumonia. BMC Public Health. 2011;11(Suppl 3):513.
25. Hristeva L, Booy R, Bowler I, Wilkinson AR. Archives of Diseases of Children. 1993;69:14–18.
26. Reiterer F. Neonatal pneumonia. Available @: http://dx.doi.org/10.5772/54310. Accessed: August 9th, 2013.
27. Owa JA, Osinaike AI. Neonatal morbidity and mortality in Nigeria. India J Pediatr 1998;65(3):441 449.
28. Titaley CR, Disley MJ, Agho K, Roberts CL, Hall J. Determinants of Neonatal mortality in Indonesia. BMC Public Health. 2008;8:232.
29. D' Souza S, Chem LC. Sex differentials in mortality in rural Bangladesh. Population and Development Review. 1980;6(2):257–270.
30. Green MS. The male predominance in the incidence of infectious diseases in Children: a postulated explanation for disparities in the literature. International Journal of Epidemiology. 1997;2(2):381–386.
31. Shakya K, McMurray C. Neonatal mortality and maternal health care in Nepal: Searching for patterns of association. Journal of Biosocial Science. 2001;33(1):87–101.
32. Alonso V, Fuster V, Luna F. Causes of neonatal mortality in Spain (1975 – 1998): influence of sex, rural urban residence and age at death. Journal of Biosocial Science. 2006;38:537–551.
33. Onwuanaku CA, Okolo SN, Ige kO, Okpe SE, Toma BO. The effects of birth weight and gender on neonatal mortality in North Central Nigeria. BMC Research Notes. 2011;4:562.
34. Lawoyin TO, Onadeko MO, Asekuu-Olarimoye EO. Neonatal mortality and perinatal risk factors in rural South-Western Nigeria: a community based prospective study. West Africa J Med. 2010;29:19–23.

35. Oladokun RE, Orimadegun AE, Olowu JA. A ten –year review of neonatal deaths in the special care baby unit at the University College Hospital, Ibadan. Nigeria Journal of Paediatrics. 2004;31:119 – 125.
36. Nmbaga BT, Lie RT, Olomi R, Mahande MJ, Kvale G, Dalt-viet AK. Cause-specific neonatal mortality in a neonatal care unit in Northern Tanzania: a registry based cohort study. BMC Pediatrics. 2012;12:116.
37. Dawodu AH, Effiong CE. Neonatal mortality: effects of selective interventions. Pediatr. 1985;75:51–57.
38. Wall SN, Lee ACC, Carlo W, Goldenberg R, Niermeyer S, Darmstadt GL, Keenan W, Bhutta ZA, Perlman J, Lawn JE. Reducing intra-partum related neonatal deaths in low and middle income countries – what works? Semin Perinat. 2010;34:395–407.
39. Carlo WA, Gnidar SS, Jehan I, Chomba E, Tshefu A, Garces A, Parida S, Althabe F, Moclure EM. Derman RJ, Goldenberg RL, Bose C, Krebs NF, Panigrahi P, Buekens P, Chakraborty H, Hartwell T, Wright LL. First breath study group: high mortality rate for very low birth weight infants in developing countries despite training. Pediatr. 2010;126:e1072 – e1080.
40. Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L. Evidence based, cost effective interventions: how many newborn babies can we save? Lancet. 2005;365(9463):977–988.
41. Vinod PK. The current state of newborn health in low income countries and the way forward. Semin Fetal Neonatal Med. 2006;11:7–14.
42. Barros F, Bhutta Z, Batra M, Hansen T, Victoria C, Rubens C, Group IGR. Global Report on preterm birth and still birth (3 of 7): evidence for effectiveness of interventions. BMC Pregnancy and Childbirth. 2012;10(Suppl 1):53.
43. Federal Ministry of Health Situation Analysis. National Child Health Policy. Nigeria: Federal Ministry of Health; 2005.
44. National Planning Commission, UNICEF. The Main causes of mortality and morbidity among children and women. In: children's and women's rights in Nigeria; a wake-up call: situation assessment and analysis. New York: UNICEF. 2001;40–54.
45. Oruamabo RS. Neonatal tetanus in Nigeria: does it still pose a major threat to neonatal survival. Arch Dis Child. 2007;97:9–10.
46. Okeke TC, Onah N, Ikeako LC, Ezenyeaku CCT, Nwogu-Ikojo E. Maternal and Fetal Outcome of Elective Caesarean Section at 37–38 Weeks versus 39 Completed Weeks of Gestation in Enugu, Southeast Nigeria. American Journal of Clinical Medicine Research. 2013;1:32-34.
47. Afolabi M. Educational training archivists and record managers in Africa: annual conference procedure of the Society of Nigerian Archivists. 1999;Lagos:SNA:61-67.
48. Awe FA. Principles and practice of schools record management: Paper presented at a records management course in Lagos State Public Service 2000; Magodo: Staff Development Centre.
49. Healthinformantics. Medical records management; 2006. Available: http://www.irmt.org/documents/educ_training/public_sector_rec/IRMT_hospital_recs.pdf. Assessed on 28th August 2013.

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