

NEONATAL MORBIDITY AND MORTALITY IN CALABAR, NIGERIA: A HOSPITAL- BASED STUDY

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ABSTRACT

Background: The morbidity and mortality pattern amongst neonates admitted into the University of Calabar Teaching Hospital were reviewed from 1st June 2003 to 30th November 2004.

Results: The major indications for admission for inborn babies were infections (27.4%), jaundice (21%) and low birth weight (LBW) (18.4%). The out born babies were admitted largely for sepsis (26.8%), jaundice (17.7%), tetanus (13.9%) and low birth weight (11.2%). *Staphylococcus aureus* (61.2%) and unclassified *coliforms* (21.9%) were the dominant isolates of septicaemia. The overall mortality rate of 19.3% was largely contributed by outborn infants (73.2% of the deaths). In descending order of magnitude, the total of 153 deaths during the period was due to infections (neonatal tetanus 20.9%, septicaemia 19.6%), birth asphyxia 23.3% and LBW 19%. Most of the deaths (70.6%) occurred within the first 7 days of life. Fifty-three (34.6%) of the deaths (most outborn infants) occurred within 24 hours of admission.

Conclusion: Nigerian government needs to improve funding of the health sector in order to reduce neonatal wastage. Training and retraining of traditional birth attendants is inevitable. More effort should be made towards improving coverage rate of tetanus toxoid among women of childbearing age.

Key Words: Neonatal Morbidity, Mortality.

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INTRODUCTION

World wide, neonatal mortality accounts for more than 37% of the estimated 10.6 million child deaths.¹ Africa's neonatal morbidity and mortality rates are among the highest in the world; of the 20 countries with the highest neonatal mortality rate, 16 are in Africa.² It has been noted by the World Health Organization (WHO) that African region may have actually experienced an increase in its neonatal mortality rate with an estimated 45 deaths per 1000 live births, contributing to 50% of infant mortality.^{2,3} Deliveries outside the hospital settings are increasing in developing countries accounting for 60-80% of all deliveries. Underlying these deliveries, are widespread poverty, illiteracy and gender discrimination faced by mothers and female children in developing countries³. These contribute to increased morbidity and mortality in sub-Saharan Africa. In all regions of the world, deaths in the neonatal period are primarily due to preterm delivery, infection and birth asphyxia.² Most of these causes of neonatal morbidity and mortality are preventable. Two thirds or more of these deaths take place in the early neonatal period. In Nigeria, neonatal mortality rates are still very high.^{4,6} One of the Millennium Development Goals(MDGs) is to reduce the number of childhood deaths under the age

of 5 years by two-thirds(from 95 per 1000 to 31 per 1000) by 2015⁷. To achieve the MDGs, a substantial reduction in neonatal deaths must follow. This study was therefore conducted to determine the pattern of morbidity and mortality among the inborn and outborn infants admitted into the newborn unit of the University of Calabar Teaching Hospital (UCTH), Nigeria.

MATERIALS AND METHODS

This was a retrospective study conducted in the neonatal unit of the UCTH, Nigeria. The unit, which had earlier been described by Asindi and Ekanem in the late 1980s⁴, has undergone much improvement in terms of structural and manpower development over time. There has been an increase in the number of consultants and residents though the nurses / patients' ratio (1:3 in the morning shift and 1:5 in the evening and night shifts) remains poor. The Unit with a bed capacity of 30 currently has two sections- Special Care Baby Unit (SCBU) for neonates born in UCTH and the Sick Babies Unit (SBU) for those born outside. The aim of creating the two sections is to limit infection spread. Unlike in the past, mothers are allowed unrestricted access into the nursery for the purpose of regular breastfeeding. Basic facilities for care in the form of incubator nursing, intravenous fluid therapy, phototherapy, naso-gastric feeding and limited respiratory support in the form of intermittent ambu bagging and oxygen therapy are available. There are no facilities presently for mechanical ventilatory support, exogenous surfactant administration and total parenteral nutrition.

The resident as a routine summarizes each death in the paediatrics service of UCTH and before the chart is completed, every child who dies in the hospital is thoroughly discussed at the weekly departmental mortality review conference. The aim is to determine the primary and the associated causes of death and possible preventive steps to take in future. A list of all newborns admitted into the unit during the period 1st June 2003 to 30th November 2004 was obtained from the neonatal ward registers and the charts were pulled out for detailed study. The information abstracted from the records included date of admission, sex, and age on admission, birth weight, gestational age, place and mode of delivery. Other relevant data included the social status, admission and final diagnosis and the outcome of management (discharge or dead). The clinical features, laboratory reports and other relevant data, including management measures and operative findings together with autopsy findings, if any, were noted. The social status of the parents was assessed using the mother's educational level and the father's occupation according to the recommendation by Olusanya's et al.⁸ These were grouped into high, for classes I and II; middle, for class III and low for classes IV and V. All babies that absconded or left against medical advice were excluded from the analysis. The data were analyzed using EPI info software version 6.04. Chi-square (X^2) test with Yates correction for continuity was calculated where appropriate. A p value of <0.05 was regarded as statistically significant.

RESULTS

During the 18-month period, 881 neonates (387 inborn + 494 outborn) were admitted in the unit. Of this number, 11 of the inborn and 76 of the outborn babies had left against medical advice leaving 794, consisting of 376 inborn and 418 outborn babies, for full analysis.

Out of the 376 inborn babies 211(56.1%) were males and 165(43.9%) were females, giving a male/female ratio of 1.3:1. Similarly, 233(55.7%) of the outborn babies were males and 185(44.3%) were females; a male/female ratio of 1.3:1. The major indications for admission for the 376 inborn babies were; sepsis 103(27.4%), jaundice 79(21%) and low birth weight 69(18.4%). The 418 outborn babies were admitted with sepsis 112(26.8%), jaundice 74(17.7%), tetanus 58(13.9%) and low birth weight 47(11.2%) - (Table 1).

Neonatal infection was largely on account of septicaemia (178 cases) and pneumonia (37 cases). Bacterial isolates from the 178 septicaemic infants were *Staphylococcus aureus* 109(61.2%), unclassified *Coliforms* 39(21.9%), *Streptococcus species* 15(8.5%), *Enterobacteriaceae* 5(2.8%), *Chromobacterium violaceum* 4(2.2%), *Klebsiella species* 4 (2.2%) and others 2(1.1%).

The weights of the infants on admission ranged from 850 - 4800 grammes. The gestational ages of the 166 low birth weight (LBW) babies ranged from 26-37 weeks. Those that weighed <1000grammes were all inborn.

The places of delivery of the 418 outborn neonates were health institutions, 199(47.6%), homes of

Table 1: Comparison Of Outcome Among Inborn And Outborn Babies Using Selected Clinical Parameters

Disease	Inborn No (%)	No. Deaths (%)	Outborn No.(%)	No. Death (%)	X^2	P-Value
Septicaemia	103(27.4)	7(17.1)	112(26.8)	23(20.5)	7.33	0.006
Neonatal jaundice	79(21.0)	2(4.9)	74(17.7)	6(5.4)	1.40	0.1566
Low birth weight	69(18.4)	10(24.4)	47(11.2)	19(17.0)	8.69	0.0031
Neonatal tetanus	0	0	58(13.9)	32(28.6)	0	0
Birth asphyxia	23(6.1)	16(39)	43(10.3)	20(17.9)	2.35	0.1253
Bronchopneumonia	18(4.8)	2(4.9)	19(4.6)	3(2.7)	0.00	1.000
Intra uterine growth Retardation	12(3.2)	1(2.4)	10(2.4)	1(0.9)	0.37	1.000
Congenital malaria	12(3.2)	-	15(3.6)	0	0	0
Meconium Aspiration	10(2.7)	2(4.9)	6(1.4)	1(0.9)	0.25	0.6964
Others	50(13.3)	1(2.4)	34(8.1)	7(6.3)	6.10	0.0135
Total	376(100.0)	41(100.0)	418(100.0)	112(100.0)	31.11	0.0000

Significant at p<0.05

Table 11: Social Status of the Mothers and Place of Birth of Their Babies: Inborn Versus Outborn

Social Status of the Mother	Place of Birth of Their Babies		Total
	Inborn	Outborn	
High	101	40	141
Middle	143	66	209
Low	132	312	444
Total	376	418	794

$X^2=125.9$, $df=$, $p<0.0001$ (With Yates' Correction for continuity)

Table 111: Distribution of Ages at Deaths of 153 Neonates: Inborn Versus Outborn

Age In Days	Inborn		Outborn		X^2	P-Value
	No. Admitted (%)	No. Death (%)	No. Admitted (%)	No. Death (%)		
= 1	212(56.4)	9(2.4)	115(27.5)	33(7.9)	37.66	0.0000
2-7	159(42.3)	27(7.2)	165(39.5)	39(9.3)	1.82	0.1773
8-28	5(1.3)	5(1.3)	138(33.0)	40(9.6)	1.08	0.2987
Total	376(100.0)	41(100.0)	418(100.0)	112(26.8)	31.11	0.0000

traditional birth attendants, 168(40.2%) and churches, 51(12.2%).

The modes of deliveries for inborn babies were spontaneous vertex delivery 228(60.6%), Caesarean section 132(35.1%), instrumentations 13(3.5%) and breech delivery, 3(0.8%). For outborn babies, 334(79.9%) were spontaneous vertex, and 84(20.1%) by Caesarean section.

The social status for inborn were high, 101(26.9%), middle 143(38%) and low, 132(35.1%) while that for outborn babies were correspondingly 40(9.6%), 66(15.8%) and 312(74.6%)-Table 11. There was a statistically significant difference between these social classes and the places of deliveries, $X^2=125.9$, $df=2$, $p<0.0001$.

Mortality

Forty-one (10.9%) of the 376 inborn and 112(26.8%) of the 418 outborn newborns died with an overall mortality of 153(19.3%). Details of the morbidity and fatality patterns are demonstrated on Table 1. In descending order of frequency, the 153 deaths during the period of study were largely due to severe birth asphyxia, 23.3% (36 out of 153), neonatal tetanus 20.9%, septicaemia 19.6% and LBW 19%. Most of the deaths 70.6% (108 of 153) occurred within the first 7 days of life (Table 111). Fifty-three (34.6%) of the deaths (mostly outborn infants) occurred within 24 hours of admission.

DISCUSSION

The mortality rate of 19.3% in this survey is high but comparable with the experience in other centres in Nigeria^{5, 6, 9-11} and some other African countries.¹²⁻¹⁵ This morbidity and mortality pattern appears to have remained the same in Nigeria for the past five

Decades.^{4-6, 9-11} This study has demonstrated that infection followed by birth asphyxia and low birth weight remain the leading causes of neonatal morbidity and mortality in Calabar. Neonatal tetanus and septicaemia were the predominant factors of infection. This embarrassing picture is not surprising considering the fact that an increasing number of Nigerian women continue to deliver outside hospital setting.^{9, 10} The high cost of delivering in government and private health facilities drives expectant women of the middle and low socio-economic classes to

patronize home and church delivery whereby their infants very easily get contaminated.¹⁶ Nevertheless, from the data available in this study, delivery in the hospital may not be full guarantee against infection, but does appear to protect against neonatal tetanus. Persistent lack of basic facilities such as detergents, flowing tap water in the wards for hand washing and the poor nurse: patient ratio in a good number of Nigerian hospitals, is an obvious explanation. In Nigeria, from several studies, the incidence of neonatal tetanus ranges from 14.6 to 20 per 1000 live births and it has remained a major contributor to neonatal mortality in the country.¹¹ The WHO estimates that, on the average, only 5% of neonatal tetanus cases are actually reported to health services¹⁷. All the cases in this report were born in homes/churches, and the mothers had no antenatal care and had received no tetanus toxoid. The practice of using native herbs, salt, sand and saliva to dress umbilical cord is still in vogue.⁴ There is superstitious belief in our society that the umbilicus is a portal of entry for evil spirit hence all these materials are introduced for protection. A sustained effort to change these cultural practices will reduce the incidence.

Birth asphyxia contributed prominently to mortality in the unit. Our experience is similar to that of University College Hospital, Ibadan, in which birth asphyxia is also the number two cause of neonatal death.⁶ As observed by Etuk and Etuk,¹⁸ Traditional birth attendants (TBAs) continue to take on high-risk deliveries without referring them; thus contributing to asphyxia-related mortality. These TBAs need to be trained, since it is not possible to avoid them in our mother-child care system. Additionally, inadequate equipment for neonatal resuscitation and monitoring high-risk infants in hospital has added to the death toll. It is our observation that the newborn unit of the UCTH was better equipped in the 1980's with adequate resuscitation equipment, incubators, oxygen and apnoea monitors for effective management of high-risk infants. Because of poor funding of the health sector over the years, there has been a decline in the quality of care. The experience is not unique to Calabar but presumably nationwide. Low birth weight/preterm babies also contributed to the high morbidity and mortality. There is need to

reduce the incidence of preterm deliveries because Nigerian hospitals lack the modern technology and specialized manpower necessary for the intensive care of preterm/low birth weight infants. Early booking, optimum maternal nutrition and regular attendance of antenatal care are the recipe for reducing the incidence of preterm deliveries and LBW.

That most of the deaths (70.6%) in the present study occurred within the first 7 days of life is in consonance with other African experience^{4-6,9-15} Early neonatal death is intrinsically linked to the health of the mother, the care she receives before, during and immediately after giving birth. It supports the observation by the WHO that babies continue to be very vulnerable throughout their first week of life after which their chances of survival improve markedly.³ Also, a large proportion (34.6%) of the total deaths occurred within 24 hours of admission and this involved mostly the outborns. This could have been due to a delay in transportation, long distance from hospital, inability to recognize danger signs, and financial constraint. In addition, the negative attitudes of health care staff could discourage illiterate women who need the service most. Health services, based on principle of equity, adopted by the Primary Health Care Development Agency seek to ensure that health services are available to all in the community. All communities are expected to have access to functional health facilities within five kilometers or 30 minutes walking distance.

In conclusion, neonatal morbidity and mortality have remained high in our community and the predominant causes, which are basically preventable, have not changed. The government should be prepared to finance health care and reduce the cost to levels where patronage will improve. Consequently, improvement in the supply of basic materials and equipment, as well as boosting staff morale can all work in concert to reduce neonatal wastage. While controversies over the support to TBAs go on, it is essential to point out that it would be unwise to ignore this group of persons who directly handle over 60% of Nigerian deliveries. Their training and retraining is inevitable. More effort should be made towards improving coverage rate of tetanus toxoid among women of childbearing age.

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REFERENCES

1. John Hopkins Bloomberg School of Public

Health and the World Health Organization. News Published Monday 28/March/2005 .<http://www.jhsph.edu>. Accessed 28/3/05

2. **Hyder AA, Wali SA, McGuckin J.** The burden of disease from neonatal mortality: a review of South Asia / sub-Saharan Africa. *Brit J Obstet Gynaecol. An International Journal of Obstetrics and Gynaecology* 2003; **110**: 894-901.
3. World Health Organization (Geneva). Make every mother and child count. Progress and some reversals. *World health Report*; 2005.
4. **Asindi AA, Ekanem AD.** Neonatal deaths in Calabar, Nigeria. *E Afr Med J.* 1988; **65**: 335-41.
5. **Obi SN, Onyire BN.** Pattern of neonatal admission and outcome at a Nigerian Tertiary Health Institution. *Orient J Med.* 2004; **16**: 31-37.
6. **Oladokun RE, Orimadogun AE, Olowu JA.** A ten-year review of neonatal deaths in the Special Care Baby Unit at the University College Hospital, Ibadan. *Nig J Paediatr.* 2004; **31**: 119-123.
7. United Nations General Assembly-56th Session: Road map toward the implementation of the United Nations Millennium Declaration: report of the Secretary-General. New York: United Nations; 2001.
8. **Olusanya O, Okpere EE, Ezimokhai M.** The importance of socio-economic class in voluntary fertility in developing country. *W Afr J Med.* 1985; **4**: 205-7.
9. **Ezechukwu CC, Ugochukwu EF, Egbuonu I, Chukwuka JO.** Risk factors for neonatal mortality in a regional tertiary hospital in Nigeria. *Nig J Clin Pract.* 2004; **7**: 50-52.
10. **Udoma EJ, Udo JJ, Etuk SJ, Dukes ES.** Morbidity & mortality among infants with normal birth weight in a newborn baby unit. *Nig J Paediatr.* 2001; **28**: 13-17.
11. Federal Ministry of Health and Human Services (FMH & HS). Neonatal Tetanus. *Nig Bull Epidemiol.* 1992; **2**: 13-6.
12. **Welbeck J, Biritwum RB, Mensah G.** Factors affecting the survival of the "at risk" newborn at Korle Bu Teaching Hospital, Accra, Ghana. *W Afr J Med* 2003; **22**: 55-8.

13. **English M, Muhoro A, Aluda M, Were S, Ross A, Peshu N.** Outcome of delivery and cause specific mortality and severe morbidity in early infancy: A Kenyan District Hospital Birth Cohort. *Am J Trop Med Hyg.*2003; **69**: 228-232.
14. **Klingenberg C, Olomi R, Oneko M, Sam N, Langeland N.** Neonatal morbidity and mortality in a Tanzanian Tertiary Care Referral Hospital. *Ann Trop Paediatr: International Child Health* 2003; **23**: 293-299.
15. **Ayaya SO, Esamai FO, Rotich J, Liechty E.** Perinatal mortality in the Special Care Nursery of Moi Teaching and Referral Hospital, Eldoret, Kenya. *E Afr Med J* 2004; 8: 555-561.
16. **Etuk SJ, Asuquo EEJ, Itam IH, Ekanem AD.** Reasons why booked women deliver outside orthodox health facilities in Calabar, Nigeria. *Int J Social Science and Public policy*;1999;2 (1):90-102.
17. WHO Department of vaccines and other biologicals. Field manual for neonatal deaths elimination. (WHO/V&B/99.14) Geneva, 1999.
18. **Etuk SJ, Etuk IS.** Relative risk of birth asphyxia in babies of booked women who deliver in unorthodox health facilities in Calabar, Nigeria. *Acta Tropica.* 2001; **79**:143-147.