

## Pattern of Neonatal Admissions & its outcome in a tertiary care hospital of Southern Punjab (a 5 years study)

MUHAMMAD SALEEM, RAGHIB IQBAL, SHAHZAD BOKHARI, MUBARAK ALI, ZAHID KHAN

### ABSTRACT

**Aim:** To determine the disease pattern and its outcome in a neonatal unit of S. Z. H., Rahim Yar Khan.

**Study design:** Retrospective study.

**Place & Duration of Study:** The study was conducted in the neonatal unit of Sheikh Zayed Hospital, Rahim Yar Khan from 1<sup>st</sup> January 2009 to 31<sup>st</sup> December 2013 (5 years).

**Method:** The data of all the admitted neonates was analyzed regarding age at admission, sex, gestational age, birth weight, mode and place of delivery, diagnosis, and outcome (discharge, discharge on request, left against medical advice, death) and deaths were analyzed in a same way.

**Results:** A total of 76800 patients (aged 0-14 years) were admitted in pediatric unit in 5 years, out of them 20230 (26.3%) were neonates. Among the admitted neonates, male to female ratio was 1.7:1. Low birth weight accounted for 53% of total admissions. Major causes of admission were birth asphyxia 36.6%, prematurity with complications 34%, sepsis 14.6%, congenital malformations 5.6% and neonatal jaundice 4.1%. Neonates admitted aged less than 24hours were 56% and 64% of neonates were delivered by spontaneous vaginal delivery while 36% cesarean born. Neonates delivered in SZH were 41% followed by private hospitals 34% and home 22%. Out of the total neonatal admissions, 67% were discharged in a satisfactory condition, 3.9% were discharged on request, 3.3% left against medical advice and 25.8% expired. Out of the total neonatal deaths, male to female ratio was 2:1. Main bulk of mortality was observed in first 7 days of life in 88% and 61% of the expired neonates were low birth weight. The major causes of mortality were birth asphyxia 46% followed by prematurity with complications 29%, sepsis 18%, meconium aspiration syndrome 2.1% and congenital malformation 2%. Of the total expired neonates, 39% were delivered at home followed by 36% in sheikh Zayed hospital while 25% in private clinics and hospitals.

**Conclusion:** Birth asphyxia, low birth weight, prematurity, sepsis, and congenital malformation are the main causes of neonatal admission and mortality. Improving antenatal services, neonatal care and timely referral to tertiary care hospitals will definitely help to reduce neonatal morbidity and mortality.

**Keywords:** Neonates, Asphyxia, Prematurity, Sepsis.

---

### INTRODUCTION

Worldwide, 130 million infants are born each year, of these 6.6 million die before reaching to their 5<sup>th</sup> birthday and 2.9 million (44%) of these die in 1<sup>st</sup> 28 days of life.<sup>1</sup> The current global under 5 mortality rate is 48/1000 live births with infant mortality rate 36/1000 live births and neonatal mortality rate 21/1000 live births<sup>1</sup>. Though in the last two decades, there has been a global decline in under-five and infant mortality rates, yet neonatal mortality still contributes a very significant proportion of under-five mortality in most countries.<sup>2</sup> The United Nations Millennium Development Goal 4 targets reduction of under 5 mortality rate by two thirds, by the year 2015<sup>2</sup> As the under 5 mortality is on decrease but in many countries the proportion of neonatal mortality

as a contributor to under 5 has increased.<sup>1</sup> Therefore, efforts to achieve MDG- 4 are focused mainly on reducing neonatal deaths in high-mortality countries<sup>3</sup>.

Two third of the world's total neonatal deaths occur in just 10 countries, mostly in Asia. Pakistan is number three among these and alone accounts for 7% of global neonatal deaths.<sup>4</sup> Neonatal mortality in Pakistan (55/1000 live births) accounts for more than 60% of under 5 mortality (86/1000 live births) and more than 75% of infant mortality (69/1000 live births)<sup>1,5</sup>.

Pakistan also ranks among the top three countries globally with the highest percentage of babies born with low birth weight. Majority of the causes of neonatal morbidity and mortality in our country are preventable. The lack of proper antenatal, obstetrical, neonatal services, poor infrastructure of primary health care, low awareness of the health needs of pregnant women, illiteracy, lack of immunization and poor socioeconomic condition are the main contributory factors.

---

Department of Pediatrics, Sheikh Zayed Medical College/Hospital Rahim Yar Khan

Correspondence to Dr. Saleem Muhammad, Associate Professor Email: [dms11976@gmail.com](mailto:dms11976@gmail.com) Cell: 03216808633, 03338808633

Approximately 70-75% of neonatal deaths occur in the first week of life and of these, more than one quarter occur in the 1<sup>st</sup> 24hrs.<sup>4,6</sup> Prematurity (34%), birth asphyxia (24%), infections (22%) and congenital malformations (9%) collectively account for 89% of neonatal deaths worldwide.<sup>1</sup> In our country, the major causes for neonatal deaths are the same but with birth asphyxia contributing more than prematurity and infections in many of studies.<sup>6</sup> The reasons for neonatal diseases and high mortality are poor antenatal services, maternal malnutrition, lack of skilled birth attendant, lack of neonatal resuscitation facilities both in terms of trained manpower and equipments, lack of proper cord care and breast feeding, low literacy rate and poor political commitment.

Knowing the pattern of neonatal diseases is a useful indicator of the availability, utilization, and effectiveness of maternal and child health care services and varies from place to place and time to time even in the same locality.<sup>7</sup> Information on admission and mortality patterns of hospitalized neonates reflects the major causes of illnesses and standard of care provided to neonates in a particular locality.<sup>5</sup> Such information identify gaps and provide a basis on which interventions to improve neonatal outcomes are designed which ultimately help in reduction of neonatal morbidity and mortality.

This study was carried out in a neonatal unit of Sheikh Zayed hospital/college, Rahim Yar Khan. Rahim Yar Khan is one of the heavily populated district of southern Punjab with approximately 4 million population and Sheikh Zayed hospital is the only tertiary care hospital which caters a large population of southern Punjab, Sind and Baluchistan province, where the provision of health care services are still meager. Similar sort of study was conducted by same author to know the pattern of admission and mortality in 2010 (one year study).<sup>8</sup>

The purpose of this study was to know the patterns of diseases in neonates admitted in our hospital and to determine the causes of neonatal mortality in detail to address previously uncovered aspects and analyzing data of 5 years which will help to identify interventions for a better neonatal outcome.

## PATIENTS & METHODS

This retrospective study was based on analysis of the record of all patients admitted in neonatal unit of Sheikh Zayed hospital, Rahim Yar Khan from 1<sup>st</sup> January 2009 to 31<sup>st</sup> December 2013. The data of all the admitted neonates was analyzed regarding age, sex, gestational age, birth weight, place and mode of delivery, diagnosis and outcome (discharge,

discharge on request, left against medical advice, death) and deaths were analyzed in a same way. SPSS version 16.0 was used for statistical analysis. Diagnosis was made mainly on clinical grounds and based on WHO case definition e.g. prematurity (live newborn delivered before 37 weeks from 1st day of last menstrual period, low birth weight (LBW) having a birth weight less than 2.5kg. Sepsis was suspected on clinical grounds and was confirmed by relevant investigations. Birth asphyxia was diagnosed on clinical grounds on the basis of sarnat-staging. Congenital heart disease was confirmed by echocardiography and other congenital anomalies accordingly. Approval for the study was obtained from the hospital's ethical committee.

## RESULTS

A total of 76800 patients (aged 0-14 years) were admitted in pediatric unit in 5 years, out of them 20230 (26.3%) were neonates. Among the admitted neonates, male to female ratio was 1.7:1. Low birth weight accounted for 53%(10725) of total admissions, out of which 34% were preterm while 19% were full term small for gestational age(SGA). Major causes of admission were birth asphyxia 36.6%, prematurity with complications 34%, sepsis 14.6%, congenital malformations 5.6%, neonatal jaundice 4.1%, meconium aspiration syndrome 3.1%, neonatal tetanus 0.5% and miscellaneous 1.5%. Neonates admitted aged less than 24hours were 56% while aged 2-7days 23% and aged 8-28 days 21%. Neonates delivered by spontaneous vaginal delivery were 64% while 36% by cesarean section. Neonates delivered in SZH were 41% followed by private hospitals 34%, home 22% and remaining 3% in other government hospitals/dispensaries.

Out of the total neonatal admissions, 13550 (67%) were discharged in a satisfactory condition, 800 (3.9%) were discharged on request, 670(3.3%) left against medical advice and 5211(25.8%) expired. Out of the total neonatal deaths, male to female ratio was 2:1. Main bulk of mortality was observed in first 7 days of life in 4060(88%) and 61% of the expired neonates were low birth weight. The commonest cause of mortality was birth asphyxia in 46% followed by prematurity with complications 29%, sepsis 18%, meconium aspiration syndrome in 2.1%, congenital malformation in 2%, Tetanus in 1.2% and miscellaneous in 1.7%. Of the total expired neonates, 2040 (39%) were delivered at home, 1875(36%) in Sheikh Zayed hospital, while 1296(25%) in private clinics and hospitals. Majority of the expired neonates (68%) were delivered by normal vaginal delivery while 32% by cesarean section.

Table I: Pattern of admissions

Disease	n
1-Birth asphyxia	7400(36.5%)
2-Prematurity with complications	6880(34%)
3-Sepsis	2950(14.5%)
4-Congenital malformations	1145(5.6%)
5-Neonatal jaundice	830(4.1%)
6-Meconium aspiration syndrome	635(3.1%)
7-Tetanus neonatorum	95(0.5%)
8-Miscellaneous	295(1.5%)

Fig. I. Prematurity with complications (n=6880)

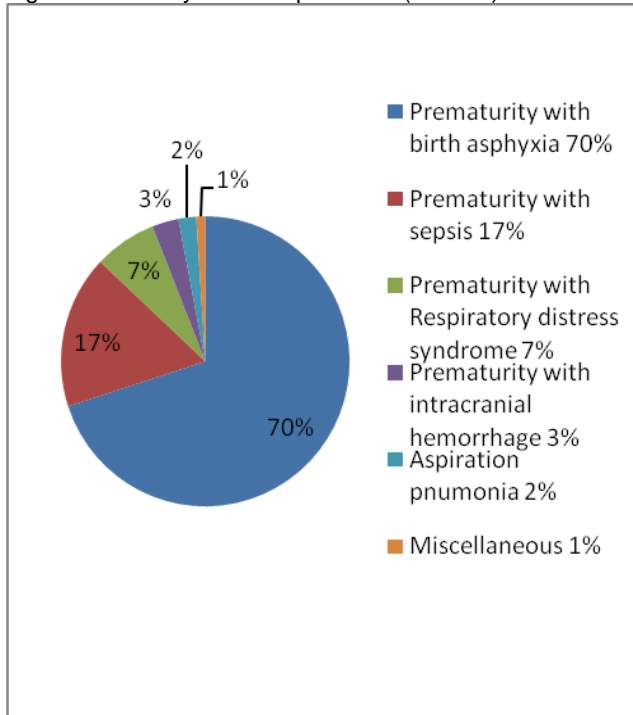


Figure II. Age of admitted neonates

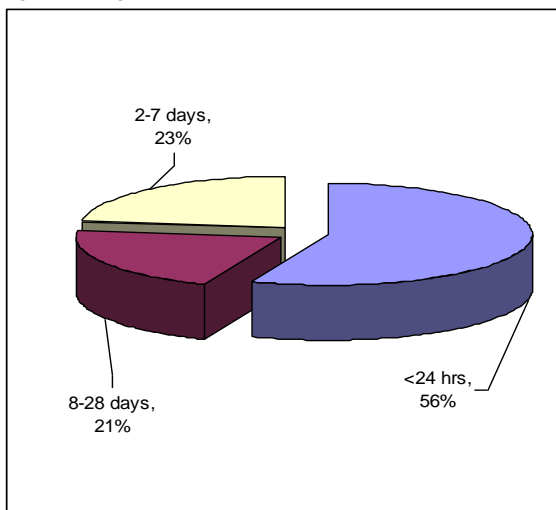


Figure III: Outcomes of neonatal admissions

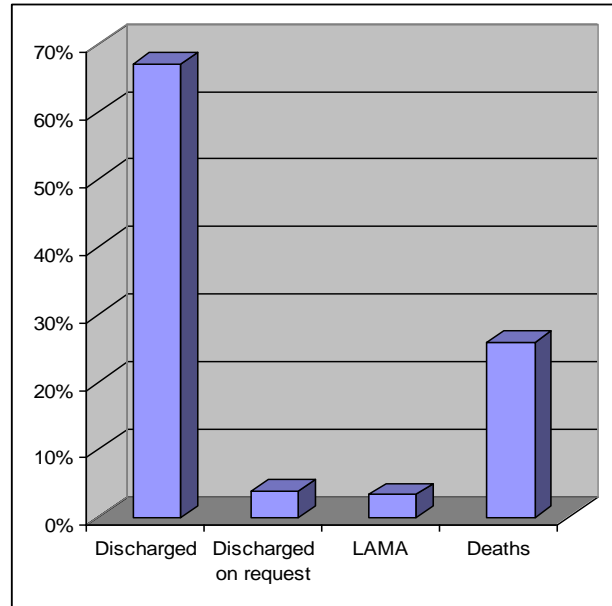


Figure IV: Age of expired neonates

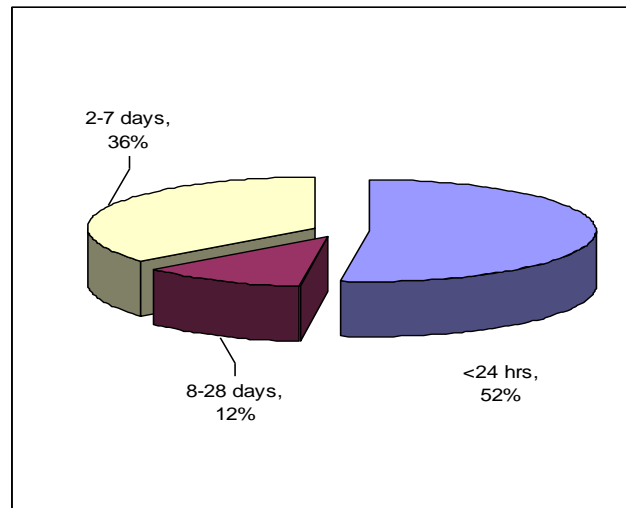


Table II: Causes of neonatal mortality

1-Birth asphyxia	2397(46%)
2-Prematurity with complications	1511(29%)
Prematurity with asphyxia	1065(20.4%)
Prematurity with sepsis	305(5.9%)
Prematurity with respiratory distress syndrome	75(1.4%)
Prematurity with intracranial hemorrhage	66(1.3%)
3-Sepsis	940(18%)
4-Meconium aspiration syndrome	110(2.1%)
5-Congenital malformations	105(2%)
6-Tetanus	60(1.2%)
7-Miscellaneous	88(1.7%)

## DISCUSSION

Neonatal admissions in our study contributed 26.3% to total pediatric admissions and more than 60% to total pediatric mortality. This number of admission is still below the expected as major bulk of deliveries in our country is being conducted at home and getting treatment of ailments from nearby health professionals. We are receiving neonates mainly delivered in sheikh Zayed hospital and also very sick neonates who are delivered and referred either from private clinics/hospitals or from home. This all suggests that the neonatal morbidity is higher as compared to which is documented in many of national studies because of limitations in data collection. Hence it demands good neonatal health care facilities in our area.

In our study, male babies outnumbered female in admission (64%) as well as in mortality (67%) which is consistent with the biological vulnerability of male neonates as has been proven universally in other studies.<sup>3,10,11</sup> Majority of neonates (56%) were admitted in first 24 hours of life and 79% in first week of life which is similar to many other studies<sup>12,13</sup> but less as compared to study conducted in Lahore where it was 75%<sup>10</sup> in first 24 hours of life. High percentage of admission in 1st 24 hours of life suggests that most of neonatal morbidity and mortality occurring in this period and also depicts the vigilance, knowledge of parents/attending doctor for early referral of cases to tertiary care hospital. So more awareness is required in our area for early referral as compared to other developed cites.

Low birth weight accounted for 53% of the neonatal admission and 61% of neonatal deaths, was the major contributing factor to neonatal morbidity and mortality in our study which is similar to study conducted in Karachi<sup>14</sup> but higher as compared to other local studies where it was 41% in Peshawar<sup>10</sup> and 39% in Lahore.<sup>15,16</sup> Majority of LBW in the present study were preterm (64% of LBW) while 34% were SGA. Initial studies have shown that prematurity is mainly responsible for LBW in developed countries and SGA in developing countries due to prevalent poverty and malnutrition<sup>17,18</sup> but our study and many national and international studies have proved changing trend as major contribution to LBW by prematurity as in developed countries.<sup>19,20,21,22</sup> LBW neonates are at seven times higher risk of perinatal mortality and low APGAR score.<sup>19,23</sup> Lack of maternal literacy, antenatal care, maternal short stature and maternal malnutrition are probably the contributory factors for high incidence of low birth weight babies.<sup>24,25</sup>

Major causes of admission in our study were birth asphyxia (36.6%), prematurity with

complications (34%), sepsis (14.6%) and congenital malformations (5.6%). In premature neonates, birth asphyxia was again a major complication (70%) thus making birth asphyxia as a whole around 60% of the admissions. Pattern of neonatal admission in our study is similar to many of the local studies with birth asphyxia as a major cause of admission<sup>12, 18</sup> but the percentage is very high in our setup as compared to Karachi 40%<sup>26</sup> and Rawalpindi 31%<sup>27</sup>. The high incidence of birth asphyxia in our study is suggestive of poor literacy rate, poor antenatal care, maternal malnutrition, lack of skilled birth attendants and poor neonatal resuscitation. The contribution of neonatal sepsis to total admission was less in our study which is also less as compared to various national studies. Sepsis though complicated majority of the cases of birth asphyxia and LBW but as our study was based on the primary diagnosis so actual frequency of sepsis could not be assessed which is obviously higher as compared to the documented.

In our study, 78 % of neonates were delivered in hospitals including 41% in SZH followed by 34% in private hospitals and 3% in other government hospitals/dispensaries while 22% at home. These figures are different from other local studies where major bulk of deliveries takes place at home and is considered as a major risk factor for birth asphyxia. In our set up, majority of deliveries took place in hospitals which is on one hand encouraging in terms of awareness of people in reducing risk of delivery complication but unfortunately we still had birth asphyxia as a major cause of admission suggestive of poor antenatal services, late referral of complicated pregnancies and poor neonatal resuscitation facilities both in terms of equipments and trained manpower.

Neonates delivered by spontaneous vaginal delivery were 64% while 36% by cesarean section (CS). According to WHO, cesarean sections more than 10-15% is not justifiable and is a risk for both of mother and baby. Reasons of high rate of CS in our setup are probably many unbooked and referred patients who came in critical condition with history of trial of labour or associated medical disorders where urgent CS was done to save the life of the mother and the fetus. Other reasons included lack of adherence to standard guidelines and protocols for managing labour and non availability of system of audit for caesarean section rates.<sup>28</sup>

The good news is that the neonatal mortality is on decline globally. The world's neonatal mortality rate fell from 33 deaths per 1,000 live births in 1990 to 21 per 1,000 in 2012.<sup>1</sup> All regions showed marked drop in mortality but lower percentage of reductions in South Asia and Sub-Saharan Africa (39% and 28% respectively) than other regions.<sup>1</sup> In countries where

the childhood mortality is highest, almost 10 percent of babies do not survive more than a month<sup>8,9</sup> probably because of poor obstetrical and neonatal health services. Our study reflecting the same because neonatal mortality was higher in relation to post-neonatal mortality (25.8% in the neonatal and 4.6% in the post-neonatal age group). Neonatal mortality in our unit is high which is similar to mortality statistics of many national<sup>14, 29</sup> and international studies from developing countries.<sup>21, 30</sup>

Many factors are believed to be responsible for high neonatal mortality particularly in underprivileged countries like Pakistan. Sheikh Zayed hospital is the only tertiary care hospital of district Rahim Yar Khan. The people of these areas belong to low socioeconomic class having low literacy rate especially among females, lack of health education, inadequate antenatal services, late referral of deliveries and sick newborns to tertiary care hospital. Another important factor for this high mortality is poor infrastructure and lack of manpower trained for neonatal resuscitation. Recent reports from Pakistan and other underdeveloped countries indicate that substandard care, inadequate training, low staff competence and a lack of resources, including equipment and medication, are the factors that contribute to high neonatal deaths.<sup>31</sup> It has been recognized that more than 50% newborn deaths can be prevented by interventions such as improving the maternal health, antenatal services, tetanus toxoid immunization to mothers, clean and skilled care at delivery, improving neonatal resuscitation, exclusive breastfeeding, good umbilical cord care and better management of infections in newborns.<sup>32</sup>

Globally common causes of neonatal mortality are prematurity with its complications, birth asphyxia, sepsis and severe congenital malformations.<sup>1,33</sup> The proportion attributable to each cause varies from country to country and even in same country in different centers. In areas where neonatal mortality is low, prematurity and congenital malformations have main contribution while at places where mortality is high, the contribution of asphyxia and infections has been greater.<sup>8</sup> The commonest cause of mortality in our study was birth asphyxia followed by prematurity with complications, sepsis, meconium aspiration syndrome and congenital malformations. Birth asphyxia as a major cause of mortality in our study is comparable to other national studies but contribution (46%) is very high for mortality as compared to 21% from Karachi<sup>10</sup>, 23% from Services Hospital Lahore<sup>34</sup> and 32% from Allied Hospital Faisalabad.<sup>35</sup> It is also higher in comparison to other developing countries.<sup>36,37</sup> The highest neonatal mortality due to birth asphyxia could be because of poor antenatal, neonatal services and late referral of either deliveries

or sick newborns. Prematurity with complications was the second leading cause of neonatal mortality followed by sepsis as third major cause of mortality in our study because sepsis in full-term neonates and sepsis in pre-term accounted collectively for 24% deaths, the results are similar with other studies.<sup>22, 23</sup>

The first week of life is the most fragile and vulnerable period for a neonate as most of the deaths are likely to occur in this time. In our study, 88% of neonatal deaths were in first 7 days of life and in particular 52% in first 24 hours of life is comparable with other studies.<sup>21</sup> Of the expired neonates, 61% were delivered in hospitals including 36% in SZH and 25% in private clinics/hospitals followed by 39% at home which is bit different from other studies where main bulk of expires is from home delivered. As main bulk of mortality in our study is from hospital deliveries suggests poor antenatal, neonatal care and late referral of deliveries to tertiary care hospital resulting in poor outcome of even hospital delivered.

## CONCLUSION

Birth asphyxia, low birth weight, prematurity, sepsis, and congenital malformation are the main causes of neonatal admission and mortality.

As a suggestion to reduce neonatal morbidity and mortality, this study will be helpful to the health professionals, managers and policy makers to design neonatal health programmes particularly improving antenatal services, neonatal care and timely referral to tertiary care hospitals which will definitely help to achieve millennium development goal 4.

## REFERENCES

1. United Nations Children's Fund. *Committing to Child Survival: A Promise Renewed*. New York: United Nations Children's Fund (UNICEF); 2013.
2. United Nations. *The millennium development goals report*. New York: United Nations; 2013.
3. Hoque M, Haaq S, Islam R. Causes of neonatal admissions and deaths at a rural hospital in KwaZulu-Natal, South Africa. *South Afr J Epidemiol Infect* 2011; 26(1):26-29.
4. Lawn JE, Cousens S, Zupan J. 4 million neonatal deaths: When? Where? Why? *Lancet* 2005; 365: 891-900.
5. National Institute of Population Studies. *Pakistan Demographic and Health Survey 2012-13: Preliminary report*. Islamabad: National Institute of Population Studies; 2013.
6. World Health Organization. *The world health report 2005: Make every mother and child count*. Geneva: World Health Organization; 2005. (<http://www.who.int/whr/2005/en>).
7. The Nigerian Academy of Science. *Reducing Maternal and Infant Mortality in Nigeria (Workshop Summary)*. Nwosu J, Odubango MO, Osinusi BO, eds. 2009. *West African Book Publishers*, Lagos, Nigeria.
8. Saleem M, Ali M, Anwar J, Babar M I, Rafi M, Mahmood Ret al. *Clinical Audit of Neonatal Admissions in a Tertiary Care Hospital*. *J S Z M C* 2011; 2(4):231-235.
9. Jelka Zupan, M.D. *Perinatal Mortality in Developing Countries* *N Engl J Med* 2005; 352:2047-2048.

10. Rahim F, Jan A, Mohummad J, Iqbal H. Pattern and outcome of admissions to neonatal unit of Khyber Teaching Hospital, Peshawar. *Pak J Med Sci* 2007; 23(2): 249-253.
11. Roy RN, Nandy S, Shrivastava P, Chakraborty A, Dasgupta M, Kundu TK. Mortality Pattern of Hospitalized Children in a Tertiary Care Hospital of Kolkata. *Indian J Community Med* 2008; 33(3): 187-189.
12. Junejo A.A, Abassi K.A, Ameet kumar, Shaikh A.H. Disease pattern and outcome in neonatal unit at Children Hospital Chandka Medical College, Larkana. *Pak paed J* 2009; 33(4): 238-24.
13. Jan AZ, Ahmad S, Zahid SB. Clinical audit of admission pattern and its outcome in a Neonatal ICU. *Gomal J Med Sci* 2013; 11: 31-6.
14. Parkash J, Das N. Pattern of admission to neonatal unit. *J Coll Physician Surg P* 2005; 15:341-44.
15. Chishti AZ, Iqbal MA, Anjum A, Maqbool S. Risk factor analysis of birth asphyxia at the children's hospital, Lahore. *Pak Padiatr J* 2002; 26:47-53.
16. Wu Z, Viisainen K, Wans Y, Hemminki F. Perinatal mortality in rural China: Retrospective cohort study. *B M J* 2003; 327:1319-20.
17. Villar J, Belizan JM. The relative contribution of prematurity and fetal growth retardation to low birth weight in developing and developed societies. *Am J Obstet Gynecol* 1982; 143:793-798.
18. Kiess W, Chernausek SD, Hokken-Koelega ACS. Small for Gestational Age: Causes and Consequences. *Pediatr Adolesc Med*.2009; 13:148-162.
19. R Ugwu, A Eneh. The Proportion Of Low Birth Weight Babies Due To Small For Gestational Age (SGA) And Prematurity In Port Harcourt, South-South Nigeria - Changing Trends. *The Internet J of Pediatr Neonatol*.2010; 13(1).
20. Ezeugwu EC, Onah HE, Odetunde IO, Azubuike JC. Singleton Low Birth Weight Babies at a tertiary hospital in Enugu, South East Nigeria. *The Internet Journal of Gynecology and Obstetrics* 2010; 14(1).
21. Toma BO, Ige OO, Abok II, Onwuanaku C, Abah RO, Donli A. Pattern of neonatal admissions and outcome in a tertiary institution in north central Nigeria. *J Med Trop* 2013; 15:121-5.
22. Takashi Yorifuji, Hiroo Naruse, Saori Kashima, Takeshi Murakoshi, Tsuguhiko Kato, Sachiko Inoue et al. Trends of preterm birth and low birth weight in Japan: a one hospital-based study. *B M C Pregnancy and Childbirth* 2012;12:162.
23. Adam I, Babiker S, Mohammed AA, Salih MM, Prins MH, Zaki ZM. Low body mass index, anemia and poor perinatal outcome in a rural hospital in eastern Sudan. *J Trop Pediatr* 2008; 54(3): 202-4.
24. Gebremariam A. Factors predisposing to low birth weight in Jimmu Hospital South Western Ethiopia. *East Afr Med J* 2005; 82(11): 554-8.
25. Hassan AA, Abubaker MS, Radi EA et al. Education, prenatal care, and poor perinatal outcome in Khartoum, Sudan. *Int J Gynaecol Obstet*. 2009; 105: 66-67.
26. Ejaz I, Khan HI, Baloch GR. Neonatal mortality reports from a tertiary hospital in Lahore/causes and outcome. *Pak Padiatr J* 2001; 25:35-8.
27. Tariq P, Kundi Z. Determinants of neonatal mortality. *J Pak Med Assoc* 1999; 49:56-60.
28. Farah Karim, Asifa Ghazi, Tehmina Ali, Rukhsana Aslam, Uzma Afreen, Romana Farhat. Trends and Determinants of Caesarean Section. *Journal of Surgery Pakistan (International)* 2011; 16 (1).
29. Jamal M, Khan N. Neonatal morbidity and mortality in high risk pregnancies. *J Coll Physician Surg Pak* 2002; 12:657-61.
30. Islam MN, Siddika M, Hossain MA, Bhuiyan MK, Ali MA. Morbidity pattern and mortality of neonates admitted in a tertiary level teaching hospital in Bangladesh. *Mymensingh Med J*. 2010; 19(2):159-62.
31. Lassi ZS, Haider BA, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database Syst Rev* 2010 Nov 10 ;( 11):CD007754.
32. Chishti AZ, Iqbal MA, Anjum A, Maqbool S. Risk factor analysis of birth asphyxia at the children's hospital, Lahore. *Pak Padiatr J* 2002; 26:47-53.
33. Jehan I, Harris H, Salat S, Zeb A, Mobeen N, et al. Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan. *Bulletin of the World Health Organization* 2009; 87:130-138.
34. Butt NA, Malik A, Kazi MY. Pattern of neonatal admissions in tertiary care hospital. *Pak Journal of Med & Health Sci* 2010; 4: 436-8.
35. Anjum ZM, Shamoan M. Pattern of Neonatal unit of Allied Hospital Faisalabad Pakistan, *Annals Punjab Med Col* 2009; 3: 129-31.
36. A.K.M. Mamunur Rashid, C.H. Habibur Rasul, S. Mahbub Hafiz. Neonatal mortality: a scenario in a tertiary level hospital of a developing country. *Pediatrics reports* 2010; 2:e9.
37. Okechukwu AA, Achonwa A. Morbidity and mortality patterns of admissions into the special care baby unit of university of Abuja Teaching Hospital, Gwagwalada, Nigeria. *Niger J Clin Pract* 2009; 12:389-94.