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**Neonatology and Genetics**

# Causes of Admissions and Deaths in Neonate Department Benghazi Children Hospital 2019

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| Abstract | Original Research Article |
|---|---|

This research aims to study the causes of neonatal admissions and deaths among newborns at neonate department in Benghazi Children Hospital. A cross sectional retrospective study was conducted during 2019. Data included; causes of admission, causes of deaths, gender, age, residency, area of referral, duration of hospital stay. Out of 1720 neonatal admissions reviewed, the total number of deaths was 229, the overall mortality rate was (13.3%) but much higher (25.2%) among the referred babies. The male gender was predominant admissions and deaths (61.3% and 63% respectively). Most of neonatal admissions and deaths were occurred in the first week of life. The most frequent cause of admission was neonatal jaundice 492 (28.6%) followed by RD 380 (22.1%). The common cause of death was prematurity and its related problems 66 (28.3%), then neonatal sepsis 51 (22.3%) and congenital heart disease 36(15.7%).
**Keywords:** Neonate Department, neonatal admissions, wellbeing, death.

## BACKGROUND

He first month is the most crucial period for child survival. Neonatal mortality continues to remain high with little improvement over the years in Sub-Saharan Africa, and North Africa including Libya.

This regions shows the least progress in reducing neonatal mortality and continues to be a significant public health issue.

The causes and predictors of neonatal admissions and deaths in the neonatal intensive care unit are not well documented.

Hence, this study aimed to determine the causes and predictors of neonatal admissions and mortality among infants admitted to neonatal department in Benghazi children hospital

The neonatal period is a highly vulnerable period of life when a neonate may develop certain serious problems which lead to death) [1].

Neonatal mortality is highest in the first 24 hours of life and accounts for 65% of infant mortality [2].

The neonatal mortality rate is the number of neonates dying before reaching 28 days of age, per 1,000 live births in a given year [3], is a core indicator for neonatal health and wellbeing and is becoming a prominent component of overall under-five mortality. It is therefore receiving particular attention from Health authorities 1.

Even though the under-5 mortality rate dropped by 47% (from 9.9 million to 5.6 million children) from 2000 to 2016 globally, the neonatal mortality rate only fell by 39% over the same period [2].

Of the 5.9 million under five deaths reported in 2015, 2.7 million died during the neonatal period [3].

A World Health Organization (WHO) report stated that worldwide neonatal mortality rates decreased from 36 deaths per 1,000 live births in 1990 to 19 cases

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per 1,000 live births in 2015, which indicates that the neonatal mortality rate has fallen by 45 to 47% during these years.

In 2017, UNICEF reported that neonatal mortality from sub-Saharan Africa and South Asia, accounted for 27/1000 live births. A child born from this region was nine times more likely to die in the first month of life than a child from a high-income country (https://data.unicef.org/topic/child-survival/neonatal-mortality/).

A number of previous studies have attempted to identify factors associated with neonatal admission [4] and mortality whilst there was only 2.8% reduction for Africa and 2.9% for sub-Saharan Africa over the same period [4, 5].

Therefore, this study was designed to evaluate neonatal mortality and associated factors among newborns admitted to the Specialized Neonatal Care Unit (SNCU) (Neonatal department) in Benghazi children hospital 2019.

# Distribution of under-five deaths by age-groups
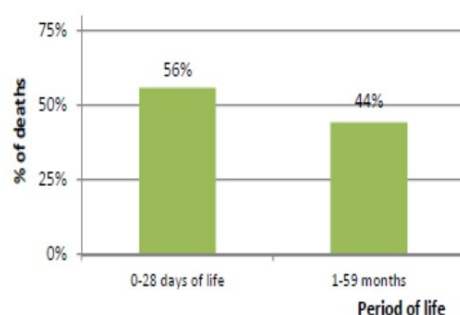


Source:Calculated based on data from the UNICEF/WHO/The World Bank/UN Pop Div. Levels and Trends in Child Mortality Report 2014
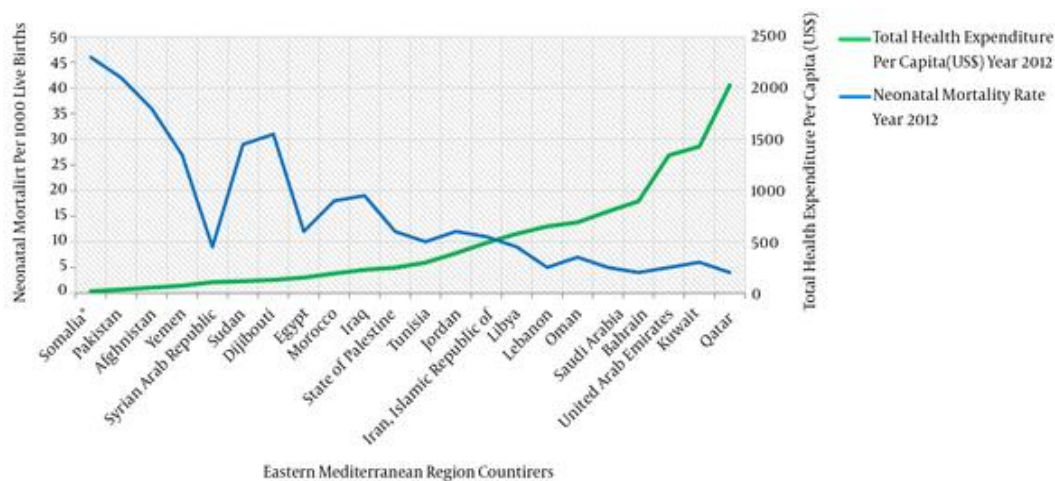


**Common causes of neonatal mortalities**
1. Prematurity: Premature infants come early into the world, and they are born fragile, small, and weighing less than full term infants. Many of the babies who survive face greater risks of significant health problems and disability throughout their lives (I.e. learning disabilities, visual and hearing problems, chronic lung disease and other long-term diseases).
2. Neonatal infections: Neonatal infections are a major cause of death worldwide. It is estimated that

approximately 4 million deaths occur annually in developing countries in the neonatal period.
3. Birth Asphyxia: It is estimated that in developing countries, asphyxia causes around seven deaths per 1000 births, whereas in developed countries, this proportion is less than one death per 1000 births.
4. Respiratory Distress Syndrome (RDS) or Hyaline Membrane Disease (HMD): RDS is one of the most common causes of neonatal respiratory failure. According to the National Neonatal Perinatal Database 2003, HMD was found to affect

1.2% of total live births and contributed to 13.5% of total neonatal deaths.
5. Congenital anomalies: Congenital malformation such as congenital heart diseases

# OBJECTIVE
- To determine causes of neonatal admissions ,neonatal deaths ,neonatal mortality rate , and associated factors in the Neonatal Department in Benghazi children hospital
- To evaluate the causes of transfer and deaths in referred cases

**Methods and Study design**

A retrospective cross-sectional study was carried out to investigate neonatal admissions, mortality and associated factors among neonates admitted to the neonatal department in Benghazi children hospital in 2019.

# METHODS
Medical records of all neonates admitted to the Neonatal Care Unit at the period from 1 January 2019 to 31 December 2019 were reviewed using a cross-sectional study. Data included; causes of admission, causes of deaths, gender, age, residency, area of referral and duration of hospital stay was collected.
- The neonatal department in Benghazi children hospital provides services to newborns born in Benghazi and surrounding areas and it is a referral center to most of eastern Libyan part.
- The department has about 60 incubators ,30 cots, 7-10 ventilator machines
- The quality of man power inside the unit over 24 hours was divided into two shifts, each shift included 3-4 doctors ( SHO), one senior registrar and one in call consultant and 4 nurses.
- The average daily admissions is 4.77cases

Benghazi children hospital



The most important causes of admission and mortality were analyzed. Univariate and multivariate logistic regression analysis was used to evaluate the causes and risk factors associated with neonatal mortality. Variables significant at P < 0.05 level in the Model fit was evaluated using Chi-square = 12.89, df = 8; P = 0.116), implies the model's estimates fit the data at an acceptable level.. P-value < 0.05 was considered statistically significant.

**Study Population**

Information of all the 1720, males (n=1055, 61.33%) and female (n=665, 38.66%) neonates admitted to the NCU from January 1st –December 31st, 2019 was reviewed, with complete information were included in the study.

**Statistical analysis**
- Double data input was performed using CSPro (version-7) software, and was exported to SPSS statistical package version 20 for windows (SPSS) for analysis.

- Quantitative indices are expressed as means ± standard deviations using t-test. were significant at P value of < 0.05 level in the univariate analysis were included and retained in the multivariate model.
- We evaluated model fit through inspection of Hosmer and Lemeshow test (Chi-square = 12.89, df = 8; P = 0.116), which implies that the model's estimates fit the data at an acceptable level.
- Ethical approval was sought out from the Ministry of Health research ethics and protocol review committee.

**Causes of admission in to NICU**

As elsewhere, jaundice was the major cause 492 (28.6%) of admission, followed by Respiratory distress (RDS, TTN, MAS, Pneumonia, pneumothorax.. etc.) 380 (22.1%), prematurity 270 (15.7%), sepsis 264(15.3). Congenital abnormality, including neural tube defect, digestive tract obstruction , multiple congenital anomalies 30(1.74%), congenital heart disease 29(1.68%), and Downs syndrome 15(0.87%), neonatal convulsions 34(1.97%),birth asphyxia

15(0.87%) were among the commonly reported neonatal disorders and Infants of diabetic mothers (IDM) 23(1.33%)

Causes of neonatal deaths
- From the total admissions of 1720, 229 babies died in 2019 in the NICU.
- Preterm births with its complications were the major causes of neonatal mortality and accounted the highest (n = 66, 28.8%) cause of mortality followed by sepsis (n = 51, 22.3%), congenital heart disease (n = 36, 15.7%), congenital anomalies 18(7.86%), metabolic diseases 15(6.55%) and birth asphyxia 12(5.24%).
- Overall neonatal mortality in the NCUI was 13.3%. There was a significant association between prematurity (< 37 weeks), and mortality (P < 0.001) also neonatal sepsis and mortality

# RESULTS
As elsewhere, jaundice was the major cause 492 (28.6%) of admission, followed by respiratory problems 380 (20.1%), prematurity 270 (20.3%), sepsis 264(15.3%) and congenital heart diseases 80 (4.7%).

Most of the admitted baby stayed 1 to 10 days. The proportion of facility-based neonatal mortality was 13.31%. 144(62.9%) males and 85 (37.1%) females.

The causes of death were prematurity and associated complications (n= 66, 28.8%). sepsis (n = 51, 22.3%), and congenital malformation including congenital heart diseases (20.9%), metabolic diseases (n=15, 6.55%) birth asphyxia (n = 12, 5.24%).

The incidence of deaths is much higher in referred cases (25.2%) in comparison with death of cases came from home (8.1%).
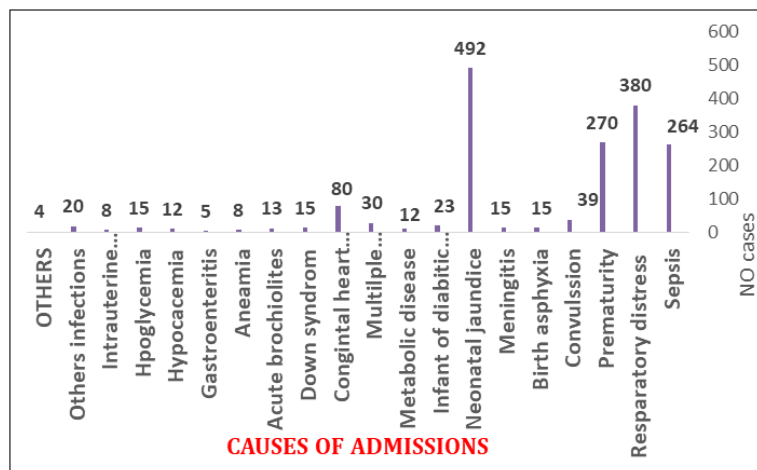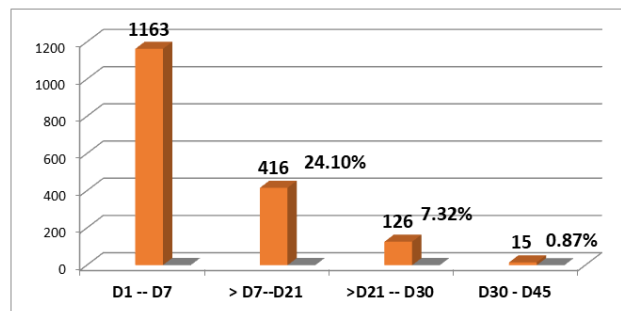


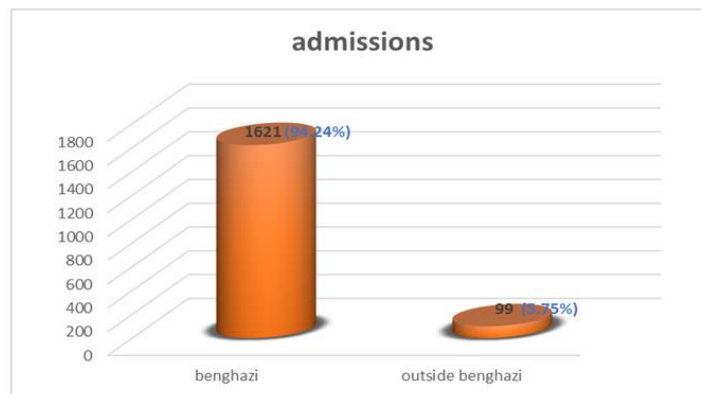**Total admissions and gender distribution 2019**
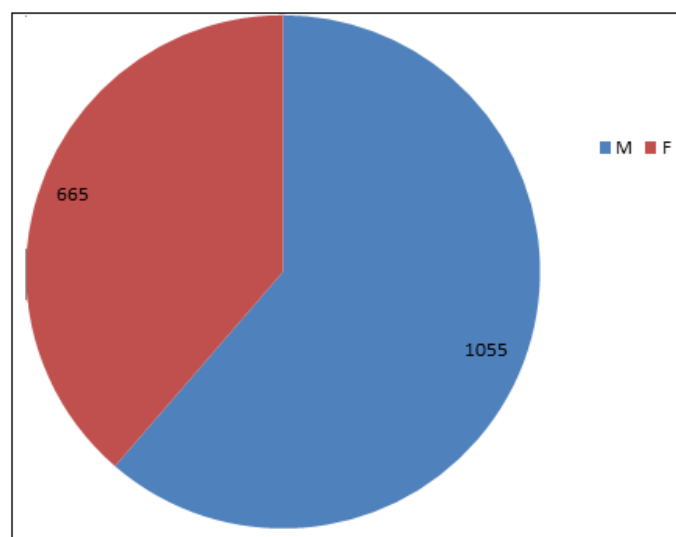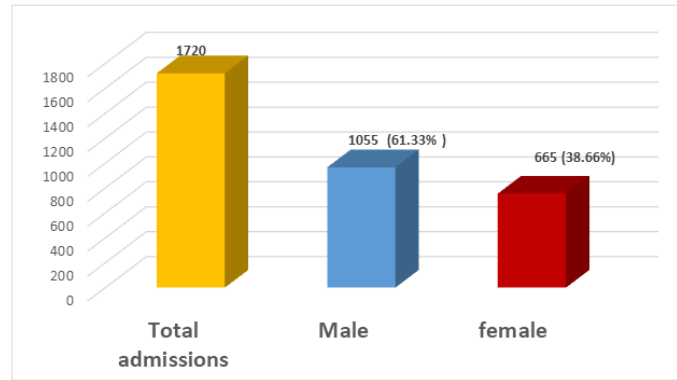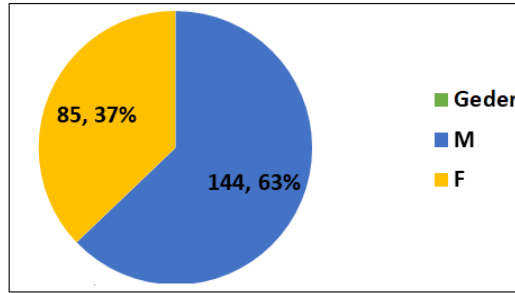
**Admissions according to age distribution**



**Admissions according to residence**

| city | No of cases | percent |
|------|-------------|---------|
| Benghazi | 1621 | **94.24%** |
| Darna | 8 | **0.46%** |
| Tobrouk | 7 | **0.40%** |
| Ejdabia | 27 | **1.57%** |
| Albeda | 10 | **0.58%** |
| Almaraj | 15 | **0.87%** |
| alkofra | 5 | **0.29%** |
| Jalo | 3 | **0.17%** |
| Sabha | 2 | **0.12%** |
| Saloog | 5 | **0.29%** |
| Alabiar | 9 | **0.52%** |
| Marada | 2 | **0.12%** |
| Seret | 6 | **0.35%** |

**Admissions from Benghazi and outside Benghazi**



**Causes of deaths**
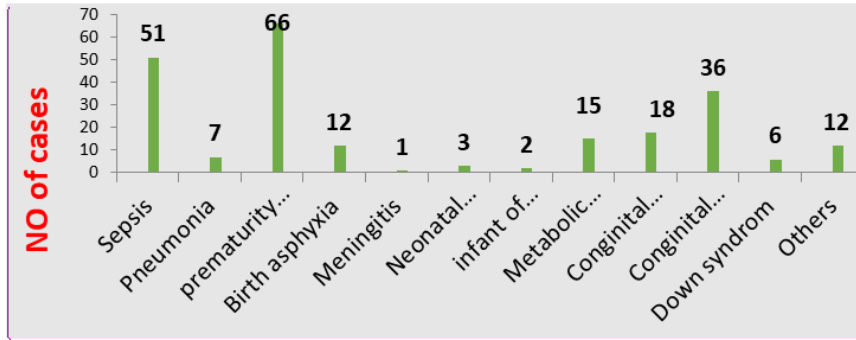
**Deaths gender distribution (total =229)**



| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| ■ D1 - D7 | | 149 | | 65% |
| ■ > D7 - D14 | | 29 | | 12.60% |
| ■ >D14 - D21 | | 20 | | 8.73% |
| ■ >D21 - D45 | | 31 | | 13.54% |
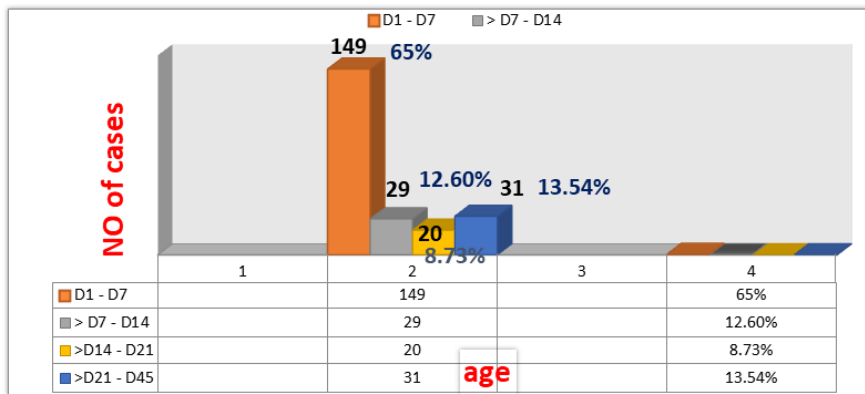
**Deaths age distribution**

**Deaths according to age distribution**

| AGE | NO of cases | percent |
|---|---|---|
| D1-1week | 149 | **%65** |
| 1weeks-2weeks | 29 | **12.60%** |
| 2weeks- weeks | 20 | **8.73%** |
| >weeks 3 | 31 | **13.54%** |
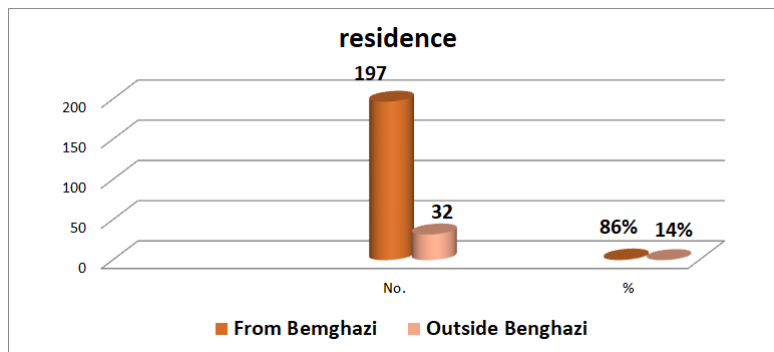


**Deaths according area of residence**

**Deaths according to residence**

| city | NO of cases | percent |
|---|---|---|
| Benghazi | 197 | **86% (12.2%)** |
| Ejdabia | 11 | **4.8% (40.7%)** |
| Albeda | 4 | **1.75% (40%)** |
| Almaraj | 6 | **2.63% (40%)** |
| Seret | 4 | **1.75% (66.7%)** |
| Tobrouk | 3 | **1.31% (42.9%)** |
| Darna | 2 | **0.88% (25%)** |
| alkofra | 2 | **0.88% (40%)** |
| Total deaths | 229 | **100%** |

| Chi-Square Tests | | | | | |
|---|---|---|---|---|---|
| | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | 2.674[a] | 1 | .102 | | |
| Continuity Correction[b] | 2.335 | 1 | .127 | | |
| Likelihood Ratio | 2.679 | 1 | .102 | | |
| Fisher's Exact Test | | | | .109 | .063 |
| Linear-by-Linear Association | 2.668 | 1 | .102 | | |
| N of Valid Cases | 457 | | | | |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 58.37. | | | | | |
| b. Computed only for a 2x2 table<br>p value is 0.10 > 0.05 ….not significant | | | | | |
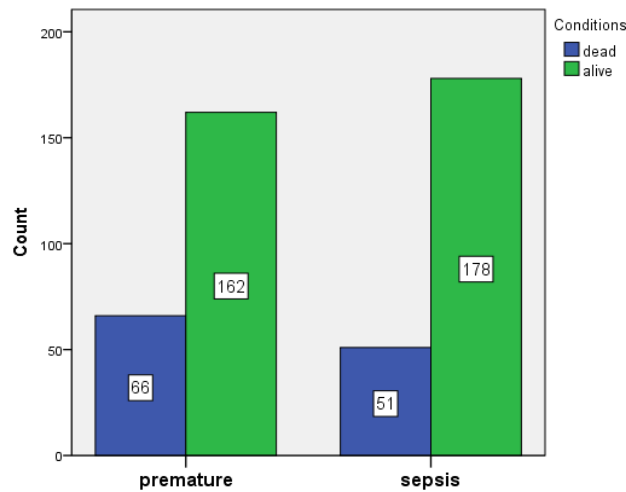


# DISCUSSION

Out of 1720 neonatal admissions to the Benghazi Children Hospital during 2019, there were 229 neonatal deaths (13.3%). The remaining 1491 (86.7%) neonates were discharged after improvement.

In this study, the male gender was predominant in admissions and deaths 62%. Most of admissions and deaths occurred at first week of life (68% and 65% respectively),

The common cause admission at Benghazi Children Hospital were Jaundice followed by prematurity. Whereas Rakesh's study in 2019 revealed that neonatal jaundice, birth asphyxia, and sepsis are the most common causes of admission (Kumar *et al*., 2019).

The common cause of death is prematurity and related problems (28.82%). The neonatal mortality is higher but the causes and other variables are similar to the data reported by a study done on 2015 (Zahra Alharam, Isaada Ali Abdalla Elsaeti, Mohamed Masood *et al*.,) 12 at neonatal department, Benghazi children hospital, which recorded 1610 newborn admitted to Benghazi neonatal department ,deaths was 122(7.5%)

,common causes of deaths is premature (26.23%) and 51.6% of deaths occurred in the first week of life a.

In Tobrouk medical center a study done by Eman altarhoni, Nema alhoni 2018-2019 show results of16.36% of neonatal deaths, the main cause of death was prematurity 61.1% and 57% of deaths in first week of life.

Anther study done in Misurata general hospital in 2012, in this study the neonatal mortality rate among 6520 newborns was 12 per 1000 live births and the deaths in the SCBU was 10.06%,the majority of deaths (88%) occurred during early neonatal period and the common cause of death is prematurity (37.5%) sepsis (18%).

Our study is agreed with a study conducted in Johannesburg, South Africa 2016 were prematurity was the main cause of death (40%) and in this study most of the deaths occurred in the first week of life [14].

## CONCLUSIONS
1. The study found that the neonatal mortality at Benghazi children hospital is nearly similar to the rates reported in other hospitals in Libya and internationally.
2. Much higher rate of deaths noted in the referred case from privet clinics and other cities.
3. Most of neonates died were premature and within the first 7days of life as reported in the literature.

## RECOMMENDATIONS
- High levels of neonatal care and facilities should be available in all general hospitals and privet clinics
- The transfer ambulances should be provided with portable incubators and portable ventilators and qualified persons
- The other specialties such as pediatric surgery, neurosurgery and ENT should be available in other cities to ovoid complications and delay in managing such cases
- Neonatal screening program should be started for early detection neonatal diseases specially metabolic and inherited diseases.
- Important drugs for neonates such as surfactant and prostaglandinE1 should be available and ready for use in all neonatal care units.
- Nursing staff should be increased in enough numbers (at least one nurse for each 3 neonates) in all NCUs and should be highly qualified for neonatal care
- Sour results proportion of facility-based neonatal deaths was unacceptably high. The main causes of death were preventable and treatable. Hence, improving the timing and quality of antenatal care is essential for early detection, anticipating high-risk newborns, and timely interventions.

Furthermore, tertiary health facilities could lead to a reduction in neonatal death in this setting.

### Limitation of the study
1. The data collected in this study only reflected a percentage of Benghazi Pediatric Hospital cases and not all cities in the country.
2. Important missing information not recorded in medical records was significant in some variables such as birth weight and maturity. Therefore, lack of information on the death certificates creates errors

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