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Hospital Outcome of Preterm Babies at the Regional Hospital Limbe: A 4-Year Retrospective Study

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ABSTRACT

Background: *Globally, preterm birth and its complications have become major public health problems as it is a major determinant of neonatal morbidity and mortality with long-term adverse health consequences. It is the leading cause of neonatal and under-5 mortality globally. In Cameroon, especially in the South West Region, there is a paucity of data as concerns preterm birth and its related morbidities and outcome.*

Objectives: *Our objective was to determine the prevalence and hospital outcome of preterm babies at the Regional Hospital Limbe.*

Methods: *A hospital-based cross-sectional study with a retrospective review of files of preterm babies admitted in the neonatology unit from the 1st January 2017 to 31st December 2020. A structured data collection sheet was used to collect information from the files. Information obtained included independent variables (gestational age at birth, gender, birth weight, hospital complications during admission, treatment received and duration of admission) and dependent variables (dead or discharge). Relationship between dependent and independent variables was tested using Pearson Chi-square. Multivariate logistic regression was used to identify factors and independent associations.*

Result: *Preterm admissions constituted 16.5% of the total admissions with a male to female ratio of 1:1.2. The common morbidities were respiratory distress 132(49.1%), hypothermia 72(26.8%), anaemia 70(26.0%), infection 65(24.2%) and jaundice 63(23.4%). The mortality rate was 31.8%. Preterm babies who had congenital malformation (AOR: 25.39;95%CI:1.80-356.38), apnoea (AOR:6.36;95%CI:1.49-27.09), respiratory distress (AOR:6.15;2.75-13.77) and anaemia (AOR:2.19;95%CI:1.07-4.50) were more likely to die compared to those who did not have these morbidities. Also, male preterm babies (AOR:2.72;95%CI:1.35-5.48) were more likely to die than their female counterparts.*

Conclusion: *Preterm babies constituted a significant percentage of neonatal admissions at the Regional Hospital Limbe with the most frequent complications being respiratory distress, hypothermia, anaemia, infection and jaundice. The mortality rate was high, with more preterm babies dying from congenital malformation, apnoea, respiratory distress, and anaemia were strongly associated with mortality.*

Keywords
Preterm, prevalence, morbidity, mortality,

Introduction
Preterm birth (PTB) is defined by the World Health Organisation (WHO) as any viable birth before 37 completed weeks of gestation or less than 259 days since the first day of a woman's last menstrual period. It is classified as being extremely preterm (less than 28 weeks), very preterm (28 to less than 32 weeks), and moderate to late preterm (32 to less than 37 weeks) [1].

According to the WHO, nearly 15 million premature babies are born annually worldwide of whom one million do not survive beyond the neonatal period [2,3]. Preterm birth-related complications have replaced pneumonia as the leading cause of mortality, not only in the neonatal period but also in the global under-5 mortality [4]. The rate of preterm birth among 184 countries ranges from 5 to 18% of newborns [2,5]. In Europe, the prevalence of preterm birth is 5% to 10%. India, China, Nigeria, Pakistan, Indonesia, and the United States account for 50% of the total preterm births in the world [6].

Africa and South Asia account for 60% of preterm births [7-9]. Prematurity is one of the leading causes of neonatal deaths in Africa with a prevalence of about 11.9% [1]. In Africa, the frequency of prematurity is estimated to be above 15%. According to the United Nations Children's Fund (UNICEF) data for prematurity in Cameroon, the preterm birth rate is estimated to be 13% [10]. The survival of these preterm infants greatly depends on their biological maturity and technological advancement [11]. Factors such as level of prenatal care, gestational age at birth, sex, availability of resources, adequate and well-trained personnel also influence management success of prematurity [12].

Preterm birth remains an important public health priority worldwide. There is a need for evidence-based strategies to prevent prematurity from occurring, as well as mitigating its effects on preterm newborns particularly in low-resource settings [13]. With the understanding that innovative solutions are needed to decrease mortality from preterm birth, the World Health Organization (WHO) published recommendations in 2015 on interventions to improve quality of care and outcomes surrounding preterm birth [14]. The issue of preterm birth is of paramount significance for achieving United Nations Sustainable Development Goal 3, which aims to end all preventable deaths of newborns and children aged under 5 years by 2030 [6,15]. Thus an urgent need for the establishment of neonatal intensive care units with adequate manpower as well as appropriate diagnostic and management facilities to improve the survival rates of this vulnerable group of patients[12].

Materials and methods
Study setting
This study took place in the neonatology unit of the Regional Hospital Limbe of the Fako Division of the South West Region of Cameroon. The Limbe Regional Hospital is located in the zone two-health area of the Limbe Health District. It is the principal secondary referral Hospital in the region and serves as one of centres for clinical training of medical students. There is a neonatology unit, which is being headed by a Paediatrician who follows up with the children daily and closely assisted by a general practitioner and 10 nurses. It has 10 cots, 5 incubators, 2 phototherapy lamps and 2 oxygen concentrators. These babies are either being transferred from the maternity ward or are referred from other health facilities around.

Study Design
This was a hospital-based cross-sectional study with the retrospective review of files of preterm babies admitted at the neonatology unit of the Regional Hospital Limbe from 1st January 2017 to 31st December 2020.

Inclusion Criteria
We included files of all preterm neonates admitted into the neonatology unit within the study period.

Exclusion Criteria
We excluded files of preterm babies that were incomplete and missing during the study period.

Data Collection and Procedure
After having gained access to the register of admission of neonates at the neonatology unit, the total number of neonates and preterm babies admitted during the study period was obtained. The available files were sorted from the archives. Files of Preterm babies with missing information were removed. The files which were left were those that met up with the inclusion criteria. Structured data collection sheets were used to collect information from the files of the preterm babies that met up the inclusion criteria. The information such as maternal sociodemographic characteristics (age, occupation, and area), gestational age of the preterm at birth, weight at birth, gender, hospital complications, treatment received, source of feeding, duration of hospitalization and outcome (discharged or died) were recorded in the data collection sheets.

Data analysis
Data collected were coded and entered into excel sheet and exported into Statistical Package for Social Sciences version 26.0 for analysis. Birth weight and gestational age at birth were categorized using WHO standards. The independent variables were maternal age, occupation, marital status, area, gestational age at birth, gender, birth weight, place of birth, hospital complications, treatment, source of feeding, duration of hospitalization, while the dependent variables included outcome (discharged, died). The first part of the analysis dealt with descriptive statistics to ascertain the frequency of the variables with categorical variables were presented as frequencies and percentages while continuous variables were presented as means and standard deviations. The Chi-square test and Fisher's exact test were used to establish if there was a relationship between independent and dependent variables. All independent variables with p-values less than 0.05

in the chi-squared analysis were included in the final logistic regression model. Statistical significance was set at a p-value <0.05 at a 95% confidence interval.

Ethical considerations

Ethical clearance was obtained from the Institutional review Board of the Faculty of Health Sciences, University of Buea (Ref. No. 2021/1296-02UB/SG/IRB/FHS). Administrative approval was obtained from the Dean of the Faculty of Health Sciences, University of Buea (Ref. No. 2021/950/UB/VD/RC/FHS), and the Regional Delegate of Public Health in the South West Region (Ref. No. R11/MINSANTE/SWR/RDPH/PS/514/784). Information collected from the files was used exclusively for this study.

Results

Trend of preterm admission over four years

A total of 1968 babies were admitted at the neonatology of which 324 were preterm and 1644 were born at term. There were 52 missing files of preterm babies with 3 incomplete files. Thus, we worked with 269 files. The prevalence of preterm babies admitted was 16.5%. There has been an increase in preterm admission with the highest recorded 97 (29.9%) in 2019, as depicted in figure 1 below.

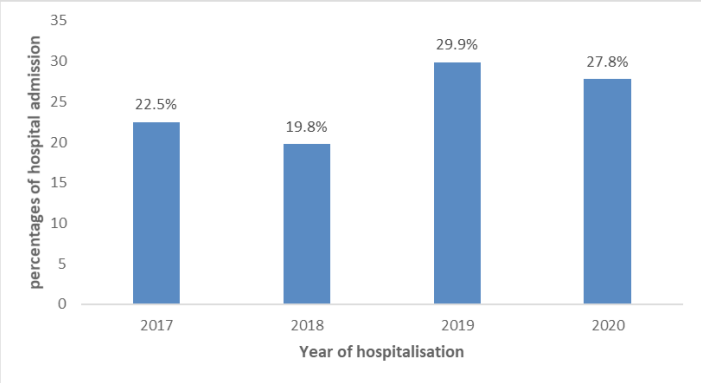

Figure 1: Admission of preterm babies with respective years.

Sociodemographic characteristics of mothers

The age, occupation, and marital status of 5,6 and 3 mothers respectively were not recorded in the files of their preterm babies. The age of the mothers ranged from 15 to 45 years with a mean age of 27.1±5.3 years. Most of the mothers were aged 20 to less than 35 years 221 (83.7%). Majority of the were unemployed 116 (44.1%), married 122 (45.4%) and lived in urban areas 187 (69.5%), as depicted in table 1 below.

Table 1: Maternal sociodemographic characteristics (n=269).

Variable	Frequency (n)	Percentages (%)
Age groups (years) (n=264) *		
<20 (15-19)	17	6.4
20-<35	221	83.7
≥35 (35-45)	26	9.8
Occupation (n=263) *		
Employed	37	14.1
Self-employed	110	41.8
Unemployed	116	44.1
Marital status (n=266) *		
Single	130	48.9
Married	136	50.6
Area (n=269)		
Rural area	82	30.5
Urban area	187	69.5

*= missing information

Profile of preterm babies

The gestational age of the preterm babies ranged from 21 to 36 weeks with a mean age of 32.4 weeks ± 2.8 weeks. Most of the preterm babies were late preterm 109 (40.5%), with 3 (4.8%) being extremely preterm, as shown in figure 2 below.

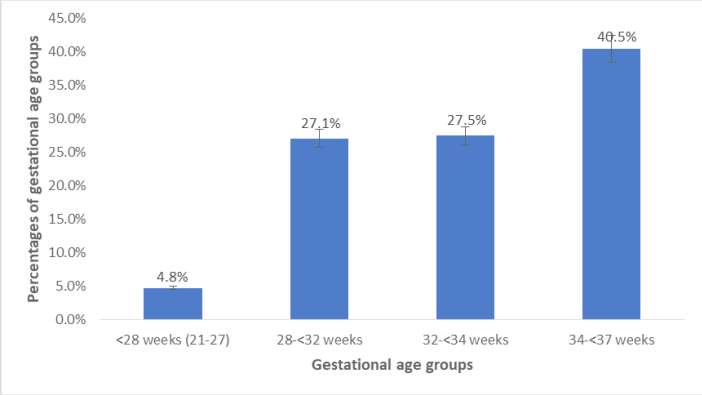

Figure 2: Gestational age groups distribution of preterm babies.

Females dominated with most weighing 1500g to <2500g and born at the Regional Hospital Limbe, as depicted in table 2 below.

Table 2: Profile of preterm babies at presentation to the neonatology unit (n=269).

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	123	45.7
Female	146	54.3
Place of birth		
Regional Hospital Limbe (RHL)	238	88.5
Out of Regional Hospital Limbe	31	11.5
Gestational age groups (weeks)		
<28 (21-27)	13	4.8
28 - <32	73	27.1
32 - <34	74	27.5
34 - <37	109	40.5
Birth weight groups (g)		
<1000 (500-<1000)	11	4.1
1000-<1500	55	20.4
1500-<2500	195	72.5
≥2500g (2500-2700)	8	3.0

Hospital complications of preterm babies

Ten complications were assessed. The majority 216 (80.3%) of the preterm babies had one or more hospital complications. The most common hospital complications were respiratory distress

132 (49.1%), followed by hypothermia 72 (26.8%), anaemia 70 (26.0%), infection 65 (24.2%), and jaundice 63 (23.4%) as depicted in table 4 below.

Table 4: Hospital complications of preterm babies at the neonatology unit (n=269).

Variable	Frequency (n)	Percentage (%)
Hospital complications		
Yes	216	80.3
No	53	19.7
Respiratory distress		
Yes	**132**	**49.1**
No	137	50.9
Hypothermia		
Yes	**72**	**26.8**
No	197	73.2
Anaemia		
Yes	**70**	**26.0**
No	199	74.0
Infection		
Yes	**65**	**24.2**
No	204	75.8
Jaundice		
Yes	**63**	**23.4**
No	206	76.6
Feeding difficulties		
Yes	31	11.5
No	238	88.5
Necrotizing enterocolitis (NEC)		
Yes	16	5.9
No	253	94.1
Apnoea		
Yes	11	4.1
No	258	95.9
Seizure		
Yes	7	2.6
No	262	97.4
Congenital malformation		
Yes	4	1.5
No	265	98.5

Association between gestational age groups and complications

The bivariate analysis revealed gestational age groups of preterm babies and how they influenced the complications. Specifically, respiratory distress (p=0.000), hypothermia (0.000), necrotising enterocolitis (p=0.013) and feeding difficulties (p=0.005) were statistically significant to complications of the preterm babies. This analysis shows that there is a decreased vulnerability to complications with increase gestational age as depicted in table 5 below.

Table 5: Association between of gestational age groups and complications (n=269).

Variable	Gestational age groups (weeks) <28 (%) 28-<32 (%) 32-<34 (%) 34-<37 (%)				p-value
Respiratory distress					
Yes	12 (92.3)	48 (65.8)	31 (41.9)	41 (37.6)	**0.000**
No	1 (7.7)	25 (34.2)	43 (58.1)	68 (62.4)	
Hypothermia					
Yes	9 (69.2)	29 (39.7)	16 (21.6)	18 (16.5)	**0.000**
No	4 (30.8)	44 (60.3)	58 (78.4)	91 (83.5)	
Anaemia					
Yes	5 (38.5)	23 (31.5)	22 (29.7)	20 (18.3)	0.109
No	8 (61.5)	50 (68.5)	52 (70.3)	89 (81.7)	
Infection					
Yes	1 (7.7)	18 (24.7)	22 (29.7)	24(22.0)	0.326
No	12 (92.3)	55 (75.3)	52 (70.3)	85 (78)	
Jaundice					
Yes	0 (0)	15 (20.5)	15 (20.3)	33 (30.3)	0.056
No	13 (0)	58 (79.5)	59 (79.7)	76 (69.7)	
Feeding difficulties					
Yes	1 (7.7)	9 (12.3)	16 (76.2)	5 (4.6)	**0.005**
No	12 (92.3)	64 (87.7)	5 (23.8)	104 (95.4)	
Necrotizing enterocolitis (NEC)					
Yes	0 (0)	3 (4.1)	10 (13.5)	3 (2.8)	**0.013**
No	13 (100)	70 (95.9)	64 (86.5)	106 (97.2)	
Apnoea					
Yes	0 (0)	3 (4.1)	4 (5.4)	4	0.818
No	13 (100)	70 (95.9)	70 (94.6)	105	
Seizure					
Yes	0 (0)	1 (1.4)	4 (5.4)	2 (1.8)	0.343
No	13 (100)	72 (98.6)	70 (94.6)	107 (98.2)	
Congenital malformation					
Yes	1 (7.7)	1 (1.4)	2 (2.7)	0 (0)	0.121
No	12 (92.3)	72 (98.6)	72 (97.3)	109 (100)	

Treatment given to preterm babies

The treatment received by preterm babies included; oxygen, antibiotics, caffeine citrate, aminophylline, cimetidine, phototherapy, glucose, phenobarbital, blood transfusion, metronidazole, and gastric lavage. The three most frequently used treatments were the first line anti biotherapy 269 (100%) followed by cimetidine 148 (55.0%) and oxygen 139 (51.7%), as depicted in table 6 below.

Table 6: Treatment given to preterm babies (n=269)

Variable	Frequency (n)	Percentage (%)
Oxygen therapy		
Yes	139	51.7
No	130	48.3
First-line anti biotherapy		
Yes	269	100.0
No	0	0
Second-line anti biotherapy		
Yes	53	19.7
No	216	80.3

Third line anti biotherapy		
Yes	1	0.4
No	168	99.6
Caffeine citrate		
Yes	94	34.9
No	175	65.1
Aminophylline		
Yes	52	19.3
No	217	80.7
Cimetidine		
Yes	148	55.0
No	121	45.0
Phototherapy		
Yes	63	23.4
No	206	76.6
Phenobarbital		
Yes	6	2.2
No	263	97.8
Blood transfusion		
Yes	60	22.3
No	209	77.7
Metronidazole plus lavage		
Yes	18	6.7
No	251	93.3

Nutrition, duration of hospitalisation, and hospital outcome of preterm babies

Majority 190 (70.6%) of the preterm babies began feeding on day 2 of hospitalization. Most of the them were started on breast milk 257 (95.5%). The majority 198 (73.6%) of the babies were hospitalized for less than 14 days. A greater proportion of preterm babies 205 (76.2%) were discharged, as depicted in table 7 below.

Table 7: Nutrition, duration of hospitalisation, and hospital outcome of preterm babies (n=269).

Variable	Frequency (n)	Percentage (%)
Started nutrition (n=269)		
Yes	**260**	**96.7**
No	9	3.3
Onset of nutrition (n=260*)		
Day 1	31	11.9
Day 2	**190**	**73.1**
Day 3	38	14.6
Day 4	1	0.4
Breast milk (n=260*)		
Yes	**257**	**98.8**
No	3	1.2
Artificial milk (n=260*)		
Yes	11	4.2
No	249	95.8
Duration of hospitalization (days) (n=269)		
<14	**198**	**73.6**
14 to <30	61	22.7
≥30	10	3.7
Outcome (n=269)		
Discharged	**205**	**76.2**
Died	64	23.8

*= missing information

Mortality rate of hospitalized preterm babies

Out of the 324 preterm babies hospitalized at the neonatology unit, 103 of them died giving a mortality rate of 31.8%. Majority of the deaths 33 (32.0%) were recorded in 2019 following by 29 (28.2%) in 2020, 24 (23.3%) in 2018 and 17 (16.5%) in 2017 as shown in figure 3 below.

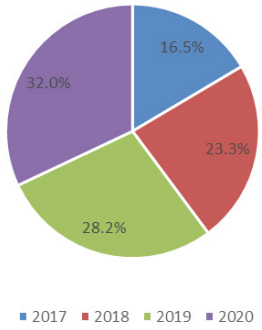

Figure 3: Distribution in the proportion of mortality with the respective years.

Factors associated with hospital outcome of preterm babies (bivariate analysis)

Association between preterm profile and hospital outcome

The bivariate analysis revealed the characteristics of preterm babies and how they influenced the outcome. Specifically, gestational age (p=0.000), gender (p=0.012), and birth weight (p=0.000) of the preterm babies were significantly associated with mortality. In addition, temperature (p=0.001) and oxygen saturation (p=0.000) on admission significantly influenced the outcome as shown below a depicted in table 8 below.

Table 8: Factors associated with mortality.

Variable	Outcome		p-value
	Died (%)	Discharged (%)	
Gestational age groups (weeks)			
<28	9 (69.2)	4 (30.8)	**0.000**
28-<32	24 (32.9)	49 (67.1)	
32-<34	20 (27.0)	54 (73.0)	
34-<37	11 (10.1)	98 (89.9)	
Gender			
Male	38 (30.9)	85 (69.1)	**0.012**
Female	26 (17.8)	120 (82.1)	
Birth weight groups (g)			
<1000	8 (72.7)	3 (27.3)	**0.000**
1000g-<1500	23 (41.8)	32 (58.2)	
1500-<2500	33 (16.9)	162 (83.1)	
>2500	0(0)	8 (100)	
Place of birth			
RHL	55 (23.1)	183 (76.9)	0.466
Out of RHL	9 (29.0)	22 (71.0)	
Temperature groups (^{0}C)			
<36.5	29 (39.2)	45 (60.8)	**0.001**
36.5-37.5	32 (19.2)	135 (80.8)	
>37.5	3 (10.7)	25 (89.3)	
Saturation groups			
<90	52 (40)	78 (60)	**0.000**
≥90	12 (8.6)	127 (91.4)	

Association between complications and outcome of preterm babies

The hospital complications that were statistically significant to the outcome of preterm babies were respiratory distress (0.000), hypothermia (0.001), apnoea (0.002), anaemia (0.006), jaundice (0.018), congenital malformation (0.015), as depicted in table 9 below.

Table 9: Association between complications and outcome of preterm babies.

Variable	Outcome Died (%)	Discharged (%)	p-value
Complication			
Yes	63 (29.2)	153 (70.8)	**0.000**
No	1 (1.9)	52 (98.1)	
Respiratory distress			
Yes	53 (40.2)	79 (59.8)	**0.000**
No	11(8.0)	126 (92.0)	
Hypothermia			
Yes	29 (40.3)	43 (59.7)	**0.001**
No	35 (17.9)	161 (82.1)	
Apnoea			
Yes	7 (63.6)	4 (36.4)	**0.002**
No	57 (22.1)	201(77.9)	
Necrotizing enterocolitis (NEC)			
Yes	7 (43.8)	9 (56.2)	0.053
No	57 (22.5)	196 (77.5)	
Anaemia			
Yes	25 (35.7)	45 (64.3)	0.006
No	39 (19.6)	160 (80.4)	
Feeding difficulties			
Yes	10 (32.3)	21 (67.7)	0.239
No	54 (22.7)	184 (77.3)	
Infection			
Yes	16 (24.6)	49 (75.4)	0.858
No	48 (23.5)	156 (76.5)	
Seizure			
Yes	1 (14.3)	6 (85.7)	0.55
No	63 (24.0)	199 (76.0)	
Jaundice			
Yes	8 (12.7)	55 (87.3)	0.018
No	56 (27.2)	150 (72.8)	
Congenital malformation			
Yes	3 (75)	1 (25)	0.015
No	61 (23.0)	204 (77.0)	

Factors associated with mortality of preterm babies (multivariate analysis)

Following multivariate analysis, gestational age, gender, oxygen saturation, congenital malformation, respiratory distress, apnoea, and anaemia were statistically significant. Preterm babies with congenital malformation were 25 times (AOR: 25.39;95%CI:1.80-356.38) more likely to die than those without congenital malformation. Furthermore, preterm babies who had apnoea (AOR:6.36;95%CI:1.49-27.09) and respiratory distress (AOR:6.15;2.75-13.77) were 6 times more likely to die than their counterpart without apnoea and respiratory distress. Preterm babies with anaemia were 2 times (AOR:2.19;95%CI:1.07-4.50) were two times more likely to die than their counterparts without anaemia.

Preterm babies born at 28 to less than 32 weeks (AOR:0.24;95%CI:0.05-0.96) and at 34 to less than 37 weeks (AOR:0.09;95%CI:0.02-0.41) of gestation had lesser chances of dying as compared to their counterparts born before 28 weeks of gestation.

Male preterm babies were about 3 times (AOR:2.72;95%CI:1.35-5.48) more likely to die than their female counterparts. Preterm babies who had an oxygen saturation of 90% and above (AOR:0.16; 95%CI:0.08-0.32) had lesser chances of dying as compared to those with oxygen saturation of less than 90% as depicted in table 10 below.

Table 10: Factors associated with mortality of preterm babies (Multivariate analysis).

Variable	Adjusted OR (95% CI)	p-value
Gestational age groups (weeks)		
<28	1	
28-<32	0.24 (0.05-0.96)	0.044
34-<37	0.09 (0.02-0.41)	0.001
Gender		
Male	2.72 (1.35-5.48)	0.005
Female	1	
Temperature groups (^{0}C)		
<36.5	1.23 (0.07-21.87)	0.888
36.5-37.5	1.18 (0.28-4.89)	0.824
>37.5	1	
Oxygen saturation (%)		
<90	1	
≥90	0.16 (0.08-0.32)	0.000
Respiratory distress		
Yes	6.15 (2.75-13.77)	0.000
No	1	
Apnoea		
No	1	
Yes	6.36 (1.49-27.09)	0.012
Anaemia		
No	1	
Yes	2.19 (1.07-4.50)	0.032
Congenital malformation		
No	1	
Yes	25.39 (1.80-356.38)	0.016
Hypothermia		
No	1	
Yes	1.38 (0.11-17.24)	0.803

Discussion

Neonatal and under-5 mortality attributable to preterm birth and complications remains a huge challenge globally and in low- and middle-income countries like Cameroon. Despite improvement in postnatal care provided in delivery rooms like warmth, breastfeeding support and neonatal intensive care units, preterm babies remain vulnerable to a wide array of complications in the neonatal period and beyond.

Few studies have been done in the South West Region of Cameroon on the outcome of preterm babies admitted to the neonatology unit. This hospital-based retrospective cross-sectional study was carried out to determine the prevalence of the preterm babies admitted at the neonatology unit, assess frequent hospital complications, mortality rate and complications associated with mortality.

Characteristics of preterm babies

We found out that preterm babies born at 32 to 36 weeks of gestation predominated (68.0%) while those born at less than 28 weeks of gestation were the least (4.8%). A similar trend was found in retrospective studies carried out by Abdul-Mumin et al in Ghana [16] and Paudel et al in Nepal [17]. This was however in line with the global report on prematurity in which preterm babies born at 32 to 36 weeks of gestation accounted for about 84.3% of cases whereas preterm babies born at less than 28 weeks of gestation accounted for only 5.3%. The very low prevalence of extremely preterm babies can be explained by the high stillbirth in this group [18].

In our study population, there was female predominance with a female to male ratio of 1.2:1. This finding was similar to those observed by Abdul-Mumin et al in Ghana [16] and Gupta et al in India [19]. However, our finding was contrary to those obtained in studies conducted by Chiabi et al in Cameroon [7] and Ayele et al in Ethiopia [20] who had a male predominance.

Prevalence of preterm babies admitted

According to the study, the prevalence of preterm babies admitted at the neonatology unit of the Regional Hospital Limbe (RHL) was 16.5% of the total number of neonates hospitalised during the study period. This high rate could be explained by the fact that RHL is one of the main centres in the South West Region and serves as a referral centre for the management of preterm babies in the area. The prevalence is similar to that reported by Ugwu in Nigeria [21] and Paudel et al in Nepal [17] who both reported a prevalence of 16.4%.

Our study had a lower prevalence than the 26.5% reported by Chiabi et al. in Cameroon [7] who carried out a retrospective cross-sectional study at the neonatology unit of the Yaounde Gynaeco-Obstetric and Paediatric Hospital (YGOPH). This could be explained by the difference in the long duration of the study with the hospital being one of the main referral centres in the Country where very complicated cases are referred. On the other hand, Awoala et al in Nigeria recorded a higher prevalence rate (46.4%) of preterm admissions [21]. This can be explained by the difference in the level of the neonatology unit. They did their study in a tertiary unit in an overpopulated town.

Hospital complications of preterm babies

We found out that the frequent hospital complications were respiratory distress, hypothermia, anaemia infection and jaundice. This lack of knowledge and practice of correct methods of transportation for these preterm babies like the Kangaroo mother care (KMC) method to prevent hypothermia, is not yet being implemented by most health care professionals in our setting.

A lot of pregnant women are already anaemic despite the iron supplement during pregnancy, this could also favour severe anaemia in our context. Our results were similar to the findings of Ayele et al in Ethiopia [19] where hypothermia, respiratory problems and jaundice were the most common complications and Kunle-Olowu et al in Nigeria [12] who observed respiratory problems, jaundice and sepsis as the most frequent complications.

Mortality rate of preterm babies

The current study had a mortality rate of 31.8% of the total number of preterm babies admitted during the study period. The high mortality rate can be attributed to the complications of preterm babies which arises from their immature systems that are not yet prepared to support life in the extrauterine environment, thus causing them to die Moreover, our study was carried out in a neonatal unit with inadequate infrastructure and limited trained health professionals, this could be the reason for the high mortality rate recorded in our study. Contrary to our study, Khan et al in Pakistan had a much lower mortality rate of 16% [22]. The reason could be that their study was conducted in a neonatal intensive unit with well-equipped infrastructure and adequately trained health professionals.

Factors independently associated with mortality

Respiratory distress, apnoea, anaemia, and congenital malformation were independently associated with the mortality of preterm babies. Preterm babies who had congenital malformation 25 times more likely to die compared to those who did not congenital malformation. The problem of insufficient material resources, a standby team to operate, inadequate postoperative care, and the absence of a neonatal intensive care unit can explain why preterm infants with congenital malformation have high mortality.

Preterm neonates who had apnoea and respiratory distress were both 6 times more likely to die than those who did not have these complications. This could be explained by the fact that there is the unavailability of exogenous surfactant, lack of respiratory support machines, insufficient trained Staff, higher rates of infections, hypoglycemia and the absence of a kangaroo mother care (KMC) unit. Preterm infants who had anaemia were 2 times more likely to die than their counterparts without anaemia.

Our results were similar to the findings obtained by Chiabi et al in Cameroon [7] who found out that there were more deaths in preterm babies who had congenital malformation. Also, Paudel et al in Nepal [17] observed more deaths in preterm babies with respiratory distress syndrome.

Gestational age, gender and oxygen saturation on admission were independently associated with mortality.

Males were about 3 times more likely to die than females. This is finding consistent with a study done by Ayele *et al* in Ethiopia, 2019. This could be explained by the fact that the female fetus has a more favourable hormonal milieu leading to accelerated lung maturation compared to the male fetus. Furthermore, male fetuses are exposed to higher levels of androgen and Mullerian inhibiting substances, which adversely affect surfactant production [20] Preterm babies born at 28 to less than 32 weeks and 34 to less than 37 weeks had lesser chances of dying than those born less than 28weeks gestation. It is well known that the survival of preterm babies increases with each additional gestational week they spend

in utero. Preterm babies are able to adapt to the extra-uterine life as increasing gestational age is associated with better respiratory maturity [20].

Limitation

Due to the retrospective nature of this study, we were unable to get information of some preterm babies which would have been useful for our study as their files were missing.

Strength

This is the first study to be carried out in the South West Region on the hospital outcome of preterm babies.

Conclusion

This study found out that the prevalence of hospitalized preterm babies was 16.4%. Respiratory distress, hypothermia, anaemia, infection, and jaundice were the most common complications in preterm babies. The mortality rate of preterm babies admitted at the neonatology unit was 31.8%. Congenital malformation, apnoea, respiratory distress and anaemia were associated with mortality.

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