https://rijournals.com/research-in-medical-sciences/

RESEARCH INVENTION JOURNAL OF RESEARCH IN MEDICAL SCIENCES 3(1):21-31, 2024

©RIJRMS Publications ISSN: 1597-3107

Proportion and Factors Associated with Low Fifth-Minute Apgar Score Among Singleton Newborn Babies at Jinja Regional Referral Hospital

Kansiime Richard

Faculty of Clinical Medicine and Dentistry Kampala International University Western Campus Uganda.

ABSTRACT

This research looks at the factors that lead to low fifth-minute Apgar scores in singleton babies at Jinja Regional Referral Hospital, as well as their prevalence. Five minutes after birth, the Apgar score—a critical measure of a newborn's health—is computed to determine if medical intervention is necessary. Concerns about the high rates of newborn illness and death in the area prompted the investigation, which sought to determine the main causes of low Apgar scores. Information was gathered from medical records and examined to determine the percentage of babies with an Apgar score of fewer than 7. The correlation between low scores and variables including maternal health, delivery problems, and newborn conditions was investigated. The results show a strong relationship between low fifth-minute Apgar scores and birth weight, method of delivery, mother age, and the quality of prenatal care. The research emphasises how crucial it is to advance maternal and neonatal healthcare procedures in order to improve the outcomes for newborns in this situation. To successfully address the identified risk factors, recommendations are provided for focused interventions and more study.

Keywords: Proportion; Factors; Low; Fifth-Minute Apgar Score; Singleton Newborns

INTRODUCTION

Newborns face the highest risk of dying during the neonatal period—the first 28 days of life—at a rate of 19 deaths per 1,000 live births [1, 2]. Neonatal mortality accounts for 46% of all under-five mortality, with most deaths occurring in low- and middle-income countries [3, 4]. Globally 2.6 million babies died before turning one month old in 2016, with about 50 per cent of these deaths occurring on the first day of life and 75 per cent in the first week of life [5]. The overall progress in reducing neonatal mortality rates has been slower than that reported in under-five mortality; while neonatal mortality declined by 49 per cent from 1990 to 2016, the under-five mortality rate declined by 62 per cent within the same period [4, 6]. Though the global neonatal mortality rate has decreased from 37 deaths per 1,000 live births in 1990 to 19 in 2016, the rate is still unacceptably high in certain regions and countries around the world [7]. Sub-Saharan Africa (SSA) is one of the regions with the highest prevalence of neonatal mortality (38 per cent), with some degree of variation across its countries and only minor declines over the last two decades [8] Within SSA, neonatal mortality rates are unevenly distributed, and countries in the Great Lakes region (Burundi, the Democratic Republic of the Congo (DRC), Kenya, Rwanda, Tanzania, and Uganda) contribute to this burden due to decades of political instability, conflicts, poor quality of healthcare governance, inadequate health financing and human health resources, low standard health service delivery, and poor socioeconomic status [9]. The causes of neonatal mortality are well known and include preterm birth complications, intrapartum-related complications, birth asphyxia, congenital anomalies, and infections such as neonatal sepsis, tetanus, meningitis, and pneumonia [10]. These causes are often exacerbated by underlying determinants, which could be related to the environment of the newborn, whether it is an impoverished family, a marginalised community, or a country consumed by conflict. These underlying determinants operate as socioeconomic factors, maternal lifestyle factors, health service factors, and environmental factors, which could be mitigated through a system wide approach that strengthens the health systems to provide quality health care. Studies have shown that a vast majority of neonatal deaths are preventable through improved access to good-quality maternal and newborn health services delivered by skilled health professionals, clean water supply, proper antenatal and postnatal nutrition for mother and newborn, disinfectants, and skin-to-skin contact [11]. However, in resource-limited countries experiencing prolonged periods of conflict and political instability like those located in the Great African Lakes region, the need

for interventions that target the most significant underlying factors is essential to assist in proper planning and strategic allocation of scarce resources. Hence, this study aimed to ascertain the most significant factors associated with neonatal mortality across countries in the Africa-Great Lakes region to assist in national and regional policy prioritization. Findings from this study will contribute to the existing body of evidence, buttressing the need for improved quality of health services in tackling the problem of neonatal mortality and also assisting in the planning and evaluation of health policies and programmes [12]. The Apgar score, regardless of the underlying cause, is used for comparing the neonatal outcome at different obstetrical units worldwide to measure the quality of obstetrical care. The Apgar score still defines the degree of birth asphyxia according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), despite other available methods indicating birth asphyxia, such as umbilical cord acid-base balance measurement. A low Apgar score of less than seven points at five minutes is known to have implications for neonatal mortality and morbidity, for example, respiratory distress and neurological problems [1] Still, the vast majority of infants with Apgar < 7 points at five minutes (AS5 min < 7) will be healthy both during the neonatal period and later on in life. Previous national and international studies have demonstrated several risk factors for low Apgar scores or asphyxia, although results and definitions differ. The studies comprise socioeconomic, demographic, and medical risk factors. Smoking, low socioeconomic status, single civil status of the mother, maternal short stature, and maternal obesity have all been shown to increase the risk for a low Apgar score. The mode of delivery, intrauterine meconium release, and abnormalities in cardiotocography (CTG) comprise medical risk factors associated with a low Apgar score[13]
Globally, 8.2 million children under the age of 5 die each year, and more than 40% of these are neonatal deaths, occurring before 30 days of life. In sub-Saharan Africa alone, 1.2 million newborns die every year [14], and sub-Saharan Africa has the highest risk of neonatal deaths among the 186 countries studied in 2013 [11]. In Uganda, one child in every 16 does not survive to the fifth birthday, and neonatal deaths account for 42% of under-five deaths ([15]. The Millennium Development Goal on improving under-five survival, where neonatal mortality is a high proportion of all under-five deaths, was not achieved [15, 16]. The current targets in Uganda for the UN Sustainable Development Goal for reducing neonatal mortality risks are being missed since neonatal mortality has stagnated over the last decade. As cited in Kananura et al.[11], the major causes of Uganda's neonatal deaths include sepsis/pneumonia, tetanus, diarrhoea, prematurity, and birth asphyxia [17]. Other studies show that poor access to and utilisation of health services during pregnancy and childbirth, especially the high number of deliveries that take place without skilled birth attendants, are also associated with neonatal deaths. Risk factors, including mothers too young (below age 18), too old (age 35 and older), with short birth intervals, and with too many children, have also been associated with high rates of neonatal mortality [18]. Similarly, Blencowe and Cosens [19] found maternal age at birth and the preceding birth interval to be risk factors for neonatal deaths. However, there is limited literature on the demographic and socioeconomic factors that have consistently, over time, been shown to be associated with neonatal deaths in Uganda. Perinatal morbidity and mortality can be reduced if high-risk infants can be identified and managed appropriately. The present study therefore aimed to assess the proportion and associated factors with a low 5th-minute Apgar score among newborns in JRRH. The study was designed to assess the prevalence and factors associated with a low fifth-minute Apgar score among singleton newborn babies at Jinja Regional Hospital, Jinja District, Uganda.

METHODOLOGY

Study Design

An institution-based retrospective cross-sectional study will be conducted at the JRRH, maternity ward, from April 2021–May 2021.

Area of Study

Jinja Regional Referral Hospital, commonly known as Jinja Hospital, is a hospital in the city of Jinja, eastern Uganda. It is the largest hospital in Eastern Uganda, with a bed capacity of 600, although many more patients are admitted, with many sleeping on the floor. The hospital is located in the centre of Jinja, not far from the source of the Nile. It is the regional referral hospital for the districts of Bugiri, Iganga, Jinja, Kaliro, Kamuli, Mayuge, Kayunga, and parts of Mukono. The coordinates of Jinja Hospital are 00 25 52N, 33 12 18E (latitude: 0.4310; longitude: 33.2050). A total of 400 babies are delivered to Jinja Regional Referral Hospital monthly.

Inclusion criteria

All mother/neonate index singleton live births after 28 weeks of gestation during the study period will be included in the study.

Exclusion Criteria

Deliveries of unknown gestational age (unknown last normal menstrual period and no ultrasound estimation) will not be included.

Sampling Size Determination

Population aged less than one year in Jinja: 5,962
The sample size will be determined using the Krejcie & Morgan Sample Size Formula for a Finite Population [20]:

$s = X^2NP(1-P)$

$d^2(N-1) + X^2P(1-P)$ Where:

s = required sample size.

X = the z value on the table value of chi for 1 degree of freedom at the desired confidence level. (1.96 for a 95% confidence level).

N = the population size (5,962).

P = the population proportion (assumed to be 50 since this would provide the maximum sample size). d = the error margin (.05). Krejcie & Morgan simplified the process of determining the sample size by coming up with a table based on the above formula. Therefore, 357 participants will be considered for the study, and this has been evaluated using Morgan's Table (Appendix V).

Sampling procedures

A systematic random sampling technique has been used to reach each participant. By taking a monthly average of 400 deliveries from the preceding year's report and considering a skip interval of 4, the calculated sample size may be achieved in the three-month data collection period.

Data collection methods and management

The questionnaire will consist of maternal socio-demographic and obstetric variables. In addition, variables related to the newborn have been included. The completeness of the data and the relative accuracy of Apgar score estimation have been evaluated by a senior midwife, who is the maternity ward head, daily.

Data analysis

Data collected will be analysed with the aid of a manual tally and Microsoft Excel spreadsheets and presented in the form of tables, percentages, graphs, and pie charts in a Microsoft Word document.

Quality control

To ensure the validity of the research instrument, the researcher has consulted the opinions of experts in the field of study (service providers, for example, professors, doctors, nurses, and the researcher's supervisor). This has facilitated the necessary revision and modification of the research instruments, thereby enhancing their validity. The sample questionnaires have been filled out with the selected research assistants and translators to ensure that they understand the areas covered by the research.

Ethical Considerations

Clearance was obtained from the Kampala International University-Western Campus faculty of clinical medicine and dentistry through IREC. The research maintained the utmost confidentiality about the respondents. Initials and not patient names were used in the study with backing by patient I.P. numbers. The researcher got permission from the JRRH authorities to proceed with the research before embarking on data collection.

Demographic characteristics of the respondents

A total of 357 mothers were enrolled in the study. The majority of the participants were aged 20 years and below 59(16.5%), 20-34 138(38.7%) while those aged 34 years and above were 160(44.8%) as shown in Figure 1 below;

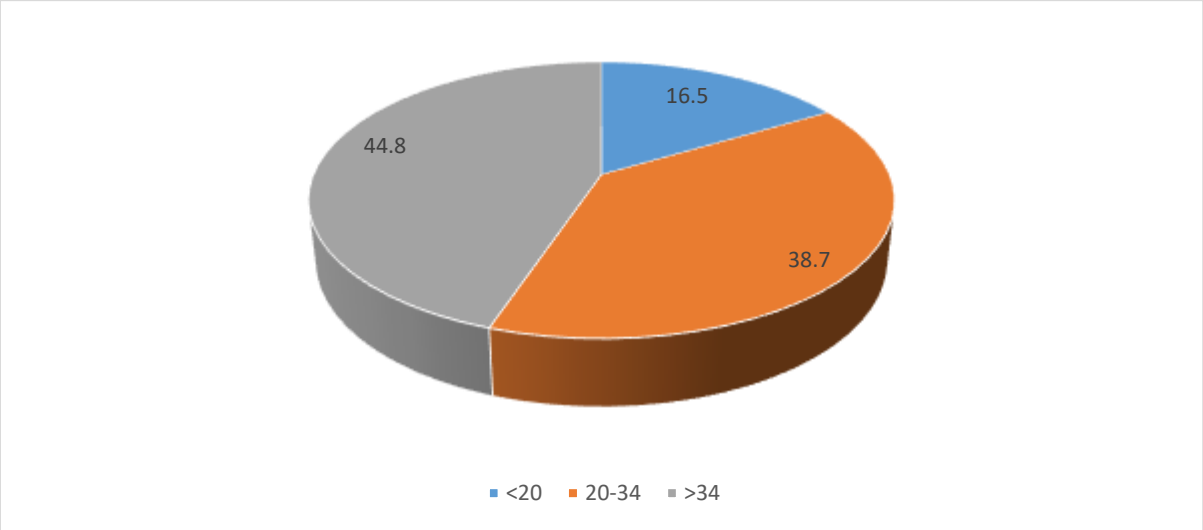

Figure 1 shows the age group of the respondents

The majority, 120(33.6%) of the respondents attained a secondary level of education while the least 43(12.0%) had no formal education. The results are shown in the figure below.

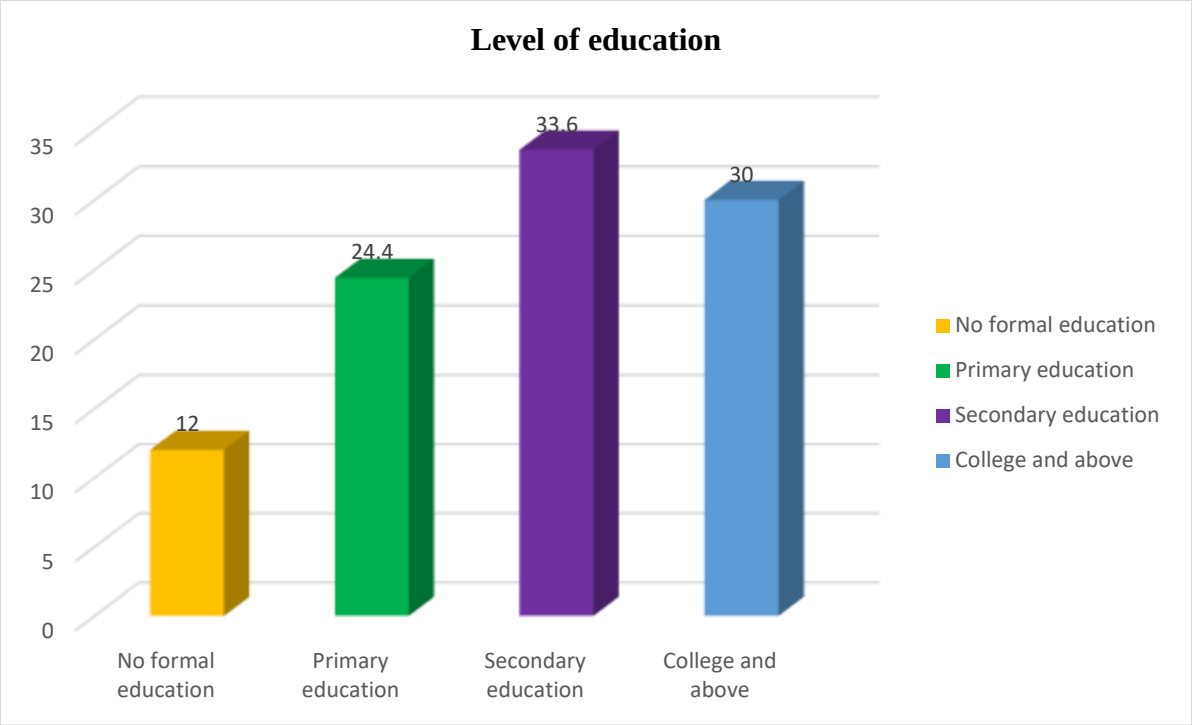

Figure 2: shows the educational level of the respondents

Majority 261(73.1%) were married, 57(16.0%) were single while the least 39(0.9%) separated as shown in figure three below.

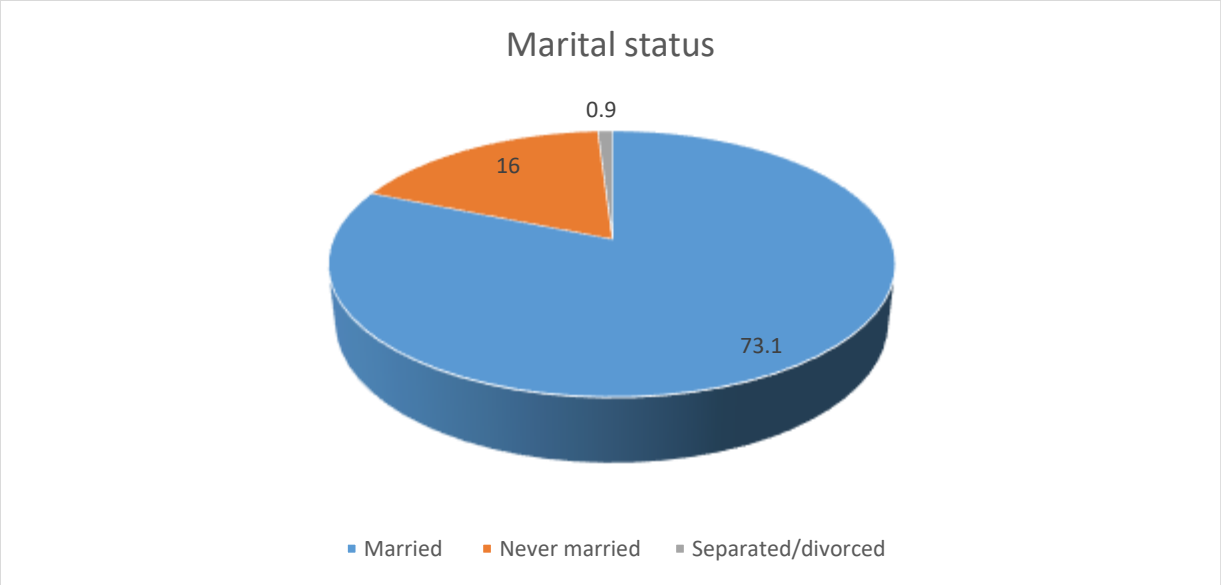

Figure 3: shows the marital status of the respondents

Majority 173(48.5%) had 2/3 children, 96(26.9%) respondents had more than 3 children while the least 88(24.6%) had only one child.

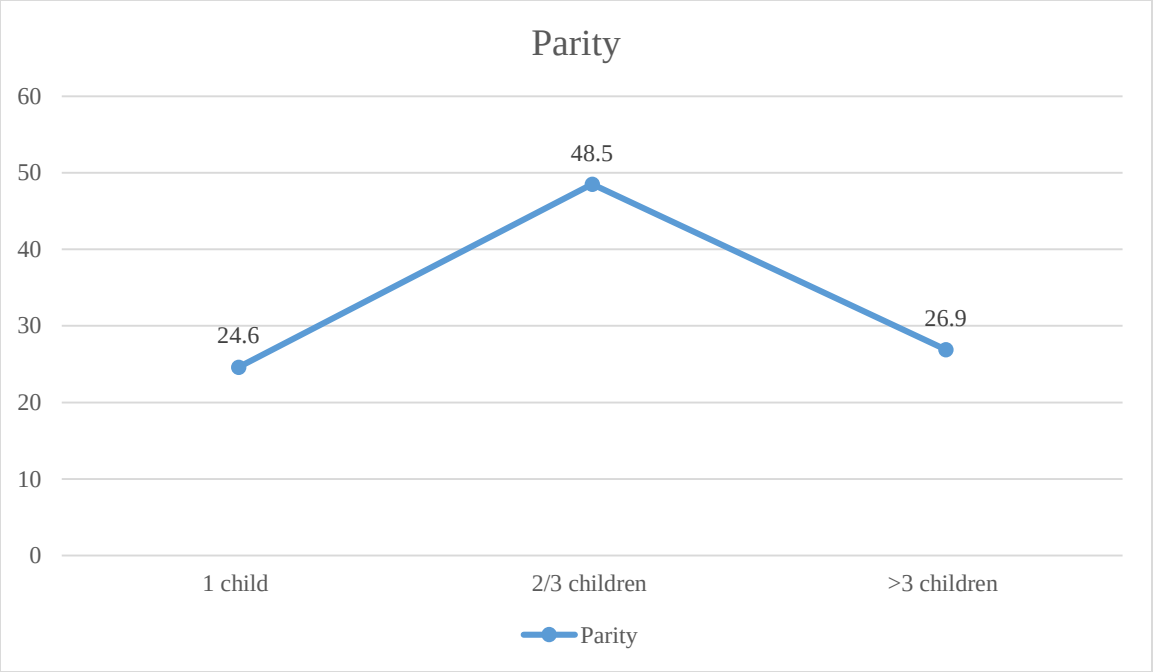

Figure 4: Shows the respondents' parity

Most 193(54.1%) were self-employed while the least 73(20.4%) were casual workers.

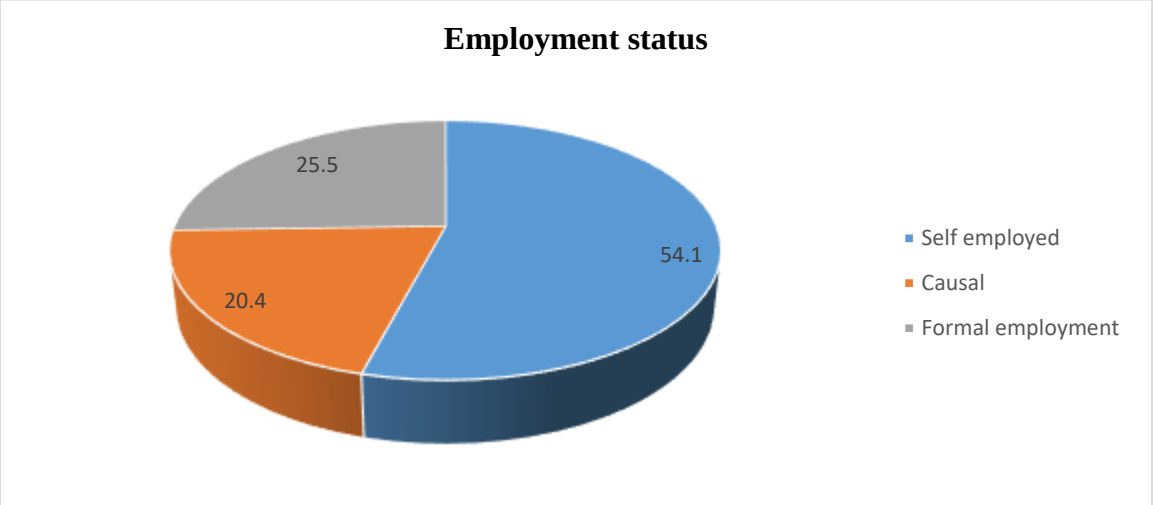

Figure 5: Shows the respondent's employment status

Most 184(51.5%) belonged to the urban setting while the least 172(48.5%) belonged to a rural setting.

Table 1: Shows the demographic characteristics of the sample

Variable	Frequency (n=357)	Percentage (%)
Age categories		
<20	59	16.5
20-34	138	38.7
>34	160	44.8
Level of education		
No formal education	43	12.0
Primary education	87	24.4
Secondary education	120	33.6
College and above	107	30.0
Marital status		
Married	261	73.1
Never married	57	16.0
Separated/divorced	39	0.9
Parity		
1 child	88	24.6
2/3 children	173	48.5
>3 children	96	26.9
Occupation		
Self employed	193	54.1
Causal	73	20.4
Formal employment	91	25.5
Residence		
Urban	184	51.5
Rural	172	48.5

Prevalence of Apgar score among singleton newborn babies of the total respondents, 69 (19.3%) babies had low Apgar scores of less than 7 while 288(80.7%) were normal.

Table 2: Shows the prevalence of low Apgar score among singleton newborn babies

Proportion	Frequency (n=357)	Percentage (%)
Apgar Low (< 7)	69	19.3
Normal (≥ 7)	288	80.7

Association between demographic characteristics and low fifth-minute Apgar score

Age categories, level of education, parity and occupation were statistically significantly associated with low Apgar scores among babies of women attending at Jinja Regional Referral Hospital in the model at a 5% level. Women in the age group <20 years were 5 times more likely to have babies with a low Apgar score as compared to those who belonged to the age group of 34 years and above (OR =5.73: 95%CI, 2.31-28.4: P<0.001). Women with no formal education were 3times more likely to produce babies with low Apgar scores as compared to those who attained a college level of education (OR=**3.29**: 95%CI, **1.94–5.57: P<0.001).** Women with only one child were 1 time more likely to produce babies with low Apgar scores as compared to those who had more than 3 children (OR=1.28: 95%CI, **0.69-10.16**: P=**<0.030**). Women who had formal employment were 3times more likely to produce babies with low Apgar scores as compared to those who had casual work (OR=**3.87**: 95%CI, **0.72–4.91**: **P=0.001).** Mothers who lived in urban were 1 time more likely to produce babies with low Apgar scores as compared to those who lived in rural areas (OR=1.19: 95%CI, 0.55-11.34: P=0.038).

Table 3 showing an association between the demographic characteristics and low fifth-minute Apgar score among singleton newborn babies

Variable	Low Apgar score		OR (95% CI)	P-Values
	Yes	No		
Age categories	n=69	n=288		
<20	19(32.2%)	40(67.7%)	5.73(2.31-28.4)	<0.001
20-34	26(18.8%)	112(81.2%)	0.71(1.34-1.31)	0.054
>34	24(15%)	136(85%)	ref	
Level of education				
No formal education	15(34.9%)	28(65.1%)	3.29 (1.94–5.57)	<0.001
Primary education	28(32.2%)	59(67.8%)	1.27 (0.44–3.68)	0.014
Secondary education	23(19.1%)	97(80.8%)	ref	
College and above	3(2.8%)	104(97.2%)	0.47 (0.86–2.53)	0.620
Marital status				
Married	52(19.9%)	209(60.5%)	0.61 (0.77–1.85)	0.061
Never married	8(14.0%)	49(86%)	ref	
Separated/divorced	9(23.1%)	30(76.9%)	0.33 (0.41–1.78)	0.052
Parity				
1 child	15(17.0%)	73(83.0%)	1.28(0.69-10.16)	0.030
2 - 3 children	35(20.2%)	138(79.8%)	ref	
>3 children	19(19.8%)	77(80.2%)	2.24((1.76-9.35)	0.042
Occupation				
Self employed	18(9.3%)	175(90.7%)	0.88 (0.63–1.23)	0.391
Causal	19(26.0%)	54(74.0%)	ref	
Formal employment	32(35.2%)	59(64.8%)	3.87 (0.72–4.91)	0.001
Residence				
Urban	29(15.8%)	155(84.2%)	1.19(0.55-11.34)	0.038
Rural	40(23.3%)	132(76.7%)	ref	

Association between obstetric factors and low Apgar score among singleton newborn babies

ANC follow-up, duration of labour, mode of delivery, gestational age at birth, birth weight, history of neonatal death, gravidity, and foetal presentation were found to be most statistically significantly associated with a low Apgar score among women attending Jinja Regional Referral Hospital at the 5% level. Women who did follow their ANC attendance were 8 times more likely to produce babies with a low Apgar score compared to those who followed up on their ANC attendance (OR = 8.83; 95% CI, **2.07–37.11**; P<0.001). Women who had an induced condition of labour were twice as likely to produce babies with a low Apgar score compared to those who had spontaneous (OR = 2.39; 95% CI, **1.74–15.84**; P = 0.041). Women who had a duration of labour above 24 hours (prolonged) were 7 times more likely to produce babies with a low Apgar score as compared to those who had a duration of 3–24 hours (OR = 7.43; 95% CI, ***5.59–16.26***; P = 0.001). Women who had SVD mode of delivery were five times more likely to produce babies with a low Apgar score compared to those who produced with instrumental delivery (OR = 5.72; 95% CI, **0.83–9.28**; P =<0.001). Women who had preterm (<37 weeks) and post-term (>42 weeks) gestational age were three times more likely to produce babies with a low Apgar score compared to those who had term (37–42 weeks) gestational age (OR = 3.79; 95% CI = **0.57–13.01**; P = 0.002). Women who had a history of neonatal death were six times more likely to produce babies with a low Apgar score compared to those who had a history of neonatal death (OR = 6.97; 95% CI, ***2.73–15.28***; P =<0.001). Women who had non-vertex foetal presentation were two times more likely to produce babies with a low Apgar score compared to those who had vertex foetal presentation (OR = 2.93; 95% CI: 95%CI, **P** = 0.003).

Table 4: Shows the Association between health system factors and low Apgar score

Variable	Low Apgar score		OR (95% CI)	P-Values
	Yes	No		
ANC follow up	n=69	n=288		
Yes	48(15.6%)	259(84.4%)	ref	
No	21(42.0%)	29(48.0%)	8.83(2.07–37.11)	<0.001
Parity				
1 child	15(17.0%)	73(83.0%)	1.28(0.69-10.16)	0.030
2 - 3 Children	35(20.2%)	138(79.8%)	ref	
>3 children	19(19.8%)	77(80.2%)	2.24((1.76-9.35)	0.042
Condition of labour				
Spontaneous	47(18.2%)	211(81.7%)	ref	
Induced/Augmented	22(22.2%)	77(77.8%)	2.39(1.74–15.84)	0.041
Duration of labour				
3–24hrs (normal)	39(14.7%)	226(85.3%)	ref	
>24 hrs (prolonged)	30(32.6%)	62(67.4%)	7.43(5.59–16.26)	<0.001
Mode of delivery				
SVD	52(29.5%)	124(70.5%)	5.72(0.83–9.28)	0.001
Instrumental	9(11.5%)	69(88.4 %)	ref	
C/S	8(7.8%)	95(92.2%)	2.51 (1.55–8.06)	0.631
Gestational Age at Birth				
Preterm (< 37 wks)	23(27.4%)	61(72.6%)	3.79(0.57–13.01)	0.002
Term (37–42 wks)	32(14.7%)	185(85.3%)	ref	
Post term (>42 wks)	14(25%)	42(75%)	0.97(0.65–7.35)	0.042
Birth weight				
Low (1500–2500 gm)	19(23.5%)	62(76.5%)	4.74(2.37–13.91)	0.050
Normal (2500–4000 gm)	50(18.1%)	226(81.9%)	ref	
History of Neonatal death				
Yes	24(33.8%)	47(66.2%)	6.97(2.73–15.28)	<0.001
No	45(15.7%)	241(84.3%)	ref	
Gravidity				
Primigravida	13(11.3%)	102(88.7%)	0.97(0.65–1.35)	0.730
Gravid ≥ 5	15(37.5%)	25(62.5 %)	3.54(0.57–11.01)	0.001
Gravid 2–4	41(20.3%)	161(79.7%)	ref	
Fetal presentation				
Vertex	45(17.4%)	213(82.6%)	ref	
Non-vertex	24(24.2%)	75(75.8%)	2.93 (1.21–4.05)	0.003

DISCUSSION

Of the total respondents, 69 (19.3%) babies had a low Apgar score of less than 7, while 288 (80.7%) were normal. The above prevalence was higher than that of another institution-based study by Ajibo et al [21] in southwest Ethiopia, which had a prevalence of 13.8%. Another study by Getachew et [22] in Ethiopia showed a lower prevalence of low agar scores at 8.4%. This confirms that the prevalence of low Apgar scores among babies of women attending Jinja Regional Referral is high. The study showed that women in the age group <20 years were five times more likely to have babies with a low Apgar score as compared to those who belonged to the age group of 34 years and above (OR =5.73; 95% CI, 2.31-28.4; P<0.001). The above results were in disagreement with the study findings

by Tavares et al [23] in Brazil, who revealed that advanced maternal age was associated with a greater probability of a premature newborn, low birth weight, low Apgar scores at 5 and 10 min, and higher mortality during the first month of life. Women with no formal education were three times more likely to produce babies with a low Apgar score as compared to those who attained a college level of education (OR = 3.29; 95% CI, **1.94–5.57; P<0.001).** The above results contradicted the study findings by Tavares et al [23] who showed education was significantly associated with a low Apgar score. Women with only one child were 1 time more likely to produce babies with low Apgar scores as compared to those who had more than 3 children (OR=1.28: 95%CI, **0.69–10.16;** P =<0.030). The above results are in line with the study findings by Getachew et al. [22], which revealed that women with only one child were more likely to produce babies with a low Apgar score. Women who had formal employment were three times more likely to produce babies with a low Apgar score as compared to those who had casual work (OR = 3.87; 95% CI, **0.72–4.91**: **= 0.001).** The above results were in line with the study findings by Njie. Et al [24], which revealed that women who had formal employment were more likely to produce babies with a low Apgar score as compared to those who had casual work. Mothers who lived in urban areas were 1 time more likely to produce babies with a low Apgar score as compared to those living in rural areas (OR = 1.19; 95% CI: 0.55–11.34; P = 0.038).

According to the study findings, women who did follow their ANC attendance were 8 times more likely to produce babies with a low Apgar score compared to those who followed up their ANC attendance (OR = 8.83; 95% CI, **2.07–37.11**; P<0.001). The above findings are in line with the findings of the study by Acup et al [25], which revealed that the increased prevalence of low Apgar scores is associated with poor antenatal attendance. Women who had an induce condition of labour were twice as likely to produce babies with a low Apgar score compared to those who had spontaneous (OR = 2.39; 95% CI, **1.74–15.84**; = 0.041). The above findings are associated with the study findings by Murata et al [26] in Japan, which revealed that mothers who had an induce condition of labour were more likely to produce babies with a low Apgar score compared to those who had spontaneous. Women who had a duration of labour above 24 hours (prolonged) were 7 times more likely to produce babies with a low Apgar score as compared to those who had a duration of 3–24 hours (OR = 7.43; 95% CI, ***5.59–16.26***; = 0.001). The reason for the low Apgar score could be due to foetal distress resulting from prolonged labour.

Women who had SVD mode of delivery were five times more likely to produce babies with a low Apgar score compared to those who produced with instrumental delivery (OR = 5.72; 95% CI, **0.83–9.28**; P =<0.001). The above findings were in line with the findings of the study by Obsa et al. [27], which revealed that mothers who had the SVD mode of delivery were more likely to produce babies with a low Apgar score compared to those who produced with other methods. Women who had preterm (<37 weeks) and postterm (>42 weeks) gestational age were three times more likely to produce babies with a low Apgar score compared to those who had term (37–42 weeks) gestational age (OR = 3.79; 95% CI = **0.57–13.01**; P = 0.002). The above study findings are supported by the study findings by Lin et al. [28], which revealed that preterm birth complications were most associated with low Apgar score results and were among the major causes of neonatal death in China. Women who had a history of neonatal death were six times more likely to produce babies with a low Apgar score compared to those who had a history of neonatal death (OR = 6.97; 95% CI, **2.73–15.28**; P =<0.001). The above results are in line with the study findings by **Cnattingius et al** [29] who revealed that women who had a history of neonatal death were more likely to produce babies with a low Apgar score compared to those who had a history of neonatal death. Women who had non-vertex foetal presentation were two times more likely to produce babies with a low Apgar score compared to those who had vertex foetal presentation (OR = 2.93; 95% CI, **21.21–4.05**; = 0.003). The above findings are supported by the study findings by **Cnattingius** et al. [29], which revealed that mothers who present a non-vertex foetal presentation are more likely to produce babies with a low Apgar score compared to those who have a vertex foetal presentation.

CONCLUSION

The study highlighted that the prevalence of low Apgar scores is 19.3%. Mainly obstetric factors (ANC follow-up, duration of labour, mode of delivery, gestational age at birth, birth weight, history of neonatal death, gravidity, foetal presentation) were significantly associated with a low 5th-minute Apgar score among singleton new babies at Jinja Regional Referral Hospital.

Recommendations

Based on the results of the study, the following recommendations were made: More studies are recommended by increasing the Apgar scoring time to 10 minutes to enhance the predictive value of this score for respiratory or neurological disabilities. Nonetheless, by noting statistical differences in outcomes, the results provide a jumping-off point for further investigations, which would need an audit of the specific labour room practices for neonates with 1-minute Apgar scores <4. The MOH needs to sensitise the communities on the care and outcome of low Apgar scores. The health care workers need to inform the clients to always attend to their health facilities when their labour periods are over.

REFERENCES

1. Mohamed, H.A., Shiferaw, Z., Roble, A.K., Kure, M.A.: Neonatal mortality and associated factors among neonates admitted to neonatal intensive care unit at public hospitals of Somali Regional State, Eastern Ethiopia: A multicenter retrospective analysis. PLoS ONE. 17, e0268648 (2022). https://doi.org/10.1371/journal.pone.0268648
2. Newborn mortality, https://www.who.int/news-room/fact-sheets/detail/newborn-mortality
3. Akombi, B.J., Agho, K.E., Merom, D., Renzaho, A.M., Hall, J.J.: Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys (2006-2016). PLoS ONE. 12, e0177338 (2017). https://doi.org/10.1371/journal.pone.0177338
4. Akombi, B.J., Ghimire, P.R., Renzaho, A.M.: Factors associated with neonatal mortality in the African Great Lakes region: A pooled analysis of national surveys. J. Glob. Health Rep. 3, e2019043 (2019). https://doi.org/10.29392/joghr.3.e2019043
5. Rosa-Mangeret, F., Benski, A.-C., Golaz, A., Zala, P.Z., Kyokan, M., Wagner, N., Muhe, L.M., Pfister, R.E.: 2.5 Million Annual Deaths—Are Neonates in Low- and Middle-Income Countries Too Small to Be Seen? A Bottom-Up Overview on Neonatal Morbi-Mortality. Trop. Med. Infect. Dis. 7, 64 (2022). https://doi.org/10.3390/tropicalmed7050064
6. Arunda, M., Emmelin, A., Asamoah, B.O.: Effectiveness of antenatal care services in reducing neonatal mortality in Kenya: analysis of national survey data. Glob. Health Action. 10, 1328796 (2017). https://doi.org/10.1080/16549716.2017.1328796
7. Sankar, M.J., Neogi, S.B., Sharma, J., Chauhan, M., Srivastava, R., Prabhakar, P.K., Khera, A., Kumar, R., Zodpey, S., Paul, V.K.: State of newborn health in India. J. Perinatol. 36, S3–S8 (2016). https://doi.org/10.1038/jp.2016.183
8. Sharrow, D., Hug, L., You, D., Alkema, L., Black, R., Cousens, S., Croft, T., Gaigbe-Togbe, V., Gerland, P., Guillot, M., Hill, K., Masquelier, B., Mathers, C., Pedersen, J., Strong, K.L., Suzuki, E., Wakefield, J., Walker, N.: Global, regional, and national trends in under-5 mortality between 1990 and 2019 with scenario-based projections until 2030: a systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. Lancet Glob. Health. 10, e195–e206 (2022). https://doi.org/10.1016/S2214-109X(21)00515-5
9. Hug, L., Alexander, M., You, D., Alkema, L.: National, regional, and global levels and trends in neonatal mortality between 1990 and 2017, with scenario-based projections to 2030: a systematic analysis. Lancet Glob. Health. 7, e710–e720 (2019). https://doi.org/10.1016/S2214-109X(19)30163-9
10. Wardlaw, T., You, D., Hug, L., Amouzou, A., Newby, H.: UNICEF Report: enormous progress in child survival but greater focus on newborns urgently needed. Reprod. Health. 11, 82 (2014). https://doi.org/10.1186/1742-4755-11-82
11. Kananura, R.M., Tetui, M., Mutebi, A., Bua, J.N., Waiswa, P., Kiwanuka, S.N., Ekirapa-Kiracho, E., Makumbi, F.: The neonatal mortality and its determinants in rural communities of Eastern Uganda. Reprod. Health. 13, 13 (2016). https://doi.org/10.1186/s12978-016-0119-y
12. Kruk, M.E., Gage, A.D., Arsenault, C., Jordan, K., Leslie, H.H., Roder-DeWan, S., Adeyi, O., Barker, P., Daelmans, B., Doubova, S.V., English, M., Elorrio, E.G., Guanais, F., Gureje, O., Hirschhorn, L.R., Jiang, L., Kelley, E., Lemango, E.T., Liljestrand, J., Malata, A., Marchant, T., Matsoso, M.P., Meara, J.G., Mohanan, M., Ndiaye, Y., Norheim, O.F., Reddy, K.S., Rowe, A.K., Salomon, J.A., Thapa, G., Twum-Danso, N.A.Y., Pate, M.: High-quality health systems in the Sustainable Development Goals era: time for a revolution. Lancet Glob. Health. 6, e1196–e1252 (2018). https://doi.org/10.1016/S2214-109X(18)30386-3
13. Svenvik, M., Brudin, L., Blomberg, M.: Preterm Birth: A Prominent Risk Factor for Low Apgar Scores. BioMed Res. Int. 2015, 978079 (2015). https://doi.org/10.1155/2015/978079
14. Kinney, M.V., Kerber, K.J., Black, R.E., Cohen, B., Nkrumah, F., Coovadia, H., Nampala, P.M., Lawn, J.E.: Sub-Saharan Africa's Mothers, Newborns, and Children: Where and Why Do They Die? PLoS Med. 7, e1000294 (2010). https://doi.org/10.1371/journal.pmed.1000294
15. Mbonye, A.K., Sentongo, M., Mukasa, G.K., Byaruhanga, R., Sentumbwe-Mugisa, O., Waiswa, P., Naamala Sengendo, H., Aliganyira, P., Nakakeeto, M., Lawn, J.E., Kerber, K., for the Uganda Decade of Change and Future Implications Analysis Group: Newborn survival in Uganda: a decade of change and future implications. Health Policy Plan. 27, iii104–iii117 (2012). https://doi.org/10.1093/heapol/czs045
16. Bukusuba, J., Kaaya, A.N., Atukwase, A.: Modelling the impact of stunting on child survival in a rural Ugandan setting. BMC Nutr. 4, 13 (2018). https://doi.org/10.1186/s40795-018-0220-4
17. Bhutta, Z.A.: Paediatrics in the Tropics. Mansons Trop. Infect. Dis. 1197-1214.e2 (2014). https://doi.org/10.1016/B978-0-7020-5101-2.00081-9
18. Migamba, S.M., Kisaakye, E., Komakech, A., Nakanwagi, M., Nakamya, P., Mutumba, R., Migadde, D., Kwesiga, B., Bulage, L., Kadobera, D., Ario, A.R.: Trends and spatial distribution of neonatal sepsis, Uganda, 2016–2020. BMC Pregnancy Childbirth. 23, 770 (2023). https://doi.org/10.1186/s12884-023-06037-y

19. Blencowe, H., Cousens, S.: Review: Addressing the challenge of neonatal mortality. Trop. Med. Int. Health. 18, 303–312 (2013). https://doi.org/10.1111/tmi.12048
20. Bukhari, S.A.: Sample Size Determination Using Krejcie and Morgan Table. (2021)
21. Ajibo, B.D., Wolka, E., Aseffa, A., Nugusu, M.A., Adem, A.O., Mamo, M., Temesgen, A. sintayehu, Debalke, G., Gobena, N., Obsa, M.S.: Determinants of low fifth minute Apgar score among newborns delivered by cesarean section at Wolaita Sodo University Comprehensive Specialized Hospital, Southern Ethiopia: an unmatched case control study. BMC Pregnancy Childbirth. 22, 665 (2022). https://doi.org/10.1186/s12884-022-04999-z
22. Getachew, B., Etefa, T., Asefa, A., Terefe, B., Dereje, D.: Determinants of Low Fifth Minute Apgar Score among Newborn Delivered in Jimma University Medical Center, Southwest Ethiopia. Int. J. Pediatr. 2020, 9896127 (2020). https://doi.org/10.1155/2020/9896127
23. Tavares, V.B., e Souza, J. de S., Affonso, M.V. de G., Da Rocha, E.S., Rodrigues, L.F.G., da Costa Moraes, L. de F., dos Santos Coelho, G.C., Araújo, S.S., das Neves, P.F.M., Gomes, F. de C., de Melo-Neto, J.S.: Factors associated with 5-min APGAR score, death and survival in neonatal intensive care: a case-control study. BMC Pediatr. 22, 560 (2022). https://doi.org/10.1186/s12887-022-03592-9
24. Njie, A.E., Nyandiko, W.M., Ahoya, P.A., Moutchia, J.S.: A comparative analysis of APGAR score and the gold standard in the diagnosis of birth asphyxia at a tertiary health facility in Kenya. PLOS ONE. 18, e0285828 (2023). https://doi.org/10.1371/journal.pone.0285828
25. Acup, W., Opollo, M.S., Akullo, B.N., Musinguzi, M., Kigongo, E., Opio, B., Kabunga, A.: Factors associated with first antenatal care (ANC) attendance within 12 weeks of pregnancy among women in Lira City, Northern Uganda: a facility-based cross-sectional study. BMJ Open. 13, e071165 (2023). https://doi.org/10.1136/bmjopen-2022-071165
26. Murata, T., Yasuda, S., Imaizumi, K., Isogami, H., Fukuda, T., Kyozuka, H., Yamaguchi, A., Sato, A., Ogata, Y., Shinoki, K., Hosoya, M., Yasumura, S., Hashimoto, K., Nishigori, H., Fujimori, K.: Association of labour duration in spontaneous deliveries with low neonatal Apgar scores and foetal acidosis: the Japan Environment and Children's Study. Sci. Rep. 12, 21519 (2022). https://doi.org/10.1038/s41598-022-24359-3
27. Obsa, M.S., Shanka, G.M., Menchamo, M.W., Fite, R.O., Awol, M.A.: Factors Associated with Apgar Score among Newborns Delivered by Cesarean Sections at Gandhi Memorial Hospital, Addis Ababa. J. Pregnancy. 2020, 5986269 (2020). https://doi.org/10.1155/2020/5986269
28. Lin, L., Liu, G., Li, Y., Shi, B., Su, Z., Jia, C., Wu, F.: Apgar scores correlate with survival rate at discharge in extremely preterm infants with gestational age of 25-27 weeks. Braz. J. Med. Biol. Res. 55, e12403 (2022). https://doi.org/10.1590/1414-431X2022e12403
29. Cnattingius, S., Johansson, S., Razaz, N.: Associations between metabolic acidosis at birth and reduced Apgar scores within the normal range (7-10): A Swedish cohort study of term non-malformed infants. Paediatr. Perinat. Epidemiol. 34, 572–580 (2020). https://doi.org/10.1111/ppe.12663

CITE AS: Kansiime Richard (2024). Proportion and Factors Associated with Low Fifth-Minute Apgar Score Among Singleton Newborn Babies at Jinja Regional Referral Hospital. RESEARCH INVENTION JOURNAL OF RESEARCH IN MEDICAL SCIENCES 3(1):21-31.