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# INVESTIGATING THE ENVIRONMENTAL DETERMINANTS OF NEONATAL SEPSIS IN THE LABOUR WARDS IN LUSAKA URBAN DISTRICT HEALTH CENTRES.

**[1]EURODY KAMWENDO, [2]OLIVER PHIRI,**
[1]PUBLIC HEALTH SPECIALIST, [2]PUBLIC HEALTH SPECIALIST
NURSING AND MIDWIFERY COUNCIL OF ZAMBIA
LUSAKA ZAMBIA

***Abstract :***
Neonatal sepsis remains a significant public health concern, contributing to high morbidity and mortality rates in newborns, particularly in resource-limited settings. This study aimed to investigate the environmental determinants associated with the occurrence of neonatal sepsis in the labour wards of Lusaka Urban District Health Centres. The research utilized a mixed-methods approach, combining both quantitative and qualitative data collection techniques to gain a comprehensive understanding of the factors contributing to neonatal sepsis.

Quantitative data were collected through a retrospective analysis of medical records of neonates admitted to the labour wards with sepsis over a defined period. Variables such as maternal age, antenatal care attendance, gestational age, birth weight, and socio-economic status were examined to identify potential risk factors for neonatal sepsis. Additionally, environmental factors within the labour wards, including hygiene practices, cleanliness, and infection control protocols, were assessed.

Qualitative data were obtained through in-depth interviews with healthcare providers, mothers, and caregivers. These interviews aimed to capture perspectives on the prevailing environmental conditions, practices, and challenges faced within the labour wards that might contribute to the onset of neonatal sepsis.

Preliminary findings indicate that several factors may influence the occurrence of neonatal sepsis in the labour wards of Lusaka Urban District Health Centres. These include inadequate hand hygiene practices, suboptimal infection control measures, overcrowding, and challenges in maintaining a clean and sterile environment. Maternal factors such as limited access to antenatal care and low socio-economic status also emerged as potential contributors.

The results of this study hold implications for policy and practice, emphasizing the importance of improving infection prevention and control strategies within labour wards. Enhanced training for healthcare personnel,

increased awareness among mothers and caregivers, and the implementation of evidence-based protocols for cleanliness and infection control are recommended. Furthermore, addressing socio-economic disparities and enhancing antenatal care services could play a crucial role in reducing the burden of neonatal sepsis.

In conclusion, this study sheds light on the complex interplay between environmental determinants and the occurrence of neonatal sepsis in Lusaka's labour wards. By combining quantitative and qualitative approaches, it provides a comprehensive understanding of the multifaceted factors contributing to the issue. The insights gained from this research can guide targeted interventions and policies aimed at preventing neonatal sepsis and improving neonatal health outcomes in resource-limited settings.

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**INTRODUCTION**

Neonatal Sepsis can be defined as any systemic bacterial infection confirmed by a positive blood culture in the first month of life (Adair, 2003). It specifically refers to the presence of a blood stream infection (BSI) such as meningitis, pneumonia, pyelonephritis or gastroenteritis in a new born baby (neonate). It encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia and urinary tract infections. Neonatal sepsis can be classified into two major categories depending on the onset of symptoms. Early onset sepsis (EOS) presents within the first 72 hours of life (WHO, 2018). In severe cases, the neonate may be symptomatic at birth. Infants with EOS usually present with respiratory distress and pneumonia. Neonatal sepsis remains one of the main causes of mortality and morbidity despite the progress in hygiene, introduction of new and potent antimicrobial agents for treatment and advanced measures for diagnosis. Up to 10%, infants have infections in the first month of life, the matter which results in 30-50% of total neonatal deaths in developing countries (Mehr, 2017). It is estimated that up to 20% of neonates develop sepsis and approximately 1% die of sepsis related causes (Lancet, 2014). Similar to other Sub-Saharan African countries, the health risks faced by pregnant women and newborns in Zambia are unacceptably high. A Zambian woman has a one in 37 lifetime risk of dying from complications of childbirth (Lancet 2014). Despite substantial reductions over the past two decades, the national maternal mortality rate was 315 per 100 000 live births in 2016 with 24 per 1000 live births neonatal mortality rate (UN, 2017). This rate is 17 times higher than that of North America (UN, 2017). Although substantial investments have been made to accelerate progress for both mothers and their offspring, such efforts must rely on strong health systems that—given the ubiquity of childbirth—must extend from the largest city to the most remote region of the country

**NEED OF THE STUDY.**

At Global level when the first cases of neonatal sepsis were noticed in the United States of America and confirmed, it was suggested that a previous abortion increased the risk of intrapartum infection in a following pregnancy. Researchers hypothesized that abortion also could be associated with a higher risk of preterm labor and early rupture of membranes which predisposes the neonate to neonatal sepsis. (Moreau et al., 2015). According to Melin in the 1970s, group B Streptococcus (GBS) emerged abruptly as an important pathogen causing invasive bacterial infections, sepsis, pneumonia and meningitis in human neonates during the first week of life (Melin, 2011). Epidemiological estimates suggest that there were 1.7 million cases of neonatal sepsis globally in 2010, with 0.6 million cases and 0.14 million deaths in sub-Saharan Africa. In the World Health Organization (WHO) Africa region, the importance of neonatal infections and their contribution to under 5-year mortality is of concern (WHO,2017). Thirteen neonatal sepsis studies from Africa published between 2010 and 2015–16 do not distinguish clearly between community-acquired or hospital-acquired neonatal sepsis and/ or between vertically or horizontally acquired infections. Klebsiella species were commonly identified in all but one study, accounting for 32% (323/1009, range 0–59%). Staphylococcus aureus (24%) and coagulase-negative staphylococci (12%) were the second and third most prevalent

organisms. These findings were similar to those reported in a review of 6 studies of hospital-acquired neonatal sepsis published between 1990 and 2004, where Klebsiella species were found in 28% (441/1563) of cases, followed by S. aureus (14.3%), Escherichia coli (9.9%), other Gram negatives (8.8%) and group B streptococci (GBS) (8.5%) (WHO, 2017)

Regionally, neonatal sepsis has been observed in less developed countries, the incidence of GBS neonatal disease varies widely: 0.17 per 1000 live births in India to three per 1000 live births in Sub- Saharan Africa (Melin, 2017). The term "sepsis" was introduced by the Hippocrates in the fourth century BC and it meant decay or decomposition of organic matter (Saunders, 1959). By the 19th century, it was widely believed that microbes produced substances that could injure the mammalian host and that soluble toxins released during infection caused the fever and shock that were common place during the infections (Saunders, 1959). Sepsis accounts for 6.8% of neonatal deaths, ranking it as the third highest cause of neonatal demise following preterm births and intrapartum-related events. In Sub-Saharan Africa, sepsis-related neonatal mortality rates are high and range between 17.0 to 29.0% (sylvia, 2018). According to (sylvia, 2018) on a study conducted in Namibia, the pooled prevalence of neonatal sepsis in was 29.765% (95% CI 23.36-35.94). Home delivery (AOR = 2.67; 95% CI 1.15-4.00), maternal history of urinary tract infection (UTI) (AOR = 2.083; 95% CI 0.24-3.93), gestational age/(preterm) (AOR = 1.56; 95% CI 1.04-2.08), prolonged labor (AOR = 3.23; 95% CI 0.04-6.51) and PROM (AOR = 1.95; 95% CI 0.53-3.37) higher if compared to the western world.

At national level, in Zambia, neonatal sepsis is usually prominent among low- and middle-income families. The neonatal sepsis mortality rate is about 34 deaths per 1,000 live births, a figure well above that of more developed countries (Jones, 2014). According to Gill, the training of the traditional birth attendants has so far reduced about 18 deaths per 1,000 live births in the first 28 days of life, a significant reduction in Zambia's overall neonatal sepsis mortality rate of about 34 deaths (Gill, 2018).

It is not very clear how the environment relates to neonatal sepsis although the idea that the problem mainly affects developing countries provides an idea of the relationship between the environment and neonatal sepsis. The study will focus on capturing to determine the health worker knowledge of the infection prevention procedures and if the midwives are following the standard operating procedure (SOP) for conducting a delivery. The study will further determine the availability and sterility of the equipment being used for deliveries in labor ward and will assess the availability of programs to reduce neonatal mortality in labor wards in Lusaka urban district health centers.



**3.1Population and Sample**

a total of 78 in depth interviews were conducted amongst the midwifes, nurses and doctors from whom key information was gotten from the labour wards while two focus group discussions where conducted with each group consisting of 20 mothers .

To estimate a sample size for a proportion in a single cross-sectional survey, three numbers are needed:

1. Estimate of the expected proportion (p ) =0.5

2. Desired level of absolute precision (d) =0.05
   - Estimated design effect (DEFF) –
     - No Previous studies on contributing factors to neonatal sepsis in labour ward.
     - Conventional alpha = 0.05 (two-sided)
     - Conventional beta = 0.20 (80% power to detect a difference if one truly exists)

Then the required sample size (Z= 1.96 at alpha 0.5) is:

$$n = \frac{1.96^2\, p(1-p)(DEFF)}{d^2}$$

= 1.96x 1.96x0.5 (1-0.5)/ (0.05x0.05) =3.8416 x 0.25/0.0025 = 0.9604/0.0025

= 384.16 x 0.2 design effect since we are using clusters=76.8

This was rounded off to **78** for easy calculation.

**Sample size calculation for Neonates**

$$\underline{n = 1.96^2\, p(1-p)(DEFF)}$$
$$d^2$$

$= 1.96^2$ x 1.96 x 0.5(1 – 0.5)/(0.5 x 0.05)

= 3.8416 x 0.25/0.0025

=0.9604/0.0025

=384.16 x 0.20

=76.8 rounded of to 78

The population for this study consisted of information from key informant interviews with doctors who were about 6 in total, in depth interviews with midwives and nurses working from the labour wards which were 52 in total including two focus group discussions each consisting of 20 mothers in Lusaka Urban district health centers such as, Kanyama level one hospital, Chilenje and Chawama hospitals, in Lusaka Zambia

#### 3.2 Data and Sources of Data

Primary data is information that is collected by researchers directly from main sources through surveys, interviews, experiments, and observations. This data is original and collected by the researcher to answer a specific research question. It has not been previously published and is usually specific to a particular study (Heale & Twycoross, 2015). Primary data will be collected by using a structured questionnaire from the respondents from labour wards in Lusaka Urban district health centers. This primary data will be both quantitative and qualitative.

#### 3.3 Theoretical framework

Help Seeking Theoretical Model

Deciding to seek help is a complex process that often has no experimental precedent for patients' first sepsis experience. Help- seeking is defined as "a problem focused, planned behavior, involving interpersonal

interaction with a selected health care professional" (cornally & Mcarthy 2011). With this model it states that deciding to act is influenced by social cognitive factors with only moderate effects from knowledge and awareness (Bandura, 1986). There is a gap in literature in identifying what could be causing high rate of neonatal sepsis in urban district health centers

**3.4Statistical tools and econometric models**

After data is collected, the questions and responses will be coded to ensure that all values and variables under study are correctly defined and captured in the data sheet. The data collected from the questionnaire will be checked for uniformity, consistency and accuracy. Analysis and interpretation of data will be done with the help of computer software and statistical tools such as Microsoft Excel (Ms-excel) and Statistical Package for Social Science (SPSS) version 23.0.

**3.4.1 Descriptive Statistics**

**Table 1: Background Characteristics of Mothers**

| **Variable** | **Number** | **Proportion** | **95% Confidence interval** |
|---|---|---|---|
| **Age group** | **N** | **%** | |
| 15-24 | 38 | 48.7 | (0.5248, 0.6322) |
| 25-34 | 30 | 38.4 | (0.2959, 0.3994) |
| 35-44 | 10 | 12.8 | (0.0508, 0.1088) |
| 45-49 | 0 | 0 | |
| **Education Level** | | | |
| None | 0 | 0 | 0 |
| Primary | 23 | 29.5 | (0.1878, 0.2796) |
| Secondary | 50 | 64.5 | (0.6326, 0.7337) |
| Tertiary | 5 | 6.4 | (0.0584, 0.1196) |
| | | | |
| **Marital Status** | | | |
| Married | 42 | 53.8 | (0.8840, 0.9441) |

| | | | |
|---|---|---|---|
| Unmarried | 36 | 46.2 | (0.0559, 0.1160) |
| **Gravida** | | | |
| Gravida1 | 31 | 39.7 | (0.2781, 0.3802) |
| Gravida2 | 22 | 28.2 | (0.2079, 0.3026) |
| Gravida3 | 10 | 12.8 | (0.1792, 0.2697) |
| Gravida4 | 8 | 10.2 | (0.0768, 0.1444) |
| Gravida5 | 7 | 8.9 | (0.0662, 0.1303) |

Source: Kamwendo (2023)

**Characteristics of Mothers**

The results reveal the majority of the mothers of the babies who presented with fever in the first week of captured for research during the data collection phase as shown in the table were young. These mothers were aged 15 to 24 years (48.7%).

Majority of the mothers Had secondary level (64.5%). Most of the mothers captured in the study were married (53.8%) with a few being single (46.2%) and most of them had been pregnant only once (39.7)

## CHAPTER FOUR: RESULTS

### 4.1 Findings of the study

**Table 1: Background Characteristics of Mothers**

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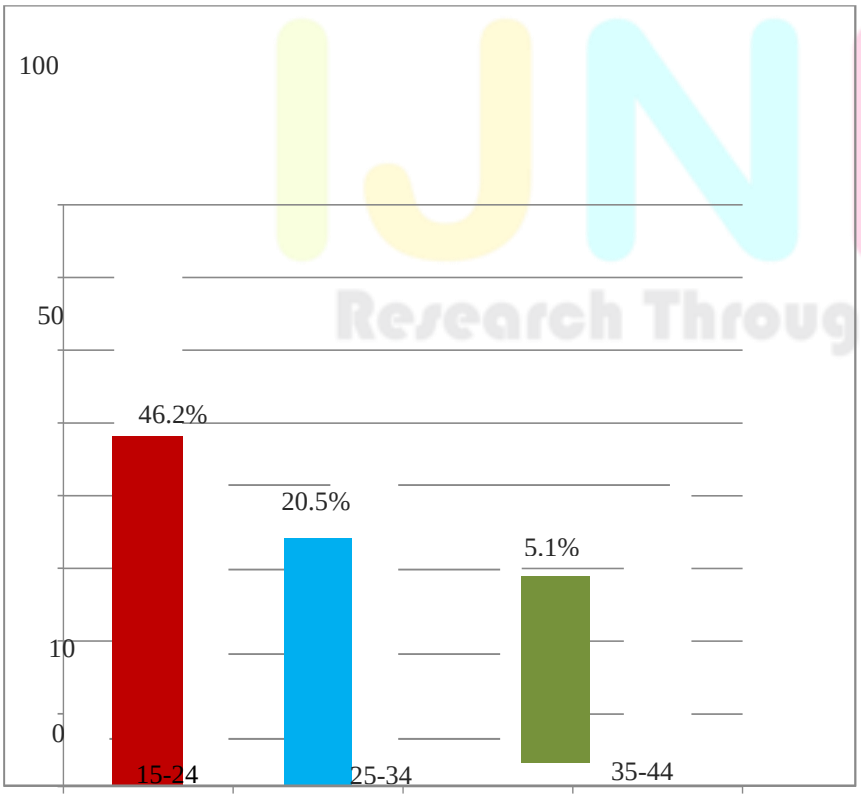
Majority of the mothers Had secondary level (64.5%). Most of the mothers captured in the study were married (53.8%) with a few being single (46.2%) and most of them had been pregnant only once (39.7)

**Figure 2: Occurrence of prolonged labour by background characteristics of the mother**



Source: kamwendo, 2023

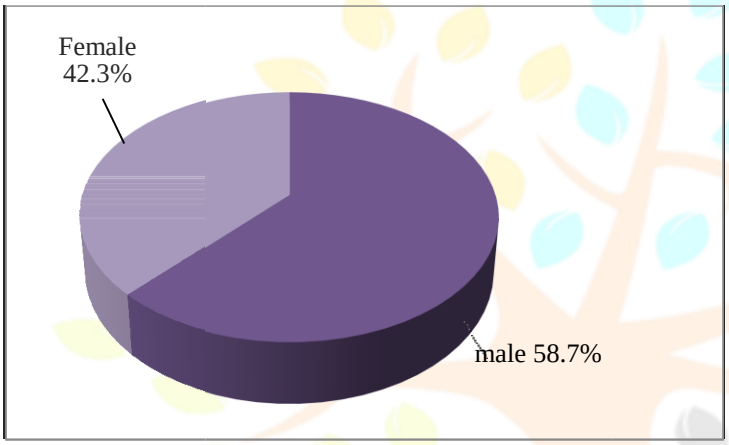
The results reveal that out of the 78 respondents captured in the study, the majority of women who had prolonged labour were the aged between 15 and 24 years (46.2%) and were pregnant for the first time as compared to those who had been pregnant more than once.

Reacting to the same question one of the key informants during an interview stated the following:

"*We receive a lot of cases of neonatal sepsis from mothers who are young, and from the analysis young mothers find it a challenge recognizing symptoms of an infection, there's delay in getting timely medical intervention, their immune system may not be fully strong, inadequate prenatal care among others".*

**Figure 3: Background Characteristics of Babies who presented with fever.**

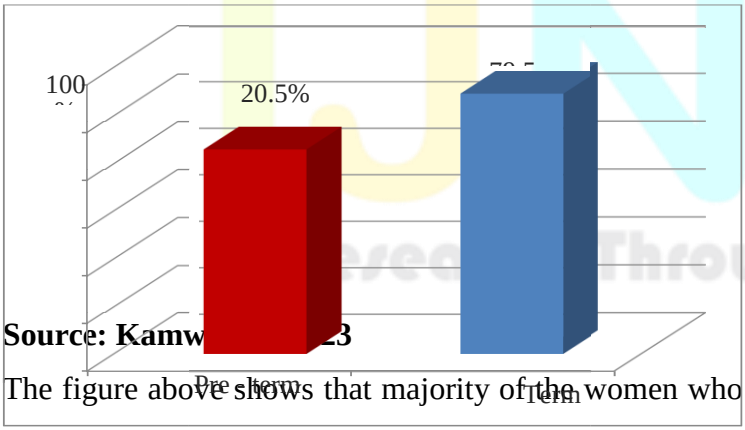
**Figure 3.1 Sex of Baby**




**Source: Kamwendo, 2023**

The results above shows that majority (58.7%) of the babies who presented with fever were male as compared to the female (42.3%

**Figure 3.2 Duration of pregnancy**

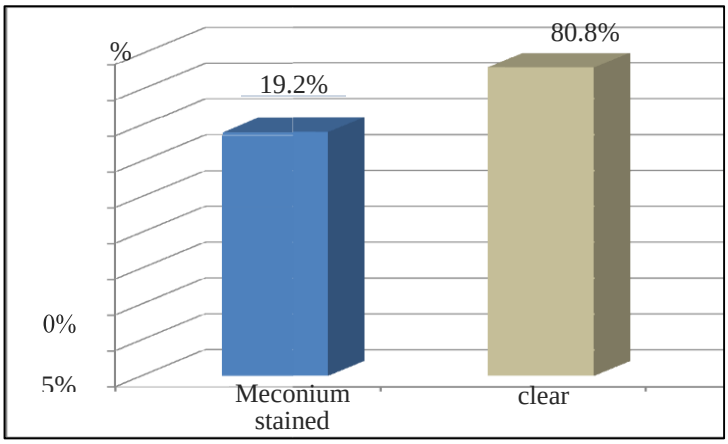



**Source: Kamw 23**

The figure above shows that majority of the women who attended delivery at the facilities had pregnancies which went up to term (79.5%) while few (20.5%) had preterm births.

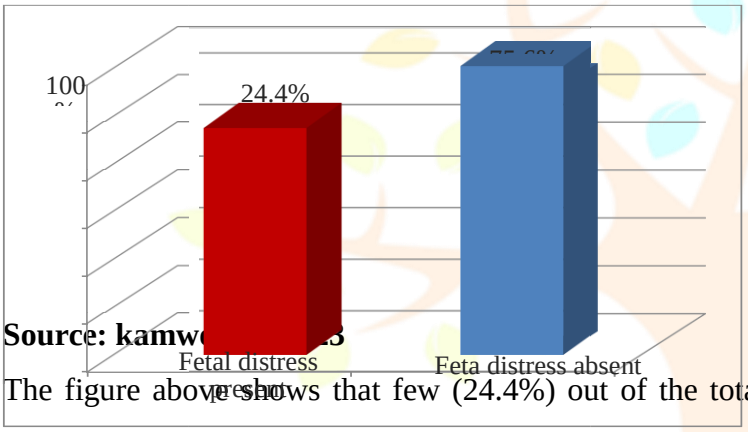
**Figure 3.3 Liquor**

**Source: kamwendo, 2023**




The figure above shows that (80.8%) of the majority births had clear liquor while few had meconium stained liqor (19.2%)

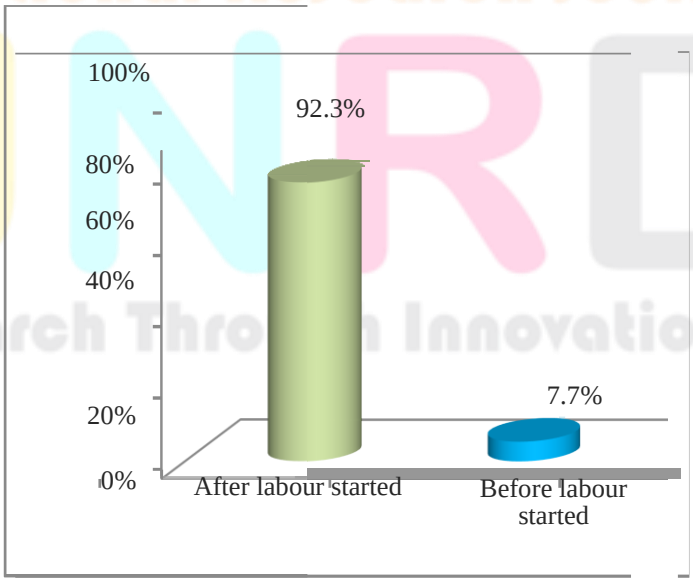
**Figure 3.4 fetal heart rate**




**Source: kamw**

The figure above shows that few (24.4%) out of the total babies had experienced fetal distress while the majority (75.6%) did not experience any fetal distress.

**Figure 3.5 timeframe for rupture of membranes**




**Source: kamwendo, 2023**

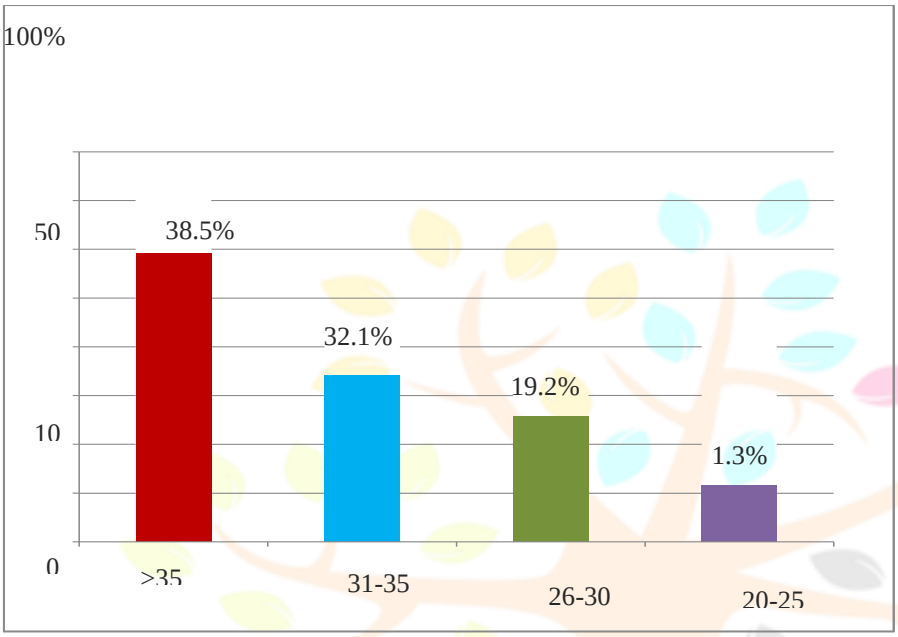
The results reveal that Out of the 78 mothers captured (7.7%) mothers had their membranes break before labour started or more than 18 hours before giving birth.

## RESULTS OF DATA COLLECTED FROM THE MIDWIVES

The results presented below shows the frequencies of the responses from the 75 health workers who successfully participated in the study.

**Figure 4: Background characteristic of health worker**

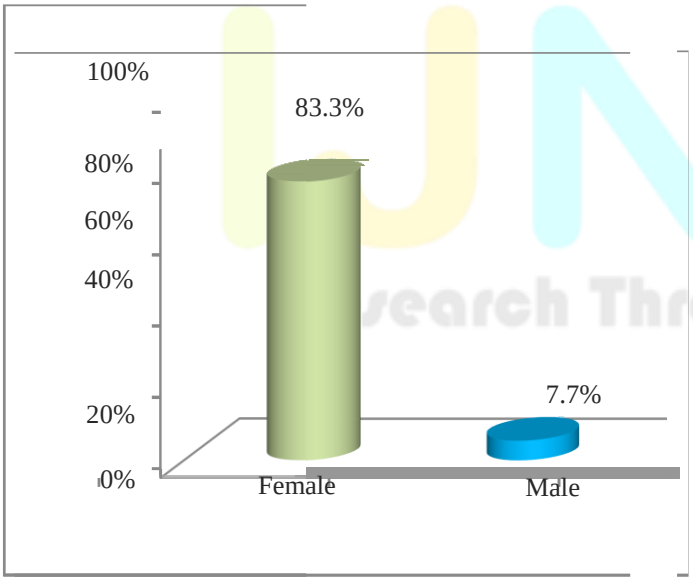
**Figure 4.1 age group**




**Source: kamwendo, 2023**

The results above shows that majority of the health workers (38.5%) where aged more that 35 years while few (1.3%) where aged between 20 and 25 years.

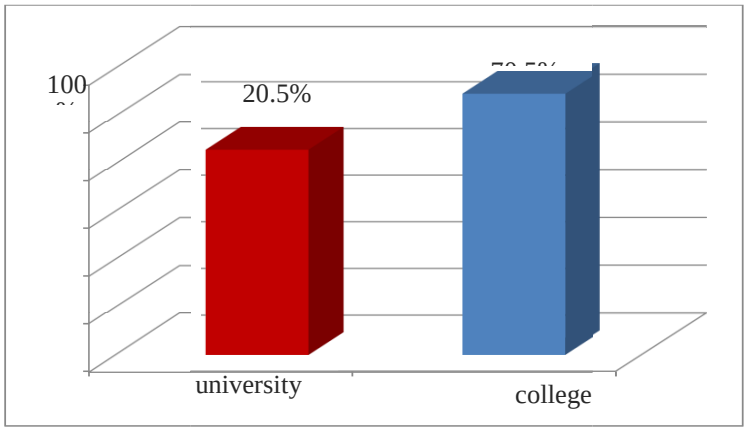
**Figure 4.2 Gender**




**Source: kamwendo, 2023**

The results above shows that majority of the healthworkers (83.3%) were female while few where male (7.7)

**Figure 4.3: Education level**




**Source kamwendo, 2023**

The figure above shows that majority (70.5%) of health workers attained college level of education while few (20.5%) attained university level qualification.

| **Length of Service** | | | |
|---|---|---|---|
| 1-5 | 4 | 5.6 | (0.0209, 0.1293) |
| 6-10 | 32 | 45.1 | (0.0644, 0.2126) |
| 11-15 | 20 | 28.2 | (0.0550, 0.1966) |
| 16-20 | 14 | 19.7 | (0.1146, 0.2893) |
| >20 | 1 | 1.4 | (0.0036, 0.0068) |

**v. RESULTS AND DISCUSSION**

**Table6: Challenges encountered when following infection prevention guidelines**

| **Variable** | **Number (N)** | **Proportion (%)** | **95% Confidence Interval** |
|---|---|---|---|
| **Availability** | | | |
| Yes | 20 | 28.1 | (0.1798, 0.3763) |
| No | 51 | 71.8 | (0.6237, 0.8202) |
| | | | |
| **Sterility** | | | |
| Yes | 65 | 91.5 | (0.8532, 0.9712) |
| No | 6 | 8.4 | (0.0288, 0.1468) |
| **Safety** | | | |
| Yes | 65 | 91.5 | (0.7717, 0.9259) |
| No | 6 | 8.4 | (0.0741, 0.2283) |

| **Education Level** | | | |
|---|---|---|---|
| College | 66 | 88 | (0.7874, 0.9356) |
| University | 9 | 12 | (0.0644, 0.2126) |

**Source: kamwendo, 2023**

The results show the challenges encountered when following infection prevention guidelines. The majority of midwives said that equipment was not available and that the equipment used was sterile. The majority of the midwives said the midwifery practice was safe to the patients. Most of the respondents were college graduates with a few being university graduates.

**Table 7: Investigator Observation Sheet**

| **Variable** | **Number** | **Proportion** | **95% Confidence Interval** |
|---|---|---|---|
| **Are midwives following GNC Manual** | **N** | **%** | |
| Yes | 8 | 11.3 | (0.1985, 0.2015) |
| No | 63 | 88.7 | (0.4902, 0.9433) |
| **Are midwives disinfecting equipments accordingly** | | | |
| Yes | 33 | 46.5 | (0.1682, 0.6873) |
| No | 38 | 53.5 | (0.3127, 0.8318) |
| **Midwives knowledgeable of infection prevention procedures** | | | |
| Yes | 26 | 36.6 | (0.1078, 0.6032) |
| No | 45 | 63.3 | (0.3968, 0.8922) |
| **Are health worker practices Safe in labour ward** | | | |
| Yes | 54 | 76 | (0.3127, 0.8318) |
| No | 17 | 23.9 | (0.1682, 0.6873) |
| **Is standard equipment** | | | |

| | | | |
|---|---|---|---|
| **available in labour ward?** | | | |
| Yes | 66 | 92.9 | (0.4902, 0.9433) |
| No | 5 | 7.1 | (0.0567, 0.5098) |
| **Midwives working Culture** | | | |
| Work as I earn attitude | 56 | 78.9 | (0.3127, 0.8318) |
| Professionalism | 15 | 21.1 | (0.1682, 0.6873) |

**Source: kamwendo, 2023**

The results reveal that the majority of midwives do not strictly follow the guidelines in the GNC manual (88.7%). The majority of the midwives do not disinfect equipment accordingly as prescribed in the infection prevention manual (53.5%). The results show that the majority of the midwives are not knowledgeable of infection prevention procedures in their practice (63.3%).

The results have revealed that the health workers practice in labour ward are safe; while the standard equipment is available and that the majority of the midwives have an "I don't care attitude" and lack professionalism.

### 8.1 Knowledge on infection prevention guidelines

During an interview with the key informants who are the doctors and in-depth interview with midwives they were asked whether they are aware about the prevention guidelines/ procedures for maternal and child health. One of the respondents answered the following:

> *"…. We are very much aware of the infection prevention measures that can be used in the labour ward, amongst them hand hygiene, vaccination of mothers from diseases that can cross the placenta and affect the unborn child such as tetanus, clean environment, use of sterile equipment's among others. However, some of these infection prevention measures we fail to achieve them because of increase in traffic flow of clients with limited sterilizing machines, handwashing points and disinfecting materials for carbolization hence we fail to adheare to all infection prevention measures…." KII-1*

Furthermore, during in depth interview the midwives were asked about the challenges or barriers that they encounter when following the infection prevention guidelines/ procedures, and this is what the respondents said:

"…*We face a lot of challenges when following infection prevention measures such as inconsistence in medical supplies and chemicals for infection prevention ad a results this causes inconsistence adherence, we usually lack proper resources where majority of the funds are channeled to purchase of medicines while few funds are allocated for other medical supplies, workshops and continuous development programs concerning*

*infection prevention are rarely conducted at the facilitates hence we fail to acquaint ourselves with the current trends..."IDI-2*

The midwives where further asked about how they keep their instruments sterile in the labour wards and the following was the response:

"…*We mainly use autoclaving machines to sterilize our instruments and sometimes chemical sterilization is also used however, we use a central sterilization point which is mostly fully booked and unable to attend to sterilization of equipment's at request…." IDI-3*

**8.2 Working culture of midwives, nurses and physicians in the labour ward**

During an interview with the key informants and an in-depth interview with the midwives and nurses, they were asked on how the working culture is within the ward and the following were the response:

"…..*We collaborate well amongst ourselves in the ward; however, the collaboration is not that strong between the midwives, doctors and nurses as sometimes the midwives feel the need to take the lead without adequate consultations from other healthcare personnel. This has resulted in less information being communicated to expecting mothers on cleanliness because of few nurses, monitoring patients and ensuring a safe environment. Doctors will mainly be involved when there is need for a complex case or emergency or during a surgical intervention. How ever, we may need effective decision making and a patient centered approach of our working culture in the labour ward…." IDE-4*

Finally, during the interview process to the health workers, they were asked how neonatal sepsis can be reduced in the labour wards within the Lusaka district health center and the following were responses:

"…. *We need comprehensive education and training on all health care staff on infection prevention in the labour wards such as infection prevention and control, sterilization and aseptic techniques among others. We need to ensure that antenatal care is emphasized for pregnant women as this help detect and treat any infections early. Furthermore, others indicated that; we need more clean environments, appropriate antibiotics, isolation and infection control units, regular audits and quality improvement and multidisciplinary approach to foster collaborations among midwives, nurses, doctors and other health care providers to ensure a holistic and coordinated approach to neonatal and maternal care……"IDE-5*

## CHAPTER FIVE: DISCUSSION OF FINDINGS

### 5.0 Introduction

This chapter discusses the findings of the study, highlighting the major causes of neonatal sepsis determining the health worker knowledge of the infection prevention procedures by following the standard operating procedure (SOP) for conducting a delivery. The chapter will further determine the availability and sterility of the equipment being used for deliveries in labor ward and then assess the availability of programs to reduce neonatal mortality at each of the selected facilities and finally determine the prevalence of neonatal sepsis in Lusaka Urban Health facilities. According to the results, the causes of neonatal sepsis included prematurity and low birth weight. Neonates who showed signs of fever in the first week of life were born premature, because of meconium-stained liquor, while other neonates were in distress before birth, with a few indicating

early rupture of membranes and to some extent some had pronged labor. The study collaborates with earlier studies conducted on neonatal sepsis.

**5.1 Health worker knowledge of the infection procedures**

Having compared with Odabasi (2020) in a study conducted in Ghana, the results revealed that the university graduates were more knowledgeable on infection prevention than the college graduates. The study results further revealed that the midwives were knowledgeable on the infection prevention procedures despite the investigator observation sheet revealing that the midwives had limited knowledge. Based on the knowledge from the respondents, some of the known infection prevention guidelines were the avoidance of artificial rapture of membranes, treating of infections antenatally especially urinary tract infections, use of antiseptic techniques when performing sterile procedures such as cord care, hand washing, using protective clothes, autoclaving the instruments, use of sharp boxes, correct labeling of bins with liners, single use of syringes and needles, use of a disinfectant like Jik, and proper disposal of contaminated waste (Ministry of Health Infection Prevention user guide 2003) . Other preventive measures included avoiding breastfeeding if the mother had sores on the breast, vulva swabbing before vaginal examination, handling all patients as infectious and the use of 0.5% chlorine solution. This was observed in the way the midwives were conducting the deliveries. Only very few midwives displayed knowledge of infection procedures. The study was in line with that of odabasi, (2020) in which similar findings where observed.

**5.2 Standard operating procedure for conducting a delivery**

The standard procedure for conducting a delivery was not followed by the majority of midwives and the hand washing before wearing gloves was not neglected by most of the midwives further showing that a trolly was not set, vulva swabbing was rarely done, aseptic technique was not followed. Sometimes sterile equipment was not used. The findings are in line with the study of Johnson (2012) who had similar findings in a systematic analysis conducted in South Africa where majority of the hospitals where not using the standard operating procedure for conducting a delivery.

**5.3 Availability and sterility of equipment being used for deliveries**

The questionnaires and investigator observation sheets revealed that most of the important equipment were available in all labor wards and the study also showed that the equipment used for conducting deliveries were autoclaved adequately and the study was in agreement with the study conducted by Newman (2011) in which he looked at reduction of neonatal sepsis by use of sterilized instrument was instrumental in reducing the infection (chi-square 0.003)

**5.4 Availability of Programs to reduce Neonatal Mortality**

The programs for reducing nosocomial infections neonatal mortality were not available and the teaching sessions were not held to such an extent that the midwives were rarely sent for refresher courses on how to reduce neonatal mortality. Some of the midwives were not even aware of nosocomial infections as seen in their practice. The findings of the study are in agreement with the study of Kamanga (2022) in a study looking at reducing maternal and neonatal mortality through integrated and sustainability focused programming in Zambia in which it was identified that refresher courses reduce neonatal sepsis in labour wards hence reducing neonatal mortality rates.

**5.5 Neonatal Sepsis resulting from Prolonged Labour**

The majority of the mothers were young adults and that the majority had at least one child with a few having five or more children. The mothers captured did not present signs of fever in labor and all the age groups and parities did not manifest with fever while in labor. Temperature checking was done on admission and four hourly until the mother delivered. The occurrence of prolonged labor was common among the mothers of parity one with a few in parity two and three, having compared the finding of the study to that of Yancy et al. (2005) in which a multivariate analysis was conducted to determine the associations between maternal characteristics, intra-partum events and neonatal sepsis. The results showed that chorio- amnionitis, preterm delivery and prolonged duration of internal monitoring are independent risk factors for neonatal sepsis.

**5.6 Neonatal Sepsis resulting from Preterm Labour**

A few mothers had their neonates manifesting with fever in the first week of life were premature and comparing the results to Lawn et al. study results, the main direct causes of neonatal sepsis were estimated to be preterm birth. Seale et al. (2005) also found that the most common risk factors for neonatal sepsis that were identified were prematurity, maternal pyrexia, low birth weight and difficulties at delivery.

The male neonates who presented with fever in the first week of life were more as compared to the female babies though the margin was minimal. The results further showed neonatal sepsis was less prevalent in those mothers who had husbands than in those who did not have husbands. The babies born from married parents recorded minimal cases of premature birth, the results were in line with Kamanga (2022). Who indicated that Married couples may often have a stable and supportive environment, which could contribute to better overall health during pregnancy, Married couples might be more likely to have access to healthcare services, which can lead to better prenatal care and monitoring, potentially reducing the risk of complications, Married couples might be more inclined to adopt healthier lifestyles, including proper nutrition, regular exercise, and avoiding harmful behaviors (such as smoking and excessive alcohol consumption) during pregnancy and Marriage might be associated with better socioeconomic status, which can indirectly affect pregnancy outcomes due to improved access to resources and education.

**5.7 Neonatal Sepsis resulting from Meconium stained Liqour**

A few cases of babies who passed meconium in liquor presented a few cases of fever in the first week of life. However, the condition in babies was very rare and comparing the results to the study done by Jones et al. carried out from 1998 to 2002 the results showed that some neonates who manifested with early onset sepsis were born from mothers with complicated pregnancy like multiple pregnancy, preterm rupture of membranes and maternal urinary tract infections.

**5.8 Neonatal Sepsis resulting from early rupture of Membranes**

A study conducted in the United Kingdom in the former Northern Region by Oddie (2002) on the risk factors for early onset neonatal group B streptococcal sepsis, the results confirmed that rupture of membranes before the onset of labor is an important risk factor. The results showed similar trends to the results obtained from

Adair (2003) which suggested that neonates who presented with sepsis in the first week of life were delivered preterm, low birth weight infants, or the mother had premature rupture of membranes.

The results have also revealed that the majority of the neonates who presented with fever in the first week of life were born normally without any complications of labor. The results can be compared to a study by Zaidi (2009). The results revealed that infections in the first week of life were as a result of gram-negative pathogens, most of these pathogens may be hospital acquired rather than maternally acquired. This results from unhygienic delivery practices.

From the study conducted among the health staffs suggested that the majority of the health workers in the selected health facilities were graduates from different colleges who had worked in the health facilities for quite a long time.

**5.9 Challenges faced by Health Workers on Infection Prevention**

The most common challenges encountered when following the infection prevention guidelines included such problems as the non-availability of equipment and disinfectants such as gloves, not enough beddings, scarcity of Jik and chlorine, inconsistent supply of savlon for vulva swabbing, lack of cotton wool and water supply at the health centers, not enough bin liners, shortage of staff.

Standard equipment such as autoclaving machines and boilers were available in the respective health facilities and delivery packs were autoclaved as per standard procedure but these ran out because of the high turnover of deliveries in certain health facilities forcing the midwives to conduct deliveries without delivery packs hence, sterility sometimes was not maintained. The shortage of midwives in the health facilities also posed as challenge in following the infection prevention guidelines. There was a report that some health facilities did not have laundry departments and the situation was worse in the rainy season. Thus, the ten health facilities recorded a very minimal number of midwives following the guidelines in the NMCZ procedure manual.

**I. ACKNOWLEDGMENT**

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