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Assessing Predisposed Factors and their Influence on Infant Mortality among residents of Malontho Sanda Tenderen Chiefdom, Sierra Leone

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Abstract

Infant mortality rate (IMR) is considered an important nationally used indicator for assessing the health status of a population, and it is closely related to the community's well-being and development (Rezaei et al., 2015). This study investigates the predisposing factors of infant mortality in Malontho town, Sanda Tendaren Chiefdom, Karene district, Northern Sierra Leone. In Sierra Leone, reducing infant mortality remains a paramount goal. Infant mortality rates are estimated at 75 deaths per 1000 live births, according to the 2019 Sierra Leone Demographic and Health Survey (SLDHS). Similar patterns were observed for infant mortality in Sierra Leone, with 89 deaths per 1000 live births in 2008 and 92 deaths per 1000 live births in 2013(SLDHS, 2019). The study uses a cross-sectional quantitative research design with a sample size of 124 childbearing women. The study was conducted over a month, and snowballing was used as the sampling method. Data were collected through a standardised questionnaire and analysed using the Statistical Package for the Social Sciences (SPSS) for Windows, Version 22.0, and MS Excel. The data were presented as percentages and frequencies in standard tables.The results show that women who gave birth below 20 years of age suffered a significant number of infant deaths, 12(75%). Women who gave birth within the age bracket 30-34 and above 35 years suffered the least, with a minimal number of one (6%) infant deaths. At the same time, women who gave birth within the age bracket 25-29 years have zero (0%) infant deaths. Women whose birth interval is 1-2 years have a significant number of infant mortalities, 8(50%). Women whose birth interval is 3-4 years have 0(0%) infant mortality, and those whose birth interval is above 4 years have minimal infant mortality of 1(6%). Women with no formal education have the highest number of infant deaths, 13(81%). Women who did not visit a health facility in the first week of delivery have a significant number of infant deaths, 10(62%). Women who visited a health facility for PNC less than 1 month after delivery have an infant mortality of 3(19%). Women

who visited a health facility for PNC within 1-3 months after delivery have a considerable number of infant deaths of 13(81).

Keywords: Antenatal care, postnatal care, maternal age and Birth interval.

Introduction

Infant mortality is a crucial metric for evaluating a nation's health status. Over recent decades, there has been a significant and consistent decrease in under-five mortality rates globally, dropping from 93 deaths per 1000 live births in 1990 to 41 deaths per 1000 live births in 2016 (UNICEF, 2017). For children and young adolescents, the risk of dying was highest in the first month of life at an average rate of 18 deaths per 1,000 live births globally in 2017. In comparison, the probability of dying after the first month and before reaching age 1 was 12 per 1,000, the likelihood of dying after age one and before age 5 was 10 per 1,000, and the likelihood of dying after age five and before age 15 was 7 per 1,000 (Child Mortality Report, 2018). Despite these substantial strides, reducing infant mortality remains challenging in the Sub-Saharan African region (Dube, 2012). This research aimed to explore the predisposing factors influencing infant mortality, focusing on the deaths of infants within their first year of life, including neonatal (less than 28 days after birth) and postnatal (28 to 364 days after birth) deaths. Studies such as that by Tadesse et al. (2018) emphasise the heightened vulnerability of infants during the neonatal period, indicating the necessity of increased attention to neonatal health within child health programs. High-income countries have achieved lower neonatal mortality rates due to prioritising neonatal health care (Tadesse et al., 2018).

This study aims to enhance maternal understanding of the critical role antenatal and postnatal care services play in safeguarding the lives of fetuses and newborns, respectively. Furthermore, the research aims to advocate for promoting girl child education in Sierra Leone. This chapter introduces the study's context, articulates the problem statement, elucidates the study's purpose, outlines research inquiries, delineates the study's characteristics, defines operational terms, specifies the study's scope, and identifies the limitations and constraints of the research.

Background of the study

In the last two decades, the world has substantially reduced mortality among children and young adolescents (including children under age 5, children aged 5−9 and young adolescents aged 10−14). Still, in 2017 alone, an estimated 6.3 million children and young adolescents died, mostly from preventable causes (Child Mortality Report, 2018). Children under age 5 accounted for 5.4 million of these deaths, with 2.5 million deaths occurring in the first month of life, 1.6 million at age 1-11 months, and 1.3 million at age 1-4 years (Child Mortality Report, 2018). In 2017, 118 countries already had an under-five mortality rate below the SDG target of a mortality rate at least as low as 25 deaths per 1,000 live births (Child Mortality Report, 2018). Among the remaining countries, progress will need to be accelerated in about 50 countries to achieve the Sustainable Development Goal (SDG) target by 2030 (Child Mortality Report, 2018).

This study contends that insufficient maternal education significantly contributes to infant mortality rates in Sierra Leone. Citing the Sierra Leone Demographic and Health Survey of 2013,

it is highlighted that despite efforts, the country faced high infant and under-five mortality rates, with maternal Age being a key determinant. The introduction of the Sierra Leone Free Health Care Initiative aimed to tackle maternal and child mortality, but progress was slow until the latter part of 2010 due to systemic challenges. Rural areas and certain regions had higher percentages of women and men without formal education, although there was a slight decrease observed from 2008 to 2013 in these proportions (SLDHS, 2013).

Numerous studies, including Hassen (2014), Adhikaril, and Sawangdee (2011), underscore the significance of maternal education in child health, specifically its influence on postnatal services, immunisation, and nutritional status. The consensus is that maternal education facilitates better health awareness, promotes healthcare utilisation, and empowers women in decision-making processes within households, thereby reducing the probability of infant mortality. Moreover, studies by Mekonnen (2011) and Mulugeta (2012) highlighted maternal education as a primary determinant of child health indicators and mortality.

The text also underscores the interlinkages between maternal education and various child health aspects, such as the utilisation of healthcare services, birth spacing, sanitation practices, and malaria prevention. Additionally, it emphasises the importance of community awareness and knowledge about antenatal and postnatal care services, especially among illiterate women, as a critical factor in reducing infant mortality rates. This study, conducted in the Malontho Sanda Tendaren Chiefdom, focuses on assessing maternal knowledge about antenatal and postnatal care services, considering factors such as maternal age, household income, educational level, and birth intervals as sociodemographic variables contributing to infant mortality. The aim is to harness community insights to enhance girl-child education and reinforce social mobilisation efforts within Sierra Leone's District Health Management Teams (DHMTs).

This research highlights the correlation between maternal education, healthcare awareness, and infant mortality. It seeks community insights to inform strategies promoting girl child education and strengthening healthcare mobilisation initiatives across Sierra Leone.

Problem statement

Infant mortality rate (IMR) is considered an important nationally used indicator for assessing the health status of a population, and it is closely related to the community's well-being and development (Rezaei et al., 2015). Globally, it has been opined that the possibility of dying after the first month before reaching age 1 is 11 per 1,000 live births, and after age 1, before turning age 5, it is 10 per 1,000 live births (UN IGME, 2019; United Nations Population Division, 2022). In recent decades, remarkable progress has been achieved globally in reducing infant mortality rates. Among children and young adolescents, the risk of dying was highest in the first month of life at an average rate of 18 deaths per 1,000 live births globally in 2017. In comparison, the probability of dying after the first month and before reaching age 1 was 12 per 1,000, the likelihood of dying after age one and before age 5 was 10 per 1,000, and the likelihood of dying after age five and before age 15 was 7 per 1,000 (Child Mortality Report, 2018).

The first 28 days of life, the neonatal period, was the most vulnerable time for a child's survival in most parts of the world. Children face the highest risk of dying in their first month of life at an

average global rate of 18 deaths per 1,000 live births in 2018 (UN IGME, 2019). The under-five deaths declined significantly from 12.6 million in 1990 to 5.6 million in 2016, with the under-five mortality rate dropping from 93 deaths per 1000 live births to 41 deaths per 1000 live births during the same period (UNICEF, 2017). Despite this advancement, 2.6 million newborns worldwide died in 2016, with neonatal deaths accounting for 46 per cent of all under-five deaths, marking an increase from 41 per cent in 2000 (UNICEF, 2017). Notably, the risk of a child dying before reaching the age of one (infant mortality) is considerably higher in certain regions, such as the WHO African region, where it stands at 52 per 1000 live births, contrasting sharply with the significantly lower rate of 8 per 1000 live births in the WHO European Region (World Mortality Report, 2015).

In Sierra Leone, reducing infant mortality remains a paramount goal. Infant mortality rates are estimated at 75 deaths per 1000 live births, according to the 2019 Sierra Leone Demographic and Health Survey (SLDHS). Similar patterns were observed for infant mortality in Sierra Leone, with 89 deaths per 1000 live births in 2008 and 92 deaths per 1000 live births in 2013(SLDHS, 2019). This issue emphasises the urgency of addressing factors influencing child health outcomes. The survey also highlighted disparities between rural and urban areas, indicating higher infant and child mortality rates in rural regions.

While studies investigating the correlation between maternal education and infant mortality have been conducted globally, such research has not been explored in this specific region of Sierra Leone. This study seeks to examine the level of knowledge among childbearing women in the Malontho communities concerning antenatal and postnatal care services provided by a single Peripheral Health Unit (PHU) characterised as the maternal and child health post (MCHP). This MCHP is stationed at the township of Malontho to serve several communities at far and nearby distances. It is anticipated that enhancing maternal awareness and knowledge regarding essential healthcare services during pregnancy and after childbirth will significantly contribute to improving child survival rates. This research aims to bridge the existing gap by shedding light on the role of maternal education and knowledge in influencing infant mortality within these communities, offering valuable insights for targeted interventions to enhance child healthcare outcomes.

Purpose of the study

This cross-sectional quantitative study aimed to evaluate the depth of maternal awareness regarding essential healthcare services, specifically antenatal and postnatal care, while also exploring the influence of maternal factors like age, education, birth spacing, and household income. Additionally, the research extended its focus to assess the knowledge of childbearing women on topics such as birth spacing and proper child care. Furthermore, it analysed the impact of variables like marital status, religion, and the number of children on the overall study, aiming to establish correlations between maternal education and infant mortality in the Malontho community, Sanda Tendaren Chiefdom, located in the northern region of Sierra Leone, Karene District.

This study aimed to gauge mothers' awareness of crucial aspects of healthcare services related to pregnancy and newborn care, including their understanding of antenatal and postnatal care practices, especially regarding healthcare services. Additionally, the research aimed to investigate maternal knowledge regarding birth spacing and adequate childcare practices. It will further examine how various factors, such as maternal education, age, household income and birth spacing, as well as socio-demographic variables like marital status, religion, and the number of children, interrelate and potentially impact infant mortality rates within the Malontho community of Sanda Tendaren Chiefdom, northern Sierra Leone.

The study design encompassed a quantitative approach (descriptive cross-sectional research design), intending to collect numerical data through surveys or structured interviews to quantitatively assess maternal knowledge levels and their potential associations with infant mortality. By examining a wide array of variables, including maternal education, hygiene practices, birth spacing, and childcare knowledge, alongside socio-demographic factors, the study aimed to unveil comprehensive insights into the dynamics influencing maternal education and its relationship with infant mortality in the specified region.

Aim of the study

The study assesses the predisposing factors influencing infant mortality in Malontho Sanda Tenderen chiefdom.

Objectives of the study

1. To explore socio-demographic factors influencing infant mortality in Malontho, Sanda Tenderen chiefdom.
2. To examine how antenatal care attendance influences infant mortality in Malontho Sanda Tenderen chiefdom
3. To assess how postnatal care visits influence infant mortality in Malontho, Sanda Tenderen chiefdom

Research questions of the study

1. What socio-demographic factors influence infant mortality in Malontho, Sanda Tenderen chiefdom?
2. How does antenatal care attendance influence Malontho Sanda Tenderen's chiefdom infant mortality?
3. How do postnatal care visits influence infant mortality in Malontho, Sanda Tenderen chiefdom?

Definition of terms

Infant Mortality: Infant mortality denotes the likelihood of an infant passing away between birth and their first birthday, encompassing deaths of babies aged 12 months or younger(Eunice Kennedy Shriver National Institute of Child Health and Human Development, nd).

Maternal Age: Maternal age signifies the age of a woman during her childbirth period (Davis, nd).

Antenatal Care: Antenatal care services encompass the healthcare services provided to women from conception to delivery, typically received from a healthcare facility (World Health Organization, 2016).

Postnatal Care: Postnatal care services refer to the healthcare provided to both a woman and her newborn from the moment of childbirth up to 59 months, generally administered at a healthcare facility.

Maternal education represents the highest level of education a woman attains during childbirth.

Cross-sectional study: A cross-sectional study involves analysing a segment or snapshot of the targeted population to draw conclusions or insights.

Assumption of the study

This research will operate under the assumption that the infant mortality data provided by the community members is a fair representation of all infant deaths occurring within Malontho, Sanda Tendaren community, within the specified timeframe. It acknowledges the potential limitation that the findings may not encompass all infant mortality data across Sanda Tendaren chiefdom. Moreover, the study assumed that the reported figures regarding antenatal and postnatal care visits, as shared by community members, are accurate and reliable.

The assumptions made in the study regarding infant mortality in the Malontho community involve certain key presumptions. These include the belief that the data provided regarding infant deaths is comprehensive and inclusive of all instances within the Malontho community during the specified period. Additionally, the study may presume that the reported information on infant mortality accurately represents the overall situation within the community. However, it might not necessarily encompass all infant mortality cases in the broader region or neighbouring communities. Furthermore, there might be an assumption that the data collected through surveys, reports, or community feedback is reliable and reflects the actual state of infant mortality despite potential limitations or discrepancies that might arise from underreporting or incomplete data.

Scope and limitation of the study

The research primarily emphasises maternal education as a primary factor influencing infant mortality while also exploring additional contributors to infant deaths within the Malontho community. However, it acknowledges limitations in generalising findings to the broader Karene district. The study focused on a population of 1200 individuals, with a sample size of 124 women aged 15-49 years as respondents, explicitly providing information on infant mortality. Limitations include excluding individuals below 15 years and above 50 years, and the confinement of information collection within the boundaries of Sanda Tendaren Chiefdom. Additionally, the study specifically targeted women who have previously given birth, omitting first-time pregnant women from participation.

Limitations of the study

The study has certain limitations that may impact its findings. Firstly, there is a likelihood of inaccuracies in reporting the age of death, potentially distorting the actual pattern of mortality across different age groups. Secondly, the selective exclusion of records related to infants who did not survive might lead to an underestimation of mortality rates, creating a skewed representation of the actual occurrences. This omission from birth histories, especially concerning infants who passed away, could affect the accuracy and completeness of the mortality data obtained. Additionally, cultural or traditional beliefs may influence some mothers not to disclose information about their deceased children, leading to gaps in the recorded data due to their reluctance to discuss such an unfortunate occurrence.

Significance of the study

The implementation of the free health care initiative in 2010, as noted by Donnelly (2011), significantly influenced infant mortality rates in Sierra Leone, suggesting that the situation could have been considerably worse without this initiative. Acknowledging the importance of maternal education as a crucial factor in child health, as highlighted by sociologists and healthcare experts like Menezes (2015), underscores the significance of this study.

This research holds immense significance in mitigating high infant mortality rates in Sanda Tendaren Chiefdom and, by extension, the Karene district. It aligns with Target 3.7 of Sustainable Development Goal 3, emphasising universal access to sexual and reproductive healthcare services, including family planning, education, and integration into national health strategies. By highlighting the importance of antenatal and postnatal care services for child survival, the insights from this study can be instrumental for researchers and policymakers at the national level. Specifically, it can advocate emphasising maternal education as a pivotal means to reduce infant mortality in Sierra Leone.

The findings have the potential to guide the introduction of effective public health interventions aimed at improving child survival rates within the country. The study aims to determine the main socioeconomic factors affectingthe infant mortality rate using time series data in Sanda Tendaren Chiefdom, Malontho town. The study hopes to provide crucial information about unexplored socioeconomic factors affecting infant mortality rates among cities in Sanda Tendaren Chiefdom, Karene district, Sierra Leone, which may show policymakers how to decrease infant mortality.

Literature Review

Socio-demographic factors

Understanding the impact of socio-demographic factors on infant mortality in Malontho, Sanda Tenderen chiefdom, requires a comprehensive exploration of various interconnected elements. Socio-demographic factors encompass a range of variables, such as maternal age, education, income, access to healthcare, and living conditions, which collectively influence infant health outcomes. It was clearly stated by UNICEF (2014) that a family's wealth and geographic location, urban or rural, remain powerful determinants of inequities in neonatal mortality.

Similarly, Yaya et al. (2014) found that socioeconomic factors affect neonatal mortality, especially among the poorest households headed by illiterates and far from the health facility. Investigating these factors involves acknowledging the multifaceted nature of infant mortality, wherein a combination of social, economic, and healthcare-related aspects plays a significant role. The interplay of these factors can profoundly impact the vulnerability of infants to health risks and mortality in this specific chiefdom. Genowska et al. (2015) mentioned in their research that various environmental and socioeconomic determinants of infant mortality exist.

Socio-demographic factors, particularly maternal education and access to healthcare, have been widely recognised as crucial determinants of infant mortality. Kayode et al. (2014) found a wide variation in neonatal mortality in sub-Saharan Africa due to differences in the quality of healthcare governance, prevalence of HIV and socioeconomic deprivation. Research indicates that higher maternal education levels often correlate with reduced infant mortality rates due to increased awareness of proper healthcare practices, better healthcare services, and improved socioeconomic conditions. In contrast, lower levels of education may limit access to essential health information and resources, negatively influencing infant health. Furthermore, socioeconomic status, including income and occupation, significantly influences healthcare access and the ability to afford quality healthcare, thereby impacting infant mortality rates (Yee, 2016). Factors such as maternal age, marital status, and cultural practices within the chiefdom may also influence infant health outcomes, necessitating a comprehensive analysis of these variables to gain a holistic understanding of the situation. Also, it has been found that poor maternal health-seeking behaviour was high among women who had a low educational background (SLDHS, 2019). Lower household wealth, an uneducated mother and birth in a rural area lower a newborn's chances of survival within the first 28 days of life (The Partnership for Maternal, Newborn & Child Health, 2011).

In Malontho, SandaTenderen chiefdom, disparities in healthcare access, socioeconomic conditions, and educational opportunities might exacerbate the risk of infant mortality. Limited access to healthcare facilities, inadequate prenatal care, and challenges in accessing essential healthcare services due to geographical constraints could contribute to higher infant mortality rates. Understanding the intricate relationships between socio-demographic factors and infant mortality is crucial for designing targeted interventions and policies that address the specific needs of this community. The percentage of respondents with no education has declined since 2013, from 56% to 46% among women (SLDHS, 2019). Efforts aimed at improving maternal education, enhancing healthcare infrastructure, promoting health awareness, and addressing socioeconomic disparities could mitigate the influence of these factors on infant mortality in Malontho, Sanda Tenderen chiefdom.

Maternal Age

The age at which childbearing begins is an essential determinant of the overall level of fertility as well as the health and well-being of the mother and child (SLDH, 2019). Maternal age is a factor that can influence infant mortality rates, although the relationship is complex and multifaceted. Generally, very young mothers, typically defined as adolescents under the age of 18, and older mothers, often considered as those over 40 years old, may face increased risks associated with

infant mortality. For adolescent mothers, there can be higher risks of complications during pregnancy and childbirth due to their bodies not being fully mature for childbirth. Childbearing at a very young age is associated with an increased risk of complications during pregnancy and childbirth and higher rates of neonatal mortality (SLDHS, 2019). In 2019, it was determined that the median age at first birth among women aged 25-49 gave birth for the first time before age 20 (SLDHS, 2019). These young mothers may also encounter socioeconomic challenges, including limited access to healthcare, education, and social support, which can contribute to higher infant mortality rates. Conversely, older mothers might face different risks. Advanced maternal age is associated with a higher likelihood of certain health conditions such as hypertension, diabetes, and chromosomal abnormalities in the baby, which could lead to increased infant mortality rates.

However, it is essential to note that various factors, including access to healthcare, socioeconomic status, cultural factors, and overall maternal health, influence the relationship between maternal age and infant mortality. Therefore, while maternal age can be a contributing factor, the individual circumstances surrounding each pregnancy play a crucial role in determining infant mortality rates. According to SLDHS (2019), 21% of women aged 15-19 have begun childbearing, 18% have had a live birth, and 4% are pregnant with their first child. It is also clear that rural teenagers are more likely to have started childbearing than urban teenagers (29% and 14%, respectively).

Birth Spacing

Birth spacing, the interval between pregnancies, plays a significant role in infant mortality rates. Optimal birth spacing, typically defined as a gap of at least 18 to 24 months between pregnancies, is associated with reduced infant mortality (Dewey et al., 2007). Short birth intervals, especially intervals of fewer than 18 months, may increase the risk of adverse birth outcomes and infant mortality (Rutstein, 2005). It was also made clear by SLDHS (2019) that short birth interval, particularly those less than 24 months, place newborns and their mothers at increased health risk. Women who conceive shortly after a previous pregnancy might not have fully recovered physically, nutritionally, or emotionally, leading to a higher likelihood of preterm birth, low birth weight, and other complications that can contribute to infant mortality. A high fertility rate, as mentioned by several researchers, leads to a shortened time between pregnancies without allowing the mother to fully recover to baseline health status before a subsequent gestation (Rutstein, 2005). As stated by (Conde-Agudelo, 2007), short birth intervals are associated with several adverse health outcomes for the mother, including anaemia, placental abruption, placenta previa and uterine rupture. Short intervals between pregnancies are closely related to adverse newborn health outcomes such as infant mortality, preterm birth, low birth weight (LBW) and congenital malformation (Arafa, 2004).

On the other hand, longer birth intervals may also have an impact. Intervals exceeding five years between pregnancies might pose an increased risk of complications in subsequent pregnancies, which could influence infant mortality rates (Davanzo et al., 2007). It is believed that optimal birth spacing allows a woman's body to recover fully from the previous pregnancy, reducing the risks associated with pregnancy-related complications and enhancing the chances of delivering a healthy baby. It also provides sufficient time for mothers to attend to their children's nutritional,

emotional, and healthcare needs, contributing to better infant health outcomes and decreased infant mortality rates. (Davanzo et al., 2007) Stated that long birth intervals can be associated with adverse maternal and neonatal health outcomes, such as increased risk for induction of labour, chorioamnionity caesarean delivery, preterm birth, low birth weight and small for gestational age infants. (Yee, 2016) stated that the ideal timing between pregnancies associated with optimal maternal and neonatal health outcomes has not been definitively established. Several studies revealed that the negative practical effect of short birth intervals is attributed to maternal and infant mortality, maternal nutritional depletion, the likelihood of care-seeking behaviour, infection transmission and sibling competition.

Family Income

Since 2013, there has been a slight increase in the percentage of women employed in professional or technical jobs from 2% to 3%, while 54% are engaged in the agricultural sector (SLDHS, 2019). Household income has a notable influence on infant mortality rates, albeit being part of a broader array of socioeconomic factors that contribute to infant health outcomes. OECD (2018) stated that, in general, lower household income or socioeconomic status is associated with higher infant mortality rates. Akinlo (2019) stated that African nations' economic growth significantly affects infant and child health,and many researchers have noted that economic growth has reduced infant mortality and child mortality rates. Mishra and Shyamala (2020) stated that children of mothers experiencing deprivations in dimensions such as education, wealth and tribe remained least likely to be fully immunised. Many other researchers beyond African countries observed that economic growth statistically significantly reduced infant and child mortality rates (Dutta et al., 2020). Families with limited financial resources may encounter challenges accessing quality healthcare, nutritious food, suitable housing, and other essential resources crucial for infant health and development. Taylor-Robinson et al., 2019 established that there is strong evidence that increased child poverty leads to deteriorating child health and increased infant deaths. Notably, from their study, it was evident that the rise in infant mortality had occurred particularly among more disadvantaged children from routine and manual socioeconomic groups (Taylor-Robinson et al., 2019). Economic constraints might restrict access to prenatal care, proper nutrition for the mother during pregnancy, and healthcare services for the infant after birth, all of which can significantly impact infant mortality rates. Lower household wealth, an uneducated mother and birth in a rural area lower newborn chances of survival within the first 28 days of life (UNICEF, 2014).

Moreover, lower-income households might face environmental risks such as poor sanitation, exposure to pollutants, and inadequate access to clean water, which can contribute to higher incidences of infant mortality due to increased susceptibility to infections and diseases. Despite the efforts and progress achieved, recent evidence suggests that access to maternal and child health care continues to be determined by socioeconomic status (Bongo & Ghosh, 2023).

Conversely, higher household income generally provides families with greater access to quality healthcare, better nutrition, safer living conditions, and educational opportunities, all of which contribute to improved infant health outcomes and reduced infant mortality rates. Rising infant

mortality is unusual in high-income countries, and international data show that infant mortality has continued to decline in most affluent countries in recent years (OECD, 2018)

However, it is essential to note that the relationship between household income and infant mortality is complex and influenced by various factors, including access to healthcare, education, cultural practices, and community resources. Numerous studies have pointed out the inadequacies of the existing child healthcare programmes regarding their limited scope and inability to ensure access for vulnerable populations (OECD, 2018). Addressing socioeconomic disparities and ensuring equitable access to essential resources are critical steps towards reducing infant mortality rates across all income levels.

Mother's educational level

A mother's education significantly influences a child's health and survival. Therefore, educating women should be a premium concern and a brilliant way to reduce infant mortality in Sierra Leone and Sub-Saharan Africa. Mother's education enhances the acquisition of health knowledge and the use of healthcare services. This issue will consequently improve child health and increase the survival rate. Women's education is undoubtedly crucial for the acquisition of healthcare knowledge. However, women's illiteracy is believed to be an underlying factor of malnutrition, missing vaccination among children, lack of exclusive breastfeeding, poor Hygiene and late notification of child health status and referral to a healthcare facility. Emina et al. (2009) observed that children whose mothers are educated tend to live a more hygienic and healthy life than their counterparts with no education. Educated mothers are more aware of maternal and child healthcare and are more sensitive to seeking healthcare services if their children are sick. They are also more sensible in making timely decisions on their own, which can help save their children's lives compared to their counterparts (Miringu, 2016). A study conducted in Turkey by Gunes (2013) stated that mothers' primary school completion improves infant health and also demonstrated that mothers' primary school completion leads to earlier preventive care initiation and reduces smoking for better health of both the mother and the child. Higher-educated mothers can access healthcare information better and make proper and timely use of healthcare services when needed. They are more likely to belong to a social group where medical services for their children are readily available (Agyemang, 2013).

Antenatal care services

Antenatal care services safeguard maternal and infant health by providing essential healthcare during pregnancy. Understanding how these services influence infant mortality in Malontho, Sanda Tenderen chiefdom, requires a comprehensive exploration of the impact of antenatal care on various aspects of maternal and newborn well-being. A study generally found that antenatal care (ANC) from a skilled provider was associated with a decreased risk of neonatal mortality with TT injection, and weight and blood pressure (BP) measurement was identified as the most effective ANC intervention (Furnee, 2008). Antenatal care encompasses a series of healthcare interventions, screenings, and education provided to expectant mothers during pregnancy. These services aim to monitor the progress of pregnancy, detect and manage potential complications, promote healthy behaviours, and equip mothers with information on proper nutrition, childbirth

preparedness, and newborn care. Antenatal care is generally considered an effective method of improving outcomes in pregnant women and their babies, although many antenatal care practices have not been subject to rigorous evaluation (Dutta et al., 2020).

In Malontho, SandaTenderen chiefdom, the availability, accessibility, and utilisation of antenatal care services significantly influence infant mortality rates. It is clearly stated that antenatal care attendance by pregnant women minimises high infant and maternal mortality rates in the countries through early detection and treatment of pregnancy-related conditions (Fagbeminiyi & Oduaran, 2019; World Health Organization, 2016). Access to comprehensive antenatal care services allows healthcare providers to identify and address risk factors or medical conditions that may threaten maternal and infant health. In particular, inadequate antenatal care, both in terms of coverage and quality, has been associated with adverse pregnancy outcomes as described by (Ajayi & Osakinle, 2013; World Health Organization, 2018). Therefore, it is essential to increase the coverage of intervention measures before, during and after pregnancy to sustain child survival, particularly the neonates. Adequate antenatal care visits enable early detection and management of complications such as hypertension, gestational diabetes, or infections that could impact the health of the fetus. It was clearly stated by Alonso et al. (2017) that, from a general perspective, antenatal care is understood to be an effective way to decrease infant mortality. Through this service, health professionals can identify the potential risks in the pregnancy and delivery, preventing adverse outcomes. Previous studies show that antenatal care has a protective effect on neonatal deaths. Moreover, these services offer opportunities for health education and counselling, empowering mothers with knowledge on proper nutrition, breastfeeding, and the importance of skilled attendance during childbirth, collectively contributing to better infant outcomes.

However, challenges related to access and utilisation of antenatal care services may persist in Malontho, Sanda Tenderen chiefdom, contributing to disparities in infant mortality rates. Factors such as geographical remoteness, inadequate healthcare infrastructure, cultural beliefs, and socioeconomic constraints might hinder pregnant women from accessing timely and comprehensive antenatal care. Limited awareness about the importance of antenatal care and traditional practices that discourage seeking medical care during pregnancy could further impact the utilisation of these services. According to Toan (2012), in his study, it was stated that the widespread establishment of ANC is the fact that there is a high possibility to detect and effectively manage early signs of, or risk factors for, illness and death during pregnancy.

To examine the influence of antenatal care services on infant mortality, research in Malontho, Sanda Tenderen chiefdom could involve analysing healthcare records, conducting surveys or interviews with mothers, and assessing healthcare facility data. Understanding the correlation between the frequency and quality of antenatal care visits and subsequent infant health outcomes can shed light on the effectiveness of these services in reducing infant mortality rates. By addressing barriers to access, improving the quality of care, and promoting community education on the benefits of antenatal care, efforts can be made to enhance utilisation and potentially decrease infant mortality rates in the chiefdom.

Postnatal care services

Postnatal care services play a pivotal role in shaping infant health outcomes, and their influence on reducing infant mortality rates cannot be overstated. The postnatal period provides opportunities to provide health information, counselling, and support to the mother and family, laying the foundation for childhood development and thriving families (WHO, 2018). In Malontho, Sanda Tenderen chiefdom, the availability, accessibility, and quality of postnatal care services significantly impact infant survival in the critical early stages of life. Postnatal care encompasses a range of healthcare services provided to the mother and newborn in the immediate weeks following childbirth. These services involve monitoring the health and well-being of the newborn, providing vaccinations, offering guidance on breastfeeding, identifying and addressing potential health complications, and educating parents on infant care practices. A substantial proportion of maternal and neonatal deaths could be prevented with good-quality care during childbirth and in the postnatal period (Kruk, 2018).

Effective postnatal care services have the potential to positively impact infant mortality rates by addressing immediate health needs and potential complications that arise after birth. Timely and comprehensive postnatal care can significantly reduce the risk of infant mortality by identifying and managing health issues that might otherwise escalate without intervention. This issue includes early detection of infections, identification of neonatal conditions, and guidance on proper feeding and care practices crucial for infant health and survival. Inadequate postnatal care services or limited access to these services may lead to undiagnosed health problems, delayed interventions, and increased vulnerability of infants to health complications, thereby contributing to higher infant mortality rates in the chiefdom. This synthesis will explore factors within health systems that can determine the availability and quality of postnatal care. The World Health Organization commissioned it to support an update on the 2013 postnatal care guidelines (WHO, 2014).

However, in many regions, including Malontho and Sanda Tenderen chiefdom, challenges persist in ensuring universal access to quality postnatal care services. Factors such as geographical remoteness, limited healthcare infrastructure, inadequate healthcare personnel, and cultural barriers might hinder access to timely postnatal care. Additionally, disparities in education and awareness about the importance of postnatal care among mothers and families could also impact the utilisation of these services. Addressing these challenges requires a multifaceted approach involving improvements in healthcare infrastructure, increasing healthcare provider availability, community education and awareness programs, and promoting culturally sensitive approaches to encourage the utilisation of postnatal care services. By enhancing the provision and accessibility of high-quality postnatal care services, Malontho, Sanda Tenderen chiefdom can potentially witness a significant reduction in infant mortality rates, ensuring a healthier start for newborns and improved overall health outcomes for the community.

Gaps in the research

The uncontrolled and poor maternal system in Sierra Leone makes it very difficult to reduce infant mortality across the various districts. No research has established the relationship between

predisposing factors (maternal age, maternal education, birth spacing, household income, antenatal and postnatal care visits) and infant mortality in the Malontho Community. This research will minimise the gap in maternal education between pregnant women and the Peripheral Health Units (PHUs). This strengthens the PHUs and increases the effectiveness and quality of essential health messages given to pregnant women and lactating mothers during their ANC and PNC visits.

Methods and Materials

Research design and rationale

A descriptive cross-sectional research design was used to analyse the primary data the study participants provided while answering the research questions. The dependent variable in this study is infant mortality. The measured independent variables are the mother's age, birth interval, antenatal care services, postnatal care services, and mother's educational level. This approach was suitable for this study because participants in the community provided data on maternal age, birth interval, antenatal care services, postnatal care services, and the mother's educational level. The data were actively collected from the participants at their own free will. These variables allowed a thorough assessment of the relationship between the predisposing factors and infant mortality. Data were collected and analysed for sampled respondents who had given birth at least once. They provided answers to the research questions.

Target Population

This research was conducted at the Malontho Community in Sanda Tendaren Chiefdom, Karene district, Sierra Leone. This chiefdom is one of the Karene District Northern Province of Sierra Leone. Malontho is a constituent community of Sanda. According to the 2015 housing and population census, Sanda Tendaren chiefdom has a population of 26,407 people. The Malontho town has an estimated population of 600 people. There are 180 women of childbearing age (15-49 years). Malontho has a periodic market, which commences once a week. It has a healthcare facility that serves the other surrounding villages. The town also has both primary and secondary schools.

This study focuses on women of reproductive age (15-49) in the Malontho community. Each participant must have given birth to a child. All women who have given birth recently were included, while those who have never been pregnant were excluded. Again, all those pregnant during the study period were excluded because they would probably fail to contribute to the study.

Sample strategy

The study data will be obtained from the information provided by the community respondents through a well-designed questionnaire. This questionnaire captures maternal age, birth interval, antenatal care services, postnatal care services, household income, and the mother's educational level at birth. The sample size for this study consists of 124 women of reproductive age (15- 49) in the Malontho community. These participants are residents of households during the research.

Determining sample size

The sample for this study was calculated using the 95% confidence level of Taro Yamane's formula (Yamane, 1973). One hundred eighty women of childbearing age had given birth to at least a child. (According to the Maternity register in the Malontho maternal and child health post) The following is a presentation of Taro Yamane's calculating formula.

$$n = \frac{N}{1 + N(e)^2}$$

Where :

n= sample size required

N = number of people in the population

e = allowable error (%)

Substitute numbers in the formula:

n=	180
	1+180*(0.05)2

n= 124 (rounded)

After calculating the sample size by substituting the numbers into the Yamane formula, the researchers considered a whole-number sample size to be 124 persons to obtain the data's reliability.

Sample procedure

The total number of respondents for this study will be 124 women. This is 10% of the estimated population of the Malontho Community. The respondents were chosen using a snowball procedure utterly devoid of bias.

Sample frame

The selection of respondents will be strictly based on eligibility requirements. The eligibility or inclusion requirement will comprise information obtained from women recently giving birth to at least one child. Women who seek healthcare services from other communities were not included in this study, even though they might be victims of the same problems. Women (age above fifty years) who have stopped giving birth to more children will also be excluded from the study.

Data management

The data will be collected from respondents through a filled questionnaire. The statistical software Excel will be used to conduct the analysis. All data will be saved in an Excel document and later transformed into Word. Thorough checks will confirm the accuracy of all records in

Excel spreadsheets and Word documents. The appropriate variables from the questionnaire will be identified and used in the running of the analysis. A total of sixty (124) women of reproductive ages (15-49) from the community will be relevant for this study. They could have experienced childbearing in the recent past before the research.

Data Analysis Plan

Pre-analysis data collection: A pilot study will be done to discover whether there are women in the Malontho community who have recently given birth and also to find out whether there are women who have experienced infant mortality directly. This will be achieved by administering ten (10) questionnaires to ten participants in the community. Five (5) questionnaires will be given to community women who live near the health facility, and the remaining five will be given to community women who live far away from the health facility. All data will be collected and scrutinised for accuracy, and necessary amendments will be made accurately.

Data gathering and Analysis: Primary data will be derived from community respondents and examined through a well-designed questionnaire to conclude maternal age, birth interval, antenatal care services, postnatal care services and mother's educational level. Tabulation of each dependent variable will produce frequencies and percentages of the maternal women in the community. This indicates how each independent variable is associated with the dependent variable (infant mortality) in the Malontho community.

Intervention Variable

Infant Mortality

Infant mortality was created as a variable using women who had children in the last two years before the study. They will be the study's sample. From this variable, age at death (inputted in months) was used, and all the deaths that were twelve months or less were categorised as infant mortality. This will be done for all the children born to a mother (respondent).

This will be determined by data collected from a well-completed questionnaire from January to February 2023. The questionnaire's question of infant mortality will be: 'Have you ever lost a child before 12 months old?' The expected responses would be Yes or No.

Outcome Variables

Maternal age

Maternal age at birth is the age at which the mother experiences childbearing. It can be categorised into young mothers (adolescents) and older mothers (adults). Young mothers are those who are less than 20 years old, whereas older mothers are those who are 20 years old and above.

Birth interval

Birth interval is used in this study to identify the risk of infant mortality for women in the Malontho community. Children born too soon after a previous birth, especially if the interval between the births is less than two years, have an increased risk of sickness and death at an early age (SLDHS, 2013).

Antenatal care services

A dual variable will indicate whether the community women (respondents) visited a health facility during their pregnancy (Yes or No). Data will be further categorised by entry into antenatal care services by the number of visits as "No ANC visit, 1-2 ANC visits, and three and above ANC visits."

Postnatal care services

A dual variable will determine whether newborns have vaccines during the first week when women in the community visit the health facility after childbirth (Yes or No). This will be categorized into first visits to the health facility after childbirth, as less than 1 month, 1-3 months, 4-6 months, and above 6 months.

Mother's educational level

The primary independent variable is the mother's educational level. The highest educational level of the mother indicates that the respondent will be achieved. Education increases women's access to public and private health facilities (Kembo & Van Ginneken, 2009). The variable will be divided into two: educated as "YES" and not educated as "NO". The "Yes" will be further categorised as primary, junior secondary, senior secondary, higher education, or vocational.

Instruments and materials

A standardised questionnaire was designed to collect data on Maternal age, Antenatal care, Postnatal care, Birth interval, and Educational level. The questionnaire consisted of 21 close-ended items (See Appendix). It was pilot-tested, and the average completion time was 10±5 minutes.

Ethical considerations

The Ethics Committee of the University of Makeni (UNIMAK) approved the study. The chiefdom head (chief) and community stakeholders were consulted and approved for the study. Individual consent was sought before the questionnaire was issued to each respondent. The questionnaire did not contain any information that may personally identify the respondents. The data provided by the respondents was highly secured and protected as they were assured of absolute confidentiality. The research provides meaningful and valuable information for policy and decision-makers by analysing primary data surrounding infant mortality in Malontho Sanda Tendaren chiefdom Karene District. Therefore, this study could be necessary for policy and

decision-makers regarding the efficiency and effectiveness of specific programmes and activities under reproductive health and health promotion.

Data Presentation and Interpretation of Data

Demographic Characteristics for the Sampled Respondents

Table 1 represents the demographic results, which show the characteristics of the respondents in Malontho Town. The table indicates that 124 respondents had given birth to at least a child in the last four years before the study. A total of 16 respondents had lost an infant recently before the survey. This can also be stated as 22% of 60 respondents had experienced infant mortality four (4) years before the Malontho community study.

The table also shows the maternal age of respondents. It indicates that 33 (26.6%) of respondents gave birth below 20 years of age. 43 (34%) of them gave birth between 20-24 years of age. 25 (20.5%) of them gave birth between 25-29 years of age, 19 (15.3%) of them gave birth above 35 years of age, and 4(3.2%) were above 35 years of age. Among these, majority 57(46%) were married, 39(31.5%) were single, 21(16.9%) were separated and 7(5.6%) were widow.

The analysis of the respondents' educational level indicates that 74 (59.7%) had no formal education. In comparison, 31 (25%) of the respondents with formal education only attained primary education as their highest level. 12 (9.7%) only attained secondary education, and 4 (3.2%) attained higher education.

The results show that the majority, 109 (87.9%) of respondents, were unemployed, while only 15(12.1%) were employed. The income status of respondents shows that 80(64.5%) were poor, 32(25.8%) were at average and 12(9.7%) were rich.

Table 1: Shows the Socio-demographic characteristics of respondents (n=124)

Maternal Age	Characteristics	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
	Below 20 years	33	26.6	26.6	26.6
	20-24 years	43	34.7	34.7	61.3
	25-29 years	25	20.2	20.2	81.5
	30-34 years	19	15.3	15.3	96.8
	35 years and above	4	3.2	3.2	100
	Total	**124**	**100**	**100**	
Marital status	Single	39	31.5	31.5	31.5
	Married	57	46.0	46.0	77.4
	Separated	21	16.9	16.9	94.4
	Widow	7	5.6	5.6	100
	Total	**124**	**100**	**100**	
The highest level of	No formal	74	59.7	59.7	59.7

education attained	education				
	Primary	31	25.0	25.0	84.7
	Junior Secondary	12	9.7	9.7	94.4
	Senior Secondary	3	2.4	2.4	96.8
	Tertiary	4	3.2	3.2	100
	Total	**124**	**100**	**100**	
Employment status	Yes	15	12.1	12.1	12.1
	No	109	87.9	87.9	100
	Total	124	100	100	
Income status	Poor	80	64.5	64.5	64.5
	Middle/Average	32	25.8	25.8	90.3
	Rich	12	9.7	9.7	100
	Total	**124**	**100**	**100**	

Field data 2023

Table 2 shows the results of respondents who had given birth to at least a child before the start of the study. The result shows that most of the respondents, 50(40.3%), had three (3) children who were born alive, 25(20.2%) gave birth to two (2) children, 27(21.1%) gave birth to four children, 10 (8.1%) gave birth to four live children, and 2(1.6%) gave birth to more than four children.

From the analysis, the results show that 16 (12.29%) of the respondents had delivered a child alive and died later before one year of age (infant mortality).While 108(87.1%) respondents had not experienced infant mortality. The analysis of respondents who had experienced infant mortality in the last four years before the study shows that 5(4%) of the respondents had no interval between successive births (twins), 11(8.9%) had less than a year birth interval between the previous birth and the child that died before a year old, 108(87.1) of the respondents did not experience any infant mortality.The analysis clearly shows that 100(80.6%) respondents had birth-placement education, while 24(19.4%) did not.

Table 2: shows the birth history of respondents (n=124)

Number of children delivered alive	**Characteristics**	**Frequency**	**Percent (%)**	**Valid Percent (%)**	**Cumulative Percent**
Valid	One	10	8.1	8.1	8.1
	Two	25	20.2	20.2	28.2
	Three	50	40.3	40.3	68.5
	Four	27	21.8	21.8	90.3
	Five	10	8.1	8.1	98.4
	Above five	2	1.6	1.6	100
	Total	**124**	**100**	**100**	
The child was delivered alive and died before age one	Yes	16	12.29	12.9	12.9
	No	108	87.1	87.1	100
	Total	**124**	**100**	**100**	
The birth interval	No interval	5	4.0	4.0	4.0

between the previous child and the dead child	<1 year	11	8.9	8.9	12.9
	No response	108	87.1	87.1	100
	Total	**124**	**100**	**100**	
Having birth spacing education	Yes	100	80.6	80.6	
	No	24	19.4	19.4	100
	Total	**124**	**100**	**100**	

Field data 2023

Table 3 shows characteristics of antenatal care (ANC) visits, and the results show that 118(95.2%) attended antenatal care services during pregnancy, and 6(4.8%) of respondents did not participate in ANC. 55(44.4%) of respondents attended ANC less than a month after being pregnant, 29(23.4%) of the respondents attended ANC 1-2 months after being pregnant, 21(16.9%) of the respondents attended their first ANC in 3-4 month interval, 14(11.3%) of the respondents attended their first ANC 5-6 month interval whereas 5(4.0%) of the respondents never attended ANC during pregnancy.

The analysis results show that 5(4.0%) of respondents had their ANC at home, 114(91.9%) of the respondents had their ANC at a health facility, and 5(4%) of respondents did not attend any ANC. The results also show that the majority of the respondents, 84(67.7%), attended 1-2 ANC visits, 5(4%) of the respondents did not attend ANC, and 84(67.7%) of the respondents attended three or more ANC visits during pregnancy.

The results also show that 115(92.7%) of the respondents received tetanus toxoid (TT) injections, and nine (7.3%) of the respondents did not receive TT injections. Majority of the respondents 93(75%) only received two doses of TT, 17(13.7) of the respondents received three doses of TT, 5(4%) received just a dose of TT and nine (7.3%) of the respondents did not receive any dose of tetanus toxoid injection. The study results show that 76(61.3%) respondents did not have a danger pregnancy sign education, whereas 48(38.7%) had a danger pregnancy sign education.

Table 3: Antenatal care visits characteristics of respondents (n=124)

Antenatal care (ANC) attendance	**Characteristics**	**Frequency**	**Percent (%)**	**Valid Percent (%)**	**Cumulative Percent**
Valid	Yes	118	95.2	95.2	95.2
	No	6	4.8	4.8	100
	Total	**124**	**100**	**100**	
First ANC visit during pregnancy	< 1 month	55	44.4	44.4	44.4
	1-2 months	29	23.4	23.4	67.7
	3-4 months	21	16.9	16.9	84.7
	5-6 months	14	11.3	11.3	96.0
	Never	5	4.0	4.0	100
	Total	**124**	**100**	**100**	
Place of ANC during pregnancy	Home	5	4.0		
	Health Facility	114	91.9	91.9	96.0

	No ANC	5	4.0	4.0	100
	Total	**124**	**100**	**100**	
Number of ANC visits during pregnancy	No visit	5	4.0	4.0	4.0
	1-2 visits	35	28.2	28.2	32.2
	3 visits and above	84	67.7	67.7	100
	Total	**124**	**100**	**100**	
Tetanus Toxoid (TT) injection received	Yes	115	92.7	92.7	92.7
	No	9	7.3	7.3	100
	Total	**124**	**100**	**100**	
Doses of TT received during pregnancy	No tetanus injection	9	7.3	7.3	7.3
	1 doses	5	4.0	4.0	11.3
	2 doses	93	75.0	75.0	86.3
	3 doses	17	13.7	13.7	100
	Total	**124**	**100**	**100**	
Danger pregnancy signs education	Yes	48	38.7	38.7	38.7
	No	76	61.3	61.3	100
	Total	**124**	**100**	**100**	

Field data 2023

The analysis in Table 4 shows that most of the respondents, 112(90.3%), had their postnatal care services in a health facility, whereas 12(9.7%) had postnatal care services at home. Among the respondents, 90(72.6%) were delivered by a nurse/midwife, 10(8.1%) were delivered by a doctor, and 24(19.4%) of the respondents were delivered by traditional birth attendants (TBA). The results also show that 75(60.5%) respondents had their children vaccinated during the first week of delivery, while 49(39.5%) did not present their children for vaccination during the first week of immunisation. For children who were delivered out of health facility, 3(2.4%) of the respondents made their first visit to the health facility in less than a month, 3(2.4%) visited the health facility 1-3 months after delivery, whereas 118(95.2%) of the respondent delivered in a health facility. The majority of the respondents, 89(71.8%), did not know the importance of child vaccination, while 35(28.2) knew the importance of child vaccination.

Table 4: Postnatal care visits characteristics of respondents (n-124)

Place of Postnatal Care Services	**Characteristics**	**Frequency**	**Percent (%)**	**Valid Percent (%)**	**Cumulative Percent**
	Home	12	9.7	9.7	9.7
	Health facility	112	90.3	90.3	100
	Total	**124**	**100**	**100**	
Who helped with the delivery	Doctor	10	8.1	8.1	8.1
	Nurse/Midwife	90	72.6	72.6	80.6
	Traditional Birth Attendant(TBA)	24	19.4	19.4	100

	Total	**124**	**100**	**100**	
Child vaccinated during the first week of pregnancy	Yes	75	60.5	60.5	60.5
	No	49	39.5	39.5	100
	Total	**124**	**100**	**100**	
Home delivery first visit to a health facility	< 1 month	3	2.4	2.4	2.4
	1-3 months	3	2.4	2.4	4.8
	No response	118	95.2	95.2	100
	Total	**124**	**100**	**100**	
Knowledge of the importance of child vaccination	Yes	35	28.2	28.2	28.2
	No	89	71.8	71.8	100
	Total	**124**	**100**	**100**	

Field data 2023

Table 5 shows data on respondents who experienced infant mortality in the last four years before the study. The results show that 12(75%) of the respondents experienced infant mortality in their maternal age below 20 years, 2(13%) experienced infant mortality between the ages of 20-24 years, whereas maternal age 25-29 did not experience any death of a child below one year of age. Of the majority of the respondents who experienced infant mortality, 13(81%) have no formal education, two (13%) have just primary education as their highest level of education, and one (6%) have only secondary education. Respondents with senior secondary, tertiary and Vocational education did not experience infant mortality. Of the respondents who experienced infant mortality, 8(50%) have a birth interval of less than a year between births, 5(31%) have 1-2 years between births, and 2(13%) have no interval (twins or firstborn). The results show that respondents with a 3-4 year interval between births did not experience infant mortality, whereas one (6%) with a birth interval more than 4 years experienced infant death.

Table 5: Socio-demographic characteristics of respondents who suffered infant mortality (n=16)

Socio demographic variables And Infant Mortality			
Maternal Age	**Characteristics**	**Infant Death**	**Percentage**
	Below 20 years	12	75%
	20-24 years	2	13%
	25-29 years	0	0%
	30-34 years	1	6%
	35 years and Above	1	6%
Total		**16**	**100%**
Educational Level			
	No formal education	13	81%
	Primary	2	13%
	Junior Secondary	1	6%
	Senior Secondary	0	0%
	Tertiary	0	0%
	Vocational	0	0%
Total		**16**	**100%**

Birth Interval			
	No interval	2	13%
	Less than 1 year	8	50%
	1-2 years	5	31%
	3-4 years	0	0%
	Above 4 years	1	6%
Total		**16**	**100%**

Field data 2023

The results in Table 6 show that 12 (75%) of the respondents who experienced infant mortality attended at least one antenatal care service, while 4(25%) did not attend antenatal care (ANC). 7(44%) of respondents who experienced infant death made 1-2 visits for antenatal care services in a health facility. 5(31%) made 3 ANC visits and above, whereas 4(25%) did not attend ANC. Respondents who made their first ANC to the health facility did not experience any infant mortality, whereas 4(25%) of respondents who experienced infant mortality made their first ANC 1-2 months of pregnancy, 5(31%) made their first ANC 3-4 months of pregnancy, and 4(25%) did not attend ANC. 7(44%) of respondents who experienced infant mortality attended ANC in a health facility, 5(31%) had their ANC at home (outreach), and 4(25%) did not attend ANC.

Table 6: Antenatal Care visits of respondents who suffered infant mortality (n=16)

Antenatal Attendance			
Antenatal Care(ANC) visit	**Characteristics**	**Infant Death**	**Percentage**
	No	12	75%
	Yes	4	25%
Total		**16**	**100%**
First ANC visit			
	<1 month	0	0%
	1-2 months	4	25%
	3-4 months	5	31%
	5-6 months	3	19%
	>6 months	0	0%
	No visit	4	25%
Total		**16**	**100%**
Place of ANC visit			
	Home	5	31%
	Health facility	7	44%
	No ANC visit	4	25%
Total		**16**	**100%**
No. of ANC visits			
	1-2 visits	7	44%
	3 visits and Above	5	31%
	No ANC visit	4	25%
Total		**16**	**100%**

Field data 2023

The results in Table 7 show that 10(62%) of respondents who lost their children before one year of age did not make their children to be vaccinated during the first week of postnatal care (PNC) services, while 6(38%) made their children to be vaccinated during the first week of postnatal care. 3(19%) of the respondents who experienced infant mortality first visited the health facility for postnatal care less than a month interval, whereas 13(81%) first visited the health facility for postnatal care between 1-3 months. The majority of the respondents, 9(56%), who experienced infant mortality, had their postnatal care services in a health facility, and 7(44%) did not attend postnatal care in a health facility.

Table 7: Postnatal Care visits of respondents who suffered infant mortality (n=16)

Postnatal Care visit			
Child vaccinated during the first week of delivery	**Characteristics**	**Infant Death**	**Percentage**
	Yes	6	38%
	No	10	62%
	Total	**16**	**100%**
First Visit to the health facility			
	<1 month	3	19%
	1-3 months	13	81%
	>3months	0	0
	Total	**16**	**100%**
Place of postnatal care services			
	Home	7	44%
	Health facility	9	56%
	Total	**16**	**100%**

Field data 2023

Discussion

The results revealed that women who are below 20 years of age are most likely to suffer infant mortality. In addition, women who are above 35 years are prone to lose their children, but women between the ages of 25-29 years are, to a fair extent, less likely to lose their children. The results also showed that women who did not attend ANC are prone to lose their children at an early age. The results showed that PNC services are essential for the survival and growth of the child. Women who did not attend PNC after birth are more likely to lose their babies compared with those who attended PNC.

The study was conducted to examine the predisposing factors that influence infant mortality. Maternal age at birth is an important variable. The results show that women who have a child below the age of 20 have an increased infant mortality of 12(75%) compared to women who have their babies at older ages. Finlay et al. (2011) stated that older women have the best infant survival rates as they experience less infant mortality.

Antenatal care (ANC) is also essential in assessing infant mortality. The results reveal that women who did not attend ANC have a significant infant mortality of four (25%) compared with

those who attended 1-2 ANC visits, 7(44%) infant mortality, and those who attended 3 ANC visits and above, 5(31%) infant mortality. This issue shows that those who attended ANC are less likely to experience infant mortality or have adverse outcomes compared to those who did not participate in ANC throughout their pregnancy.

Again, PNC follows the same trend as ANC. The results reveal that women who did not visit a health facility a week after delivery experienced the highest infant mortality of 10(62%). Those who visited a health facility less than a week after delivery for PNC had a lower infant mortality of 6(38%). Women who visited a health facility less than a month after delivery for their first PNC have an infant mortality of three (19%). In contrast, women who attended PNC for 1-2 months experienced a significant number of 13(81%) infant mortality.

Birth interval has an impact on infant mortality. The results indicate that women with births of less than a year and intervals of 1-2 years experienced a significant number of infant mortalities, 8(50%) and 5(31%), respectively. Women who have a birth interval of 3-4 years experienced no infant mortality, whereas women whose birth interval is above 4 years have 1(6%) infant mortality. Dube, 2012 stated that women who have children after 49 months or more have decreased odds of infant mortality compared to women with short birth intervals (less than 49 months). This study agrees that longer birth intervals have less risk of infant mortality.

The mother's educational level goes a long way in understanding and putting into practice maternal education for the child's survival. Women who experienced infant mortality 13(81%) in Malontho town do not have any formal education, while those who have some level (Primary, Secondary or higher) education comparatively experienced fewer deaths. Women's education and empowerment should be given the utmost priority. Educating women will promote the health of children and hence reduce the mortality rate of infants. Uneducated women are most likely involved in unhygienic practices caring for a child. In their study, Emina et al. (2009) stated that children whose mothers are educated tend to live a more hygienic life than uneducated women.

Recommendation

The study clearly shows that maternal education on antenatal care (ANC), postnatal care (PNC), maternal age, and birth interval is critical in addressing the issue of infant mortality. Equally, women need to be educated beyond the primary school level if infant mortality is to be addressed. Ensure access to prenatal care for expecting mothers, promote breastfeeding, and inform parents on safe sleeping practices to reduce the risk of sudden infant death syndrome (SIDS). Encourage vaccinations to prevent common childhood diseases. Provide access to affordable and quality infant healthcare, including regular check-ups and prompt treatment for illnesses.

Community stakeholders and healthcare workers should regularly implement community health education programs to raise awareness about infant care (antenatal and postnatal care services), nutrition and Hygiene. Establish support groups for new parents to share experiences and learn from each other. Collaborate with local healthcare providers and organisations to offer outreach programs, vaccination drives and health screenings.

Through the Ministry of Health, the government of Sierra Leone should strengthen healthcare infrastructure to ensure access to maternal and child health services across the country. Implement policies that support maternal and child health, such as maternity leave, affordable childcare, and subsidies for healthcare services. Invest in research to identify and address underlying causes of infant mortality, such as poverty, inadequate healthcare access, and social determinants of health. Monitor and evaluate national health indicators regularly to track progress and identify areas for improvement. Collaborate with international organisations and partners to share global best practices and resources for reducing infant mortality. A recommendation for further study is to examine the effects of miscarriage and stillbirth on the subsequent child.

Implications

The findings imply that the free primary and secondary education offered by the Government of Sierra Leone in 2018 should cover all girls. Government and stakeholders should act firmly to ensure that all girls attain at least secondary school education. They should also incorporate maternal education in all secondary schools and develop regular programmes at the community level on maternal and child health to address the risk associated with infant mortality.

Conclusion

The study examined the relationship between maternal knowledge and infant mortality and concluded that an existing relationship exists. The findings indicate that women who are below 20 years of age and 35 years and above are more at risk of losing their babies before 12 months of existence. Women who are within the age interval 25-29 are less likely to lose their babies before 12 months of existence. Furthermore, women who do not attend Antenatal care are much more likely to lose their babies, while those who attend Antenatal care are less likely to lose their babies. Similarly, women who participate in postnatal care immediately after delivery are less likely to lose their babies at an early age than those who do not participate in postnatal care after delivery.Babies who are born too early after another child (less than a year or 1-2 years) are more likely to die than babies with a longer birth interval (above 3 years). Women with secondary school level education are less likely to lose their babies than those with no or primary school level education.

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Appendix: Questionnaire

What socio-demographic factors influence infant mortality in Malontho, Sanda Tenderen chiefdom

No	Question	Response
1	What was your age during your first pregnancy (Maternal age)	Below 20 20-24 25-29 30-34 35 and above
2	What is your marital status?	Single Married Separated Widow
3	What is the highest level of education you have attained?	No formal education Primary Junior Secondary Senior Secondary Tertiary Vocational
4	How many children have you delivered alive?	One Two Three Four Five Above five
5	Are you currently employed or being employed during your pregnancy?	Yes No
6	What was your income level	Poor Middle/Average Rich
7	Have you delivered a child alive and died later, before one year of age?	Yes No
8	What is the birth interval between the previous child and the child that died before one year of age	No interval 1-2 years 3-4 years Above 4 years
9	Did you ever have birth spacing education	Yes No

How Antenatal Care Services Influence Infant Mortality in Malontho Sanda Tenderen Chiefdom

No	Question	Response
10	Did you attend Antenatal care (ANC) services/visit(s)?	Yes No
11	When was the First Antenatal Care Visit during pregnancy?	<1 month 1-2 months 3-4 months 5-6 months >6 months Never
12	Where did you attend Antenatal Care during your pregnancy?	Home Health facility No ANC
13	How many ANC Visits did you participate in during pregnancy	No ANC visits 1-2 visits 3 visits and above
14	Did you receive a Tetanus injection (TT) during pregnancy	Yes No
15	Did you receive a Tetanus injection (TT) during pregnancy	No Injection 1 Dose 2 Dose 3 Doses
16	Did you have Danger pregnancy signs education before and during pregnancy	Yes No

How postnatal care services influence infant mortality in Malontho, Sanda Tenderen chiefdom

17	Where did you attend postnatal care services	Home Other Home Health facility
18	Who helped with the delivery	Doctor Nurse/Midwife TBA MCH Aide Other
19	Was your child vaccinated during the first week of life?	Yes No
20	When was the first visit to the health facility?	<1 month 1-3 months 4-6 months >6 months
21	Did you have Knowledge of the importance of child vaccination	Yes No