

Effects of Maternal Death on Children Living in the Sagnarigu Municipality

David Z. Kolbila^{1*}, Abdul-Razak Doat², David S. Nigarim², Wilfred Kwose², Sylvanus Kampo³

¹Department of Obstetrics and Gynecology, School of Medicine, University for Development Studies, Tamale, Ghana

²Department of Nursing, School of Nursing and Midwifery, C. K. Tedam University of Technology and Applied Sciences, Navrongo, Ghana

³Department of Anaesthesia and Intensive Care, School of Medicine and Dentistry, C. K. Tedam University of Technology and Applied Sciences, Navrongo, Ghana

Email: *davekolbi@yahoo.com

How to cite this paper: Kolbila, D.Z., Doat, A.-R., Nigarim, D.S., Kwose, W. and Kampo, S. (2024) Effects of Maternal Death on Children Living in the Sagnarigu Municipality. *Open Journal of Obstetrics and Gynecology*, **14**, 334-347.
<https://doi.org/10.4236/ojog.2024.143031>

Received: January 29, 2024

Accepted: March 9, 2024

Published: March 12, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Introduction: The greatest effect of maternal mortality is renowned in children aged 2 - 5 months whose mothers had died. Children whose mothers died due to maternal complications were likely to record a higher mortality in infancy compared to children of surviving mothers. Motherless children mostly suffer a lot due to lack of day-to-day care, isolation, lack of motivation as well as economic cost associated with mother's death. Thus, the purpose of this study was to ascertain the lives of children whose mothers passed away during childbirth at the Sagnarigu Municipality. **Methods:** This quantitative cross-sectional study was carried out at the Sagnarigu Municipal. The study recruited 297 respondents. To assess the effects of maternal death on the lives of children, families that experienced maternal death were assessed. The number of pregnancies experienced by the deceased woman, pregnancy-related complaints experienced, determinants of maternal death, number of children alive, and their standard of living were assessed with the aid of a structured questionnaire. **Results:** The data showed that negligence, illiteracy, poor road access, poverty, ignorance, delays in recognizing the problem, delays in making appropriate decisions, delays in the health facility, delays in giving the appropriate treatments, and traditional beliefs were some of the factors that led to maternal death in the Sagnarigu Municipality. **Conclusion:** The study concluded that determinants of maternal death in the Sagnarigu Municipal included the following; negligence, illiteracy, poverty, and delays in recognizing the problem. The study findings also demonstrated that the effects of maternal death on children are diverse and cut across different areas of a child's life including livelihood sustenance, healthcare, education, and emotional and psychological development.

Keywords

Maternal Death, Effects, Orphans, Children, Pregnancy, Childbirth

1. Introduction

Maternal complications remain the top cause of death and disability among women at the reproductive age in poor resource countries. The rate of maternal mortality in resource-poor countries is about 15 times higher than that in well-to-do nations, and within countries, the poorest women have the greatest risk of dying during pregnancy or childbirth [1]. As a result, the World Health Organization has placed a key interest in ensuring that no mother dies as a result of childbearing [2]. Improving the health status of women, and pregnant mothers has received significant attention worldwide. Maternal mortality and its effects have become very important and significant on the global debate platforms such as the Millennium Development Goals [2] and the new Sustainable Development Goals Agenda [3].

Maternal mortality is defined as the death of a woman while pregnant or within forty-two (42) days of termination of pregnancy irrespective of the duration and site of pregnancy (whether ectopic or in the uterus), from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes [2] [4]. The direct Causes are complications arising from the pregnancy itself, such as severe bleeding (postpartum hemorrhage), infections, hypertensive disorders (eclampsia and pre-eclampsia), unsafe abortion, and complications during childbirth [5]. Indirect Causes are pre-existing conditions aggravated by the physiological changes of pregnancy, such as malaria, HIV/AIDS, cardiovascular diseases, and diabetes [6]. Limited access to quality healthcare services, including antenatal care, skilled birth attendance, emergency obstetric care, and postnatal care, significantly contributes to maternal mortality [7]. Factors such as geographic remoteness, poverty, lack of transportation, and cultural barriers may hinder women from accessing timely and appropriate care. Women from disadvantaged socioeconomic backgrounds are at higher risk of maternal mortality due to factors such as inadequate nutrition, lack of education, early marriage, and limited autonomy in decision-making regarding their health [8]. Weak healthcare infrastructure, shortages of trained healthcare providers, inadequate medical supplies and equipment, and insufficient health financing contribute to maternal mortality [9].

Maternal mortality over the decades has rippling effects not only on the social, cultural, educational and health of women but also affects development of their children [2]. The greatest effect of maternal mortality is noted in children aged 2 - 5 months whose mothers had died [10]. Studies suggest that children whose mothers died due to maternal complications were likely to record a higher mor-

tality in infancy compared to children of surviving mothers [11]. According to George & Wilding [12], motherless children mostly suffer a lot due to lack of day-to-day care, isolation, lack of motivation as well as the economic cost associated with mother's death.

Statistics from an annual performance review report of the Sagnarigu Municipal Health directorate showed that about thirty women have died from childbirth and pregnancy-related causes. It is not certain if the efforts made by previous interventions will be sufficient to improve the risk of losing more women at birth. It is also unclear how these unfortunate children are surviving. Childbearing is a natural process and therefore it is unacceptable for any pregnant woman to lose her life during pregnancy, delivery, and postpartum. When these unfortunate deaths occur, there is the likelihood that these orphans left behind will face some neglect, stigmatization, and discrimination which may lead to school dropout, streetism, and malnutrition. This study aimed to find out the lives of these children after losing their mothers during childbirth. The study findings will generate useful data for the Municipal Health Directorate (MHD) and other Non-governmental Organizations (NGOs) to help identify the reasons for high maternal mortality and to find solutions to it. It will also help the health authorities to adopt strategies to increase their health educational campaigns on the importance of antenatal, facility delivery, and post-natal services offered to Women in the Fertility Age (WIFA). Also, the study findings will contribute to the existing knowledge.

2. Methods

2.1. Study Design and Setting

This quantitative cross-sectional study was conducted at the Sagnarigu Municipal in the Northern Region. Quantitative cross-sectional study is a type of research design used in social sciences, public health, and various other fields to gather data at a single point in time from a population or a sample. In this type of study, information is taken from participants about their characteristics, behaviors, attitudes, or other variables of interest. The purpose of this study was to learn more about these children's lives following their mothers' deaths during childbirth. A structured questionnaire was employed to describe the various factors that influence maternal mortality and the outcome of orphaned children. This allowed access to information on perceptions and opinions on maternal mortality, trends of occurrence of maternal mortality, people's narrations of their stories and experiences of maternal mortality, and the consequences of maternal mortality on infant and child survival. Sagnarigu is home to nearly every major Ghanaian tribe, making for a diverse population. Dagombas predominate in the city, with different tribes being represented in different ways. Sagnarigu Municipal has 148,099 residents, according to the 2010 Ghana Statistical Service (GSS) housing and population census.

2.2. Inclusion and Exclusion Criteria

Participants were included based on the inclusion criteria set for the studies such as belonging to a family who lost a relative during childbirth. Children aged 10 years and above who are victims of maternal mortality. We excluded all families with no history of maternal mortality.

2.3. Study Period

The total time used for this study was twelve weeks, starting from March to May 2022. The first five weeks were used for data collection and the subsequent four for analysis.

2.4. Sampling Procedure

This study made use of convenient sampling. The study included a random sample of all eligible families who gave written informed consent. Clients were selected at random within each family. Thus, questionnaires were given to these respondents by the researcher and the research assistants. Until the entire sample was reached, this was done every day in every family.

Permission to commence data collection was sought from the community leaders and key stakeholders (Chiefs, Health Directorate, family heads, and assembly members) in the Sagnarigu Municipal. Written informed consent was also obtained from the individual family who met the selection criteria after providing them with adequate explanations regarding the aims of the study, for participants who were below 18 years old, informed consent was sought from their legal guardians who accompanied them.

2.5. Data Collection Process

A pre tested research questionnaire was used for the data collection. The questionnaire was pretested among twenty families in Tamale metropolis who lost a relative during childbirth. Children aged 10 years and above who are victims of maternal mortality. The questionnaire was grouped into three thematic areas. Section A was on social-demographic data, section B was on factors that influence maternal deaths C was on the effects of maternal death on orphaned children. During the period of data collection research assistants visited them at home from 9am to 5pm to collect data. Participants who could not read and write were assisted by the research assistants to complete the questionnaire.

During household visits, information about births, maternal deaths, and changes in household composition including marriage, and in- and out-migration. In the event of parental death, the orphaned children were followed in subsequent rounds of data collection if they relocated within the Sagnarigu Municipal. All those who moved out of the community were lost to follow-up; although such loss to follow-up is estimated to be low among reproductive-age women. Following informed consent and recruitment, study participants were interviewed using a standard structured self-administered questionnaire which was devel-

oped and validated by the authors for this study. Families with a history of maternal deaths and orphaned children aged 10 years and above were recruited from the Sagnarigu Municipality. The questionnaire was prepared in English and had it translated and explained to families and orphaned children in their local language where necessary. Questionnaires were numbered and coded before data collection. The questionnaires sought to provide information on the various factors that influence maternal deaths, and the effects of maternal death on orphaned children.

2.6. Measurements Variables

2.6.1. Independent Variables

The place of residence was categorized into various communities within the municipality. Also, questions were asked on which hospitals the mothers attended for antenatal care, where they delivered, and the gestational age at which they delivered. The hospital's mothers attended for antenatal care were categorized into either a government facility, or a private facility, or did not attend antenatal care during pregnancy. For the birth weight, all babies born with birth weight from 2.5 kg to 4.5 kg were noted to have normal weight whereas all those less than 2.5 kg or more than 4.5 kg were considered to have a low birth weight and a high birth weight respectively. The current weight of the children was assessed using the weight for age chart for the various sexes and all those between the ± 2 standard deviation were considered to have normal weight. Those above or below ± 2 standard deviation were evaluated to be overweight and underweight respectively.

2.6.2. Dependent/Outcome Variables

To assess the effects of maternal death on the lives of infants and children, families that experience maternal death were assessed. The number of pregnancies experienced by the dissed woman, pregnancy-related complaints experienced, determinants of maternal death, number of children alive, and their standard of living were assessed.

2.6.3. Sample Size Determination

The sample size for the study was established using the Cochran formula.

This is how the formula is expressed: $N = (Z)^2 * P(1 - P) / D^2$

Where: N = sample size to be determined, Z = Z score (reliability coefficient) of 1.96 at 95% confidence level, P = the estimated proportion of the attribute (i.e. the proportion of mothers who practice exclusive breastfeeding) to be measured; was determined to be 84.3% = 0.85 [13], and D = margin of error of 5% = 0.05. The sample size calculated was 202. Assuming a non-response rate of 10 %, the total sample size required for the study was 222.

2.7. Data Analysis

All statistical analyses were carried out using the Statistical Package for Social

Sciences Software (SPSS) version 20.01 (IBM Corporation, Armonk, NY, USA). The data were entered into a Microsoft Excel Spreadsheet and cleaned and subsequently exported to the statistical package for social sciences (SPSS-version 22.01) for analysis. The results were presented as means, frequencies, and tables. The confidence interval was 95% and considered statistically significant at $P < 0.05$. Statistical analysis was performed for age, educational background, occupation, marital status, religion, gestational age, parity, pregnancy-related complications, causes of maternal death, age of orphans, and their standard of livelihood. using one-way ANOVA, multiple comparisons by Tukey's test, and logistic regression. The student's t-test was used for statistical comparisons between the two groups.

3. Results

3.1. Socio-Demographic Characteristics of Dead Mothers and Orphans

Out of the 297 respondents recruited from the Sagnarigu Municipal for this study, the data analyzed showed that 96 (32.3%) of the dead mothers were within the age range of 30 - 39 years, 79 (26.7%) were within 19 years or less, whereas 64 (21.5%) were 40 years or above, and 58 (19.5%) were within the age range of 20 - 29 years (**Table 1**). Regarding the educational status of the dead mothers, the data showed that 98 (32.9%) of them completed junior high school, 78 (26.3%) had no formal education, 54 (18.2%) of them completed primary school, 46 (15.5%) completed senior high school, while 21 (7.1%) completed tertiary education (**Table 1**). It was also shown that 215 (72.4%) of the dead mothers were unemployed, whereas 82 (27.6%) of them were employed (**Table 1**). Farming was the predominant occupation of most of the dead mothers followed by trading. Most of the dead mothers 196 (66.0%) were Christians, whereas 101 (34.0%) were Muslims (**Table 1**). The data showed that 275 (92.6%) of the mothers delivered their babies at full term, while 22 (7.4%) of them delivered at pre-term (**Table 1**). We again assessed information on orphans and realized that 130 (43.8%) of them were 12 years and above, 94 (31.8%) were 10 years old, and 73 (24.6%) were 11 years old (**Table 1**). The data also showed that many mothers died leaving behind 3 or more orphans for family members to care for (**Table 1**). The data also revealed that many of the orphan's fathers in Sagnarigu Municipal were alive.

3.2. Determinants of Maternal Death

To investigate the effects of maternal death on children in Sagnarigu Municipality, we first investigated the determinants of maternal death. The data showed that many of the respondents strongly agreed that negligence, illiteracy, poverty, ignorance, delays in recognizing the problem, delays in making appropriate decisions, delays in the health facility, delays in giving the appropriate treatments, and traditional beliefs were some of the factors that lead to maternal death in the Sagnarigu Municipal (**Table 2**).

Table 1. Socio-demographic characteristics of dead mothers and orphans.

Measurements	Frequency	Percentages (%)
Age of mother at death (years)		
≤19	79	26.7
20 - 29	58	19.5
30 - 39	96	32.3
≥40	64	21.5
Level of education		
None	78	26.3
Primary School	54	18.2
Junior High School	98	32.9
Senior High School	46	15.5
Tertiary	21	7.1
Marital Status		
Not Married	67	22.6
Married	230	77.4
Religion		
Christian	196	66.0
Muslim	101	34.0
Occupation		
Unemployed	215	72.4
Employed	82	27.6
Parity		
1 - 4	213	71.7
>4	84	28.3
Gestational Age		
Term	275	92.6
Pre-term	22	7.4
Orphans age		
10 years	94	31.6
11 years	73	24.6
≥12 years	130	43.8

Continued

Number of orphans alive		
1	31	0.0
2	44	10.4
3	132	14.8
≥4	90	44.4
Is the orphan father alive?		
Yes	282	95.0
No	15	5.0

Table 2. Determinants of maternal death at the sagnarigu municipal of the northern region.

Measurements		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Negligence	Frequency	199	56	8	19	15
	Percentage (%)	67.0	18.9	2.7	6.4	5.0
Illiteracy	Frequency	89	70	9	102	27
	Percentage (%)	30.0	23.6	3.0	34.3	9.1
Poor road access	Frequency	6	2	8	11	270
	Percentage (%)	2.0	0.6	2.7	3.7	91.0
Poverty	Frequency	286	7	1	3	0
	Percentage (%)	96.3	2.4	0.3	1.0	0.0
Ignorance	Frequency	189	94	0	13	1
	Percentage (%)	63.6	31.7	0.0	4.4	0.3
Delayed in recognizing the problem	Frequency	220	72	5	0	0
	Percentage (%)	74.1	24.2	1.7	0.0	0.0
Delayed in making appropriate decisions	Frequency	201	80	1	3	12
	Percentage (%)	67.7	27.0	0.3	1.0	4.0
Delayed in the health facility	Frequency	233	64	0	0	0
	Percentage (%)	78.5	21.5	0.0	0.0	0.0
Delayed in giving the appropriate treatments	Frequency	201	96	0	0	0
	Percentage (%)	67.7	32.3	0.0	0.0	0.0
Traditional believes	Frequency	93	69	9	101	25
	Percentage (%)	31.3	23.2	3.0	34.0	8.4

3.3. Effects of Maternal Death on Orphans

To investigate the effects of maternal death on children in the Sagnarigu Municipal, the present study recruited family members and orphans of women who suffered pregnancy-related deaths. The data showed that 254 (85.5%) of the respondents strongly agreed that the children (orphans) left behind after the death of their mothers were neglected by the family members (**Table 1**). It was also observed that 198 (66.7%) of the respondents strongly agreed that many of the orphans had no dependable companion. The finding of this study showed that 219 (73.7%) of the respondents strongly agreed that many of the children were maltreated by some other family members in the Sagnarigu Municipal (**Table 1**). Nutritional deficiency of some of the orphan children was one of the effects that was strongly agreed upon by respondents. Respondents also strongly agreed that maternal death led to bad peer influences and child labor in the Sagnarigu Municipal. The data also showed that many of the children faced child trafficking in the Sagnarigu Municipal after their mother's death. School dropout of children in the municipality was one of the effects that 272 (91.6%) of the respondents strongly agreed that it was a result of maternal death (**Table 3**).

Table 3. Effects of maternal death on orphans at the sagnarigu municipal of the northern region.

Measurements		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Felt neglected	Frequency	254	31	9	2	1
	Percentage (%)	85.5	10.4	3.0	0.7	0.3
Had no companion	Frequency	198	79	14	3	3
	Percentage (%)	66.7	26.6	4.7	1.0	1.0
Felt maltreated	Frequency	219	60	7	6	5
	Percentage (%)	73.7	20.2	2.4	2.0	1.7
Faced marital Problems	Frequency	32	17	39	117	92
	Percentage (%)	10.8	5.7	13.1	39.4	31.0
Felt Lonely	Frequency	225	63	2	3	4
	Percentage (%)	75.8	21.2	0.7	1.0	1.3
Suffered Malnutrition	Frequency	261	20	1	5	10
	Percentage (%)	87.9	6.7	0.3	1.7	3.4
Experienced child labour	Frequency	253	30	14	0	0
	Percentage (%)	85.2	10.1	4.7	0.0	0.0
Involved in bad peer groups	Frequency	197	84	12	3	1
	Percentage (%)	66.3	28.3	4.0	1.0	0.3

Continued

Became timid	Frequency	92	16	54	109	26
	Percentage (%)	31.0	5.4	18.2	36.7	8.7
Dropped out of school	Frequency	272	15	4	6	0
	Percentage (%)	91.6	5.1	1.3	2.0	0.0
Experienced child trafficking	Frequency	67	105	98	4	23
	Percentage (%)	22.6	35.4	33.0	1.3	7.7

4. Discussions

This study demonstrated significant knowledge of the effects of maternal death on children and also the determinants of maternal death. Omer *et al.* [8] reported that low female literacy rates, high levels of poverty, traditional practices, and socioeconomic and cultural challenges are factors that lead to maternal death. Campbell [14] also, recognized traditional practices and policies that discriminate against women as contributing factors to maternal death. This is corroborated in the findings of this study, which revealed that negligence, illiteracy, poor road access, poverty Delay in recognizing the problem, delays in making appropriate decisions, delays in attending to the patient at the health facility, delays in giving appropriate treatment, and traditional beliefs as some major determinants of maternal death. In a similar studies conducted in Ethiopia the findings of the study revealed that cultural and traditional beliefs; trust in TBAs; lack of decision making power of women, previous negative experiences with health facilities; fear of going to an unfamiliar setting; lack of privacy and perceived costs of maternal health services were the main factors causing the first delay in deciding to seek care which leads to maternal death [15]. Cultural and traditional practices mostly prevent women from seeking primary health care which results in pregnant women depending on alternative traditional health care practices or facilities such as herbal and traditional medicines for their well-being [13]. This aspect of practices accounts for the delays in pregnant women making appropriate decisions to seek proper medical care from hospitals. These traditional policies and practices have a direct effect on pregnant women and lead to maternal death.

In addressing the effects of maternal death on children, our study revealed that many of the orphans were under the care of their grandmothers, aunts, or stepmothers or given out to foster parents and unknown individuals. Some of the orphans were said to have migrated to the urban communities for greener pastures and had no option but to face situations that were not favorable. In a narrative of one of the victims of maternal mortality, he said “I have no livelihood source and I am compelled to withstand the harsh conditions of the environment if I must survive. I try to do any work just for survival amidst all the challenges of starvation, sickness and risks”. In a related study, Children of de-

ceased mothers were cared for by the widest array of relatives, with stepmothers the most common primary caregiver while some of the children moved to grand maternal care after the stepmother produced a child of the new marriage [16]. The study also shows that many of the children suffered from malnutrition and lack of care. This finding is affirmed in a study conducted in Ethiopia to determine the relationship of undernutrition and psychosocial factors and developmental outcomes of children, the study revealed that malnourished children performed worse in all the developmental domains than the reference children. Among 819 extremely poor children, 325 (39.7%) were stunted, 135 (16.5%) were underweight and 27 (3.3%) were wasted [17]. The results also disclosed that stunting and underweight were negatively associated with all the developmental skills [17]. Children who lose a parent, especially a primary caregiver like a mother, can face a range of challenges that affect their physical, emotional, and cognitive development. Malnutrition, in particular, can have long-lasting effects on a child's growth and overall health. The absence of proper care and nurturing can also lead to emotional and psychological issues. According to a rural Tanzanian study, children whose mothers died young had a 48% chance of passing away before turning one year old, while the 6% chance belonged to children whose moms lived [18] [19]. When a mother passed away, the odds of a child dying were 4.66 (95% CI: 3.15 - 6.89) times higher than for children whose mother survived. In comparison to infants whose moms survived, infants whose mothers died during delivery or shortly after had a seven-fold increased risk of dying within the first month of life [20]. Studies also reveal that following a mother's death, family fragmentation is typical and can result in strained relationships within a home as extra children are prioritized, further taxing already scarce financial resources [21]. The study concluded that for children aged 1-5 years (s), the probability of death was lower (4.4% for sons and 7.8% for daughters) because their systems would have been immune to certain environmental conditions. According to (Razzaque *et al.* [10]) the greatest effect of maternal mortality is noted in children aged 2-5 months whose mothers had died. Knight & Yamin [22] reported in a study that children whose mothers died due to maternal mortality causes were likely to record a higher mortality at infancy compared to children of surviving mothers. Motherless children according to Razzaque *et al.* [10] usually suffer due to lack of day-to-day care, isolation, lack of motivation as well as the economic cost associated with a mother's death. The findings and outcomes of the study confirmed the assertions made by Razzaque *et al.* [10] and others. These effects identified from the study were largely children adopting deviant lifestyles due to inadequate parental control and also wrong peer influence. Most of the children who were above the age of 25 years and suffered at the hands of their caregivers developed some kind of dislike for their caregivers. In some other situations, children were either timid or not assertive. They did not have self-confidence and often saw themselves as inferior to their peers. This demise of their mothers and the nature of their care often

made them develop low self-esteem as postulated by Razzaque [10].

5. Limitations

The present study is subject to certain limitations, so it is imperative to interpret the findings within the framework of these constraints. A standardized questionnaire that forbids respondents from expressing their emotions was employed in the study. The study's findings might not accurately represent the emotions that orphaned children truly experience. Due to the correlational nature of the investigation, conjectures and assumptions are permitted. Due to these restrictions, the results must be interpreted from a certain perspective. Due to its cross-sectional survey design, the study was unable to determine causal correlations.

6. Conclusions

The study concluded that determinants of maternal death include the following; negligence, illiteracy, poverty, and delays in recognizing the problem. Maternal death can be reduced by educating families, women of reproductive age, TBAs, health personnel, and the community members at large on the dangerous signs of pregnancies and their complications. There is also the need for TBAs to be trained to acquire the skills to recognize the appropriate problem and refer it immediately for further management. Health workers need to be more skilful and provide holistic care to pregnant women when they report to the hospital. Also, community members should help curb the situation by embracing change.

The study findings demonstrated that the effects of maternal death are diverse and cut across different areas of a child's life including livelihood sustenance, healthcare, educational, emotional, and psychological development. These mixed effects are usually manifested in these children in the form of malnutrition, deviant behaviors, and truancy. Other children also felt neglected and became reserved as they grew into maturity. Children at the teenage who can fend for themselves engaged in menial jobs for survival.

Declarations

Ethics Approval and Consent to Participate

Written informed consent was obtained from each recruited respondent after providing them with adequate explanations regarding the aims of this study.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are not publicly available due to the respondent's confidentiality but are available from the corresponding author upon reasonable request.

Authors' Contributions

DZK and SK conceived and designed the study. SK was responsible for the su-

pervision and coordination of this study. DZK, ARD, and SK conducted the data collection. DZK and SK led the data analysis with inputs from ARD, DSN, and WK. SK wrote the first draft of the manuscript, and then DZK, ARD, DSN, and WK contributed to revising and reviewing the manuscript. All authors read and approved the final manuscript before submission.

Acknowledgements

We thank the Sagnarigu Municipal Chief Executive Officer (CEO) and the Sagnarigu Traditional leaders for making available all the necessary materials needed for this study.

Conflicts of Interest

Authors declare that they have no competing interests.

References

- [1] Rani, V. (2021) Population Geography: Concepts and Prospects. Vidya Books, Delhi, India.
- [2] World Health Organization (2015) WHO Recommendations on Health Promotion Interventions for Maternal and Newborn Health 2015.
- [3] Marten, R. (2019) How States Exerted Power to Create the Millennium Development Goals and How This Shaped the Global Health Agenda: Lessons for the Sustainable Development Goals and the Future of Global Health. *Global Public Health*, **14**, 584-599. <https://doi.org/10.1080/17441692.2018.1468474>
- [4] Samuel, M.M. (2023) Risk Factors Associated with Pregnancy and Maternal Mortality among Gwandara Women in Kokona Local Government Area of Nasarawa State, Nigeria. *Coou Journal of Arts and Humanities (CJAH)*, **5**, 67-77.
- [5] Aliyu, L.D., Kadas, A.S., Abdulsalam, M., Abdullahi, H.M., Farouk, Z., Usman, F., Miko, M., *et al.* (2023) Eclampsia a Preventable Tragedy: An African Overview. *Journal of Perinatal Medicine*, **51**, 300-304. <https://doi.org/10.1515/jpm-2022-0053>
- [6] Der, E.M., Adu-Bonsaffoh, K., Kwame-Aryee, R.A. and Akosa, B.A. (2017) Indirect Obstetrics Causes of Maternal Death: A-20 Year Retrospective Autopsy Study at the Korle-Bu Teaching Hospital. *Postgraduate Medical Journal of Ghana*, **6**, 34-41. <https://doi.org/10.60014/pmjpg.v6i1.109>
- [7] Sageer, R., Kongnyuy, E., Adebimpe, W.O., Omosehin, O., Ogunsola, E.A. and Sanni, B. (2019) Causes and Contributory Factors of Maternal Mortality: Evidence from Maternal and Perinatal Death Surveillance and Response in Ogun State, Southwest Nigeria. *BMC Pregnancy and Childbirth*, **19**, Article No. 63. <https://doi.org/10.1186/s12884-019-2202-1>
- [8] Omer, S., Zakar, R., Zakar, M.Z. and Fischer, F. (2021) The Influence of Social and Cultural Practices on Maternal Mortality: A Qualitative Study from South Punjab, Pakistan. *Reproductive Health*, **18**, Article No. 12. <https://doi.org/10.1186/s12978-021-01151-6>
- [9] Kyei-Nimakoh, M., Carolan-Olah, M. and McCann, T.V. (2017) Access Barriers to Obstetric Care at Health Facilities in Sub-Saharan Africa—A Systematic Review. *Systematic Reviews*, **6**, Article No. 110. <https://doi.org/10.1186/s13643-017-0503-x>
- [10] Razzaque, A., Hossain, A., DaVanzo, J., Hoque, M.E., Alam, N., Bhuiya, A. and

- Streatfield, P. (2014) Effect of Maternal Mortality on Survival of Under-Five Children: Evidence from Matlab, Bangladesh. *Asian Population Studies*, **10**, 60-74. <https://doi.org/10.1080/17441730.2013.851342>
- [11] Moucheraud, C., Worku, A., Molla, M., Finlay, J.E., Leaning, J. and Yamin, A.E. (2015) Consequences of Maternal Mortality on Infant and Child Survival: A 25-Year Longitudinal Analysis in Butajira Ethiopia (1987-2011). *Reproductive Health*, **12**, Article No. S4. <https://doi.org/10.1186/1742-4755-12-S1-S4>
- [12] George, V. and Wilding, P. (2023) *Motherless Families*. Routledge, London. <https://doi.org/10.4324/9781003389729>
- [13] Uldbjerg, C.S., Schramm, S., Kaducu, F.O., Ovuga, E. and Sodemann, M. (2020) Perceived Barriers to Utilization of Antenatal Care Services in Northern Uganda: A Qualitative Study. *Sexual & Reproductive Healthcare*, **23**, Article 100464. <https://doi.org/10.1016/j.srhc.2019.100464>
- [14] Campbell, M. (2016) Women's Rights and the Convention on the Elimination of all Forms of Discrimination against Women: Unlocking the Potential of the Optional Protocol. *Nordic Journal of Human Rights*, **34**, 247-271. <https://doi.org/10.1080/18918131.2016.1248002>
- [15] Kea, A.Z., Tulloch, O., Datiko, D.G., Theobald, S. and Kok, M.C. (2018) Exploring Barriers to the Use of Formal Maternal Health Services and Priority Areas for Action in Sidama Zone, Southern Ethiopia. *BMC Pregnancy and Childbirth*, **18**, Article No. 96. <https://doi.org/10.1186/s12884-018-1721-5>
- [16] Perry, G.C. (2021) Non-Parental Investment in Children and Child Outcomes after Parental Death or Divorce in a Patrilocal Society. *Social Sciences*, **10**, Article 196. <https://doi.org/10.3390/socsci10060196>
- [17] Worku, B.N., Abessa, T.G., Wondafrash, M., Vanvuchelen, M., Bruckers, L., Kols-teren, P. and Granitzer, M. (2018) The Relationship of Undernutrition/Psychosocial Factors and Developmental Outcomes of Children in Extreme Poverty in Ethiopia. *BMC Pediatrics*, **18**, Article No. 45. <https://doi.org/10.1186/s12887-018-1009-y>
- [18] Finlay, J.E., Moucheraud, C., Goshev, S., Levira, F., Mrema, S., Canning, D., et al. (2015) The Effects of Maternal Mortality on Infant and Child Survival in Rural Tanzania: A Cohort Study. *Maternal and Child Health Journal*, **19**, 2393-2402. <https://doi.org/10.1007/s10995-015-1758-2>
- [19] Nguyen, D.T.N., Hughes, S., Egger, S., LaMontagne, D.S., Simms, K., Castle, P.E. and Canfell, K. (2019) Risk of Childhood Mortality Associated with Death of a Mother in Low-and-Middle-Income Countries: A Systematic Review and Meta-Analysis. *BMC Public Health*, **19**, Article No. 1281. <https://doi.org/10.1186/s12889-019-7316-x>
- [20] Scott, S., Kendall, L., Gomez, P., Howie, S.R., Zaman, S.M., Ceesay, S., Jasseh, M. and D'Alessandro, U. (2017) Effect of Maternal Death on Child Survival in Rural West Africa: 25 Years of Prospective Surveillance Data in the Gambia. *PLOS ONE*, **12**, e0172286. <https://doi.org/10.1371/journal.pone.0172286>
- [21] Molla, M., Mitiku, I., Worku, A. and Yamin, A.E. (2015) Impacts of Maternal Mortality on Living Children and Families: A Qualitative Study from Butajira, Ethiopia. *Reproductive Health*, **12**, Article No. S6. <https://doi.org/10.1186/1742-4755-12-S1-S6>
- [22] Knight, L. and Yamin, A.E. (2015) "Without a Mother": Caregivers and Community Members' Views about the Impacts of Maternal Mortality on Families in KwaZulu-Natal, South Africa. *Reproductive Health*, **12**, Article No. S5. <https://doi.org/10.1186/1742-4755-12-S1-S5>