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Research Article

Factors Associated with U5M in the Afar Region of Ethiopia

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Background. Ethiopia has experienced a significant reduction of under-five mortality over the past few decades. But still, the country is far from the Sustainable Development Goals (SDGs) of 2030. This study aims to identify the potential associated factors of under-five mortality in the Afar region, Ethiopia. *Methods*. Data from a national representative cross-sectional survey of Ethiopian Demographic and Health Survey of the year 2016 were used. Data were collected from the population of all under-five children in randomly selected enumeration areas of the Afar region of Ethiopia. Chi-squared and binary logistic regression analyses were employed. *Results*. The result revealed that twin child [(AOR = 5.37; 95%CI: 2.12–13.62)], age of mothers at first birth [(AOR = 0.47; 95%CI: 0.35–0.62) of greater than 16], current breastfeeders (AOR = 0.41; 95%CI: 0.32–0.54), rural residents (AOR: 2.54; 95%CI: 2.49–2.58), used current contraceptive methods (AOR = 0.38; 95%CI: 0.15–0.94), vaccinated the child (AOR = 0.40; 95%CI: 0.27–0.59), family size [(AOR = 0.65; 95%CI: 0.41–0.92) for 4–6 household members and (AOR = 0.49; 95%CI: 0.29–0.80) for seven and more household members], rich households (AOR = 0.03; 95%CI: 0.01–0.16), mother's age group [(AOR = 3.24; 95%CI: 1.90–5.54) (age 20–29), (AOR = 12.43; 95%CI: 6.86–22.51) (age 30–39), and (AOR = 46.31; 95%CI: 21.74–98.67) (age 40 and above), and antenatal visits ((AOR = 0.48; 95%CI: 0.31–0.74) (1–3 visits) and (AOR = 0.44; 95%CI: 0.24–0.81) (4 and more visits)) significantly determined the under-five mortality. *Conclusions*. The study showed that giving birth at an early age, low coverage and quality of health access, unimproved breastfeeding culture, nonaccessibility to contraceptive methods, absence of awareness of mothers on vaccination of a child, low economic status of households, and low status of mothers' antenatal visits lead to the highest under-five mortality in the area. Therefore, community-based educational programs and public health interventions focused on improving the survival of children by providing awareness to the community and specifically to mothers should be improved.

1. Introduction

The international community has planned a new framework, the sustainable development goals (SDGs), after the end of the millennium development goals (MDGs) in 2015. Since millions of under-five children lost their life, the SDGs targeted on the reduction in the child mortality by considering a new commitment by 2030 to end the preventable causes of deaths of newborns and children under five in the world [1, 2]. Herein, every country in the world agreed to meet the goal of reducing the child mortality rate to 2.5% by 2030 (25 deaths per 1000 live births) [1–3]. But, most developing countries, including Ethiopia, are far away from the goal in which the mortality rate of children is higher than 2.5% [4].

Globally, from 1990 to 2017, child mortality rates declined in most countries; the reduction was achieved due to the significant contribution of each country in the world [4]. This significant decline in child mortality was possible through global joint efforts. In 2016, about 5.6 million under-five children died [2, 5], while it was 12.6 million in 1990 [2]. Sub-Saharan African countries accounted for 38% of newborn deaths next to Southern Asia, which was 39%. Globally, half of the newborn deaths occurred in India, Ethiopia, Nigeria, Pakistan, and the Democratic Republic of Congo [2].

International organizations like UNICEF have made remarkable progress to save children since 1990, but still millions are dying because of who they are and where they are born. Currently, the global community has made simple

solutions to address every child like medicines, clean water, electricity, and vaccines. Still, it becomes a challenge for developing regions like sub-Saharan African countries; the source of about half of the deaths that occurred in 2017 and Southern Asia were about 30%. Currently, reports indicated that, in sub-Saharan Africa (SSA), 1 in 13 children died, and in high-income countries, 1 in 185 children died [6].

In Ethiopia, according to the 2016 EDHS (2016 Ethiopian Demographic and Health Survey) report, under-five mortality (U5M) shows a 60% reduction from 2000 to 2016. In the country, U5M is higher in the rural areas, and regional variation also observed; Afar region is the highest with 125 deaths per 1000 live births, whereas Addis Ababa city administration is the lowest with 39 deaths per 1000 live births [7, 8]. The figures indicated that one out of 25 live births children in the capital city of the country (Addis Ababa) and three out of 25 live births children in the Afar region died. The report indicated that, particularly in the Afar region, the number of child deaths was harsher than from the subcontinental level [sub-Saharan Africa (SSA)].

The economic growth and improvement of community health without reducing child mortality is impossible. What it makes most developing countries under the challenges and obstacles of providing improved community health and better economic growth is the presence of higher child mortality and the absence of valid reports. Child mortality is taken as the main indicator of the social and economic development of the nation, or specifically, it is the indicator of the health status of the community. Therefore, knowing the child mortality rate and providing analyses give a contribution to identify the future directions of health program implementations and advancement of the survival status. Governments, public health policymakers, and several stakeholders lied their effort to improve childhood survival, but still the rate of under-five mortality is high [9]. Due to the presence of the gap between the value of children and survival level, a major issue should receive urgent attention from health policymakers and other stakeholders. Remarkably, these factors including the low economic and educational status of households in low-income countries and the low level of access to health facilities result in a higher mortality rate of children.

In Ethiopia, under-five mortality shows a decline from 2000 to 2016; Afar region was the highest in 2000 with 229.3 deaths of under-five per 1000 live births [10], while it was 123 in 2005 [11], 127 in 2011 [12], and 125 in 2016 [8] per 1000 live births of under-five mortality. Previously, investigators have identified different associated risk factors of child mortality in different areas. Most of those associated risk factors are linked with characteristics of mothers and children and birth-related factors. In support of this, here we are motivated to identify the potential associated risk factors that make the highest in risk of under-five child mortality in the Afar region of Ethiopia.

2. Methods

2.1. Study Area, Design, and Period. The study was conducted in the Afar regional state in Ethiopia. Ethiopia is divided into nine geographically regional states and two administrative cities for administrative purposes. Afar regional state is one among the nine regional states of the country.

2.2. Data Sources. The study is based on secondary analysis of under-five mortality survey data obtained from the 2016 EDHS (2016 Ethiopian Demographic and Health Survey). The EDHS was organized in 2016 (January–June) by the Central Statistics Agency (CSA) of Ethiopia with the government of the country in collaboration with development partners through the technical assistance of ICF [7, 8]. The EDHS survey target groups were randomly selected household members (male and female) of age 15–49 in all parts of the country, Ethiopia. Detailed information was collected on the background characteristic of the respondents, fertility, marriage, fertility preference, awareness and the use of family planning methods, child feeding practices, nutritional status of women and children, adult and childhood mortality, awareness and attitudes regarding HIV/AIDS, female genital mutilation, domestic violence, and height and weight of women and children age 0–5 from 16,688 households, and 15,683 female and 12,688 male respondents. Of these respondents, data of the Afar region households were selected for this study. It was found through the survey that a total of 1475 children aged 0–59 months were from the study area.

2.3. Study and Target Population. The target population was all under-5 children in the Afar regional state of Ethiopia, while the study population was all under-5 children in randomly selected enumeration areas (EAs) of the Afar regional state of Ethiopia.

2.4. Selection Criteria of the Study Area. The area was selected based on the reports of the U5M rate of the previous EDHSs. The reports showed that the Afar region had the leading mortality rate in the country, Ethiopia.

2.5. Sources of Data. The data were found through secondary sources of the 2016 EDHS. The EDHS used the pretested and structured questionnaire as a tool for data collection. Structured interviews were done by trained data collectors. Close supervision was performed during data collection, and the interview was conducted using local languages. The sociodemographic and economic characteristics related information was collected from the child's parents.

2.6. Study Variables. The response variable was the presence of under-5 mortality (no, yes).

Independent variables were selected based on their availability in the data and the previous studies. We had classified these variables as maternal level, paternal level, child-related, and other socioeconomic related variables.

(i) The maternal level variables included in the study were age at first birth in years (≤ 16 and > 16), place of delivery (home, public sector, and private sector),

occupation status (not worked vs had worked), educational qualification (no education, primary, secondary, and above), current marital status (married or live in union and others (single, widowed, and divorced)), current breastfeeding status (no, yes), birth order (first, 2-3, and 4 and above), place of residence (rural and urban), religion (orthodox, Muslim, and others), current use of contraceptive method (no, yes), family size (1–3, 4–6, ≥ 7), wealth index (poor, medium, and rich), mother's age group in years (below 20, 20–29, 30–39, and 40 and above), number of antenatal visits (no visit, 1–3, 4, and above visited), and preceding birth interval in months (0–24, 25–36, and > 36).

(ii) Paternal-related variables were educational level (no education, primary, secondary, and above), and occupation (not worked and had worked).

(iii) Child-related variables included in the study were twin child status or birth type (singleton and multiple), birth order number (first, 2-3, and 4 and above), sex of child (male and female), and vaccination status of the child (no, yes).

(iv) Other socioeconomic-related variables such as the sources of drinking water (piped and others) and type of toilet facility (use toilet and not any kind of toilet) were considered.

2.7. Data Processing and Analysis. The data were cleaned and analyzed using STATA 14 statistical software. Descriptive statistics were conducted to describe the characteristics of the study participants, and the result was presented using frequencies, percentages, and text. The chi-squared test of association was performed to determine the association of each independent categorical factor with under-five deaths of children. The binary logistic regression model was performed to determine the significant determinant factor of child death. The adjusted odds ratio (AOR) with the corresponding 95% confidence interval results was reported to show the risk factors of mortality. In the multivariable analysis of binary logistic regression, variables with a p value of ≤ 0.05 were considered as statistically significant.

3. Results

3.1. Maternal, Paternal, Child-Related, and Other Sociodemographic and Economic Characteristics. The descriptive statistics for the variables related to maternal, paternal, child-related, and other sociodemographic and economic characteristics are presented in Table 1.

A total of 1475 children aged 0–59 months were included in the study. Regarding children families' educational status, 83.53% of fathers and 88.95% of mothers had no formal education; 11.39% of fathers and 9.76% of mothers attended primary school. While 5.08% and 1.29% fathers and mothers, respectively, had some secondary and above education. The majority of children (96.61%) were born in singleton, while the remaining were in twins. About 92.54% of children were delivered in-home, while 6.92% and 0.54% were delivered in public and private sectors, respectively.

Regarding occupation, 83.93% of children's mothers and 18.37% of their fathers had not ever worked yet. Ninety-four percent of children were born from married or living with a partner mothers, while about 6% was from unmarried families. About 52.54% of children were born from mothers, who were under the age of 16 years at the time of first birth. Only 8.54% had got their drinking water from piped sources, and 17.69% use toilet for defecation. It showed that access to the piped drinking water source and the presence of a toilet facility for defecation was very less. About half (50.37%) of children's mothers were not breastfeeding at the survey time. About 44.88% mothers were given birth of four and above children.

The small number of children's mothers (8%) was from urban areas, while the majority (92%) were from rural areas of the region. The majority, about 96.68%, of children's mothers had Muslim beliefs. The majority of children's mothers did not use contraceptive methods (95.46%), and 83.86% of mothers had not given vaccination for their child. About 43.39% of children were from a family size of 7 and above, then followed by 4–6 family size (42.44%) and 1–3 family size (14.17%). The majority (89.70%) of children were born in loweconomic status families, only 8.88% were from rich, and very small (1.42%) were from the medium ones. Nine of ten children were born in poor families. This might indicate there is a need f or household economic improvement strategies and great emphasis in recent and long-term plans for the future.

The majority of children were males (55.53%), while 44.47% were females. Regarding the mother's age, a very small number of the mothers were under the age of 20 years, while the majority of mothers were under the age group of 20–29 years, followed by those under 30–39 years. Finally, about 80.54% had not ever got antenatal visits, and about 58.31% of children were born with the preceding birth interval of shorter than 24 months, then 25–36 months, while more than 36 months were the least (16.61%). The result showed that mothers had not adopted the culture of antenatal visits or the accessibility of health centers was very small; only two of ten mothers had visited health centers at the time of pregnancy. Because the mothers did not use contraceptive methods, nearest to 60% of mothers have had their second child in less than two years. Most mothers and fathers were illiterate and rural residents. Additionally, becoming the poorest of about 90% of households, and the different associated factors such as illiteracy and no use of contraceptive methods, not yet visited health centers during pregnancy resulted in shorter preceding birth interval, and the shorter preceding birth interval increases the number of households and it reduced the source of income. Some religious beliefs also demotivated the use of contraceptive methods.

3.2. Factors Associated with Under-Five Mortality. To identify the factors associated with the child death, the chi-squared test of association were applied. Based on a

Table 1: Sociodemographic and economic characteristics of children (0–59 months) and their mother in Afar Region, Ethiopia ($n = 1475$).

Variables	Category	Frequency ($n = 1475$)	Percentage (%)
Father's educational level	No education	1232	83.53
	Primary education	168	11.39
	Secondary education	75	5.08
Mothers educational level	No education	1312	88.95
	Primary education	144	9.76
	Secondary education	19	1.29
Child twin	Single	1425	96.61
	Multiple	50	3.39
Place of delivery	Home	1365	92.54
	Public sector	102	6.92
	Private	8	0.54
Mother's occupation	No working	1238	83.93
	Had working	237	16.07
Husband/parent's occupation	No working	271	18.37
	Had working	1204	81.63
Current marital status	Others	87	5.90
	Married	1388	94.10
Age of respondents at first birth (years)	≤ 16	775	52.54
	> 16	700	47.46
Sources of drinking water	Piped	126	8.54
	Others	1349	91.46
Types of toilet facility	Use toilet	261	17.69
	No any kind of toilet	1214	82.31
Currently breast feeding	No	743	50.37
	Yes	732	49.63
Birth order number	First	325	22.03
	2-3	488	33.09
	4 and above	662	44.88
Place of residence	Urban	118	8.00
	Rural	1357	92.00
Religion	Orthodox	35	2.37
	Muslim	1426	96.68
	Others	14	0.95
Current contraceptive method	No	1408	95.46
	Yes	67	4.54
Vaccination of child	No	1237	83.86
	Yes	238	16.14
Family size	1–3	209	14.17
	4–6	626	42.44
	≥ 7	640	43.39
Wealth status	Poor	1323	89.70
	Medium	21	1.42
	Rich	131	8.88
Sex of child	Male	819	55.53
	Female	656	44.47
Mothers age group (years)	Below 20	164	11.12
	20–29	596	40.41
	30–39	475	32.20
	≥ 40	240	16.27
Number of antenatal visits	No visits	1188	80.54
	1–3	179	12.14
	4 and above	108	7.32
Preceding birth interval (months)	0–24	860	58.31
	25–36	370	25.08
	> 36	245	16.61

bivariable (chi-squared) analysis, variables such as the educational level of the father and mother ($X^2 = 35.22$; df = 2) and ($X^2 = 51.00$; df = 2), respectively, the presence of twin child ($X^2 = 20.88$; df = 1), place of delivery (X^2=45.83; df = 2), mothers occupation (X^2=5.23; df = 1), husband's/parent's occupation (X^2=30.97; df = 1), current marital status (X^2=11.80; df = 1), age of mothers at first birth (X^2=20.06; df = 1), sources of drinking water ($X^2 = 19.81$; df = 1), type of toilet facility ($X^2 = 4.44$; df = 1), current breastfeeding status ($X^2 = 121.30$; df = 1), birth order (X^2=50.34; df = 2), place of residence (X^2=18.99; df = 1), religion (X^2=6.35; df = 2), current use of contraceptive method (X^2=25.12; df = 1), vaccination of child (X^2=78.21; df = 1), family size (X^2=15.30; df = 2), wealth status (X^2=37.68; df = 2), mother's age group (X^2=306.20; df = 3), and number of antenatal visits (X^2=112.70; df = 2) showed significant association with child death; all p values were less than 0.05, while the sex of child (X^2=0.69; df = 1; p value = 0.407) and preceding birth interval (X^2=2.45; df = 2; p value = 0.294) were statistically insignificant(Table 2).

The multivariable analyses to investigate the determinants of under-five mortality were performed using the binary logistic regression analysis (Table 2). The result of the multivariable analyses revealed that twin child (AOR = 5.37; 95%*CI*: 2.12–13.62), age of mothers (> 16) at first birth (AOR = 0.47; 95%CI: 0.35–0.62), current breastfeeders (AOR = 0.41; 95%CI: 0.32–0.54), rural resident (AOR: 2.54; 95%CI: 2.49–2.58), current contraceptive method users (AOR = 0.38; 95%CI: 0.15–0.94), vaccinated child (AOR: 0.40; 95%CI: 0.27–0.59), family size ((AOR = 0.65; 95%CI: 0.41–0.92) of 4–6 household members and (AOR = 0.49; 95%CI: 0.29–0.80) of seven and more household members), rich households (AOR = 0.03; 95%CI: 0.01–0.16), mother's age group ((AOR = 3.24; 95%CI: 1.90–5.54) (aged 20–29); (AOR = 12.43; 95%CI: 6.86–22.51) (aged 30–39); and (AOR = 46.31; 95%CI: 21.74–98.67) (aged 40 and more)), number of antenatal visits ((AOR = 0.48; 95%CI: 0.31–0.74) (1–3 visits) and (AOR = 0.44; 95%CI: 0.24–0.81) (4 and more visits)) significantly determined the under-five mortality.

Accordingly, children who were born as twins were 5.37 times (AOR = 5.37; 95%CI: 2.12–13.62) more likely to be dead as compared with children who were born in singleton, by making other factors constant. There was a reduction in mortality of children when they were born in singleton. And also, children whose mothers were aged above sixteen years at first birth were 0.47 times (AOR = 0.47; 95%CI: 0.35–0.62) or (53%) less likely to be dead as compared with children whose mothers were aged 16 and below. Children whose mothers give breastfeeding were 0.41 times (AOR = 0.41; 95%CI: 0.32–0.54) or (61%) less likely to be dead as compared with children whose mothers had not given breastfeeding. Breastfeeding will help to develop the child immunity against infection. Children's mothers who were from rural area were 2.54 times (AOR: 2.54; 95%CI: 2.49–2.58) or (154%) more likely to be dead as compared with children whose mothers were from urban areas, by controlling other factors constant. The mortality of children from rural resident mothers was more than double of that of urban resident mothers. This might be associated with certain socioeconomic and health facility factors that lead to an increase in child mortality.

The findings of this study also identified that children who had been given vaccination were 0.40 times (AOR = 0.40; 95%CI: 0.27–0.59) or (60%) less likely to be dead as compared with children who had not been given vaccination. Children who were born from rich economic status subgroups were less likely to die than those from the poor families. Contraceptive using mothers were 62% less likely for the death of their children than of no contraceptive using mothers. The presence of high family size has been shown in the reduction of the mortality rate of children. Families, who had seven and more household members, were 0.49 times (AOR = 0.49; 95%CI: 0.29–0.80) or (51%) and families who had four to six household members were 0.65 times (AOR = 0.65; 95%CI: 0.41–0.92) or (35%) less likely to children's death than families who had three or fewer household members. This might be because when household members are huge, mothers have enough time for their children to take care, which reduces the child mortality. But, from the economic point of view, it needs other investigations, since households with large family sizes have not got enough access to basic needs and services such as quality water, food, education, and health.

Finally, the likelihood of death was 3.24 times (AOR: 3.24; 95%CI: 1.90–5.54) for mothers of age 20–29 years, 12.43 times (AOR: 12.43; 95%CI: 6.86–22.51) for 30–39 years, and 46.31 times (AOR: 46.31; 95%CI: 21.74–98.67) for 40 and above years; 40 and above aged mothers were more likely to die as compared with mothers whose age was below 20 years. The mortality of children increased with increase in the age of mothers. On the contrary, the children of mothers who have given their first birth at the age younger than 16 years had high mortality rate. In agreement with the two scenarios, mothers who have given birth above 16 years, but not older than that, are better for child survival. Statistical evidence also showed that young people aged 16–24 may be disproportionately disadvantaged by working practices [13] as cited in [14], and it is hard to get a clear picture of the younger generation's work environment; since the stage is the transition period, certain adolescent health outcome complexity is observed [14]. The children of mothers who have a higher number of times antenatal visits are less likely to die than those who had no antenatal visits. Antenatal visits help mothers to reduce their pregnancy complexity and improve the survival of their child (Table 2).

4. Discussions

We investigated the determinant factors of the under-five mortality rate by considering different variables from the previous literature and availability on the dataset. The provided in-depth information on the determinants of under-five mortality was using the datasets of 2016 EDHS. Reports indicated that the country has been showing a significant reduction in under-five mortality across all regions [15]. But still, the country is at a higher risk of under-five mortality. Based on the 2016 EDHS report, the Afar

Table 2: Factors associated with child mortality among children of 0–59 months in Afar region, Ethiopia ($n = 1475$).

Variables	Category	Child death			
		No (%)	Yes (%)	COR (95%CI)	AOR (95%CI)
Father's educational level	No education	552 (78.4)	680 (88.2)	1.00	1.00
	Primary education	94 (13.4)	74 (9.6)	0.64 (0.46, 0.88)	1.13 (0.75, 1.72)
	Secondary education	58 (8.2)	17 (2.2)	0.24 (0.14, 0.41)	0.66 (0.31, 1.39)
	Pearson $X^2 = 35.122$, df = 2, p value ≤ 0.001				
Mother's educational level	No education	585 (83.1)	727 (94.3)	1.00	1.00
	Primary education	101 (14.3)	43 (5.6)	0.43 (0.30, 0.61)	0.94 (0.58, 1.54)
	Secondary education	18 (2.6)	1 (0.1)	0.06 (0.01, 0.42)	0.90 (0.09, 8.57)
	Pearson $X^2 = 51.002$, df = 2, p value ≤ 0.001				
Twin child	Singleton	696 (98.9)	729 (94.6)	1.00	1.00
	Multiple	8 (1.1)	42 (5.4)	5.01 (2.34, 10.75)	5.37 (2.12, 13.62)*
	Pearson $X^2 = 20.884$, df = 1, p value ≤ 0.001				
Place of delivery	Home	618 (87.8)	747 (96.9)	1.00	1.00
	Public sector	78 (11.1)	24 (3.1)	0.25 (0.16, 0.41)	0.72 (0.37, 1.37)
	Private	8 (1.1)	0 (0.0)	—	—
	Pearson $X^2 = 45.831$, df = 2, p value ≤ 0.001				
Mother's occupation	No working	607 (86.2)	631 (81.8)	1.00	1.00
	Had working	97 (13.8)	140 (18.2)	1.44 (1.12, 1.87)	1.47 (0.99, 2.19)
	Pearson $X^2 = 5.234$, df = 1, p value = 0.022				
Husband's/parent's Occupation	No working	88 (12.5)	183 (23.7)	1.00	1.00
	Working	616 (87.5)	588 (76.3)	0.95 (0.85, 1.07)	0.98 (0.65, 1.48)
	Pearson $X^2 = 30.974$, df = 1, p value ≤ 0.001				
Current marital status	Others	26 (3.7)	61 (7.9)	1.00	1.00
	Married	678 (96.3)	710 (92.1)	1.05 (0.94, 1.16)	0.67 (0.31, 1.44)
	Pearson $X^2 = 11.799$, df = 1, p value = 0.001				
Age of respondents at first birth (years)	≤ 16	327 (46.4)	448 (58.10)	1.00	1.00
	> 16	377 (53.6)	323 (41.9)	0.86 (0.74, 0.99)	0.47 (0.35, 0.62)*
	Pearson $X^2 = 20.055$, df = 1, p value ≤ 0.001				
Sources of drinking water	Piped	84 (66.7)	42 (33.3)	1.00	1.00
	Others	620 (46.0)	729 (54.0)	1.18 (1.06, 1.31)	1.92 (0.54, 6.81)
	Pearson $X^2 = 19.805$, df = 1, p value ≤ 0.001				
Types of toilet facility	Use toilet	140 (53.6)	121 (46.40)	1.00	1.00
	No any kind of toilet	564 (46.50)	650 (53.50)	1.15 (1.03, 1.29)	0.67 (0.43, 1.04)
	Pearson $X^2 = 4.441$, df = 1, p value = 0.035				
Currently breast feeding	No	249 (33.5)	494 (66.5)	1.00	1.00
	Yes	455 (62.2)	277 (37.8)	0.61 (0.52, 0.71)	0.41 (0.32, 0.54)*
	Pearson $X^2 = 121.3$, df = 1, p value ≤ 0.001				
Birth order	First	203 (62.5)	122 (37.5)	1.00	1.00
	2-3	244 (50.0)	244 (50.0)	1.00 (0.84, 1.19)	1.47 (0.97, 2.23)
	4 and above	257 (38.8)	405 (61.2)	1.58 (1.35, 1.84)	1.39 (0.88, 2.20)
	Pearson $X^2 = 50.336$, df = 2, p value ≤ 0.001				
Place of residence	Urban	79 (66.9)	39 (33.1)	1.00	1.00
	Rural	625 (46.1)	732 (53.9)	1.17 (1.05, 1.30)	2.54 (2.49, 2.58)*
	Pearson $X^2 = 18.992$, df = 1, p value ≤ 0.001				
Religion	Orthodox	24 (68.6)	11 (31.4)	1.00	1.00
	Muslim	674 (47.3)	752 (52.7)	1.12 (1.01, 1.24)	1.16 (0.31, 4.45)
	Others	6 (42.9)	8 (57.1)	1.33 (0.46, 3.84)	3.56 (0.51, 25.09)
	Pearson $X^2 = 6.350$, df = 2, p value = 0.042				
Currently using contraceptive methods	No	652 (46.3)	756 (53.7)	1.00	1.00
	Yes	52 (77.6)	15 (22.4)	0.29 (0.16, 0.51)	0.38 (0.15, 0.94)*
	Pearson $X^2 = 25.123$, df = 1, p value ≤ 0.001				
Vaccination of child	No	528 (42.7)	709 (57.3)	1.00	1.00
	Yes	176 (73.9)	62 (26.1)	0.35 (0.26, 0.47)	0.40 (0.27, 0.59)*
	Pearson $X^2 = 78.207$, df = 1, p value ≤ 0.001				

Table 2: Continued.

Variables	Category	Child death			
		No (%)	Yes (%)	COR (95%CI)	AOR (95%CI)
Family size	1–3	116 (55.5)	93 (44.5)	1.00	1.00
	4–6	318 (50.8)	308 (49.2)	0.97 (0.83, 1.13)	0.65 (0.41, 1.02)
	≥7	270 (42.2)	370 (57.8)	1.37 (1.17, 1.61)	0.49 (0.29, 0.80)*
		Pearson $X^2 = 15.304$, df = 2, p value ≤0.001			
Wealth status	Poor	598 (45.2)	725 (54.8)	1.00	1.00
	Medium	10 (47.6)	11 (52.4)	1.10 (0.47, 2.59)	1.19 (0.34, 4.12)
	Rich	96 (73.3)	35 (26.7)	0.36 (0.25, 0.54)	0.03 (0.01, 0.16)*
		Pearson $X^2 = 37.678$, df = 2, p value ≤0.001			
Mother's age group (years)	Below 20	133 (81.1)	31 (18.9)	1.00	1.00
	20–29	382 (64.1)	214 (35.9)	0.56 (0.47, 0.66)	0.l
	30–39	165 (34.7)	310 (65.3)	1.88 (1.56, 2.27)	12.43 (6.86, 22.51)*
	≥40	24 (10.0)	216 (90.0)	9 (5.90, 13.72)	46.31(21.74, 98.67)*
		Pearson $X^2 = 306.2$, df = 3, p value ≤0.001			
Number of antenatal visits	No visits	487 (41.0)	701 (59.0)	1.00	1.00
	1–3	130 (72.6)	49 (27.4)	0.37 (0.27, 0.52)	0.48 (0.31, 0.74)*
	4 and above	87 (80.6)	21 (19.4)	0.24 (0.15, 0.39)	0.44 (0.24, 0.81)*
		Pearson $X^2 = 112.7$, df = 2, p value ≤0.001			

*Statistically significant variables at 5% level of significance; AOR: adjusted odds ratio, COR: crude odds ratio; CI: confidence interval.

region takes the largest under-five mortality rate in which 125 deaths of children per 1000 live births were recorded.

The findings of the current study showed that children born as twins were more likely to die of than those born in singleton. This might be because the presence of twin children enforces the family to be burdened, and they are busy with access to other health facilities. Thus, a study conducted in Nigeria states that multiple-births are negatively associated with child survival [16]. The study did not show any significant difference among mothers' education and children's survival rate. In fact, mother's education has contributed to a positive factor for children's survival. An educated mother improves her child's survival by improving the quality of health, feeding status, household sanitation and family planning and providing adequate quality health services [16].

Mothers, who had worked or had occupation did not show any significant difference in the mortality rate of under-five children. But, when mothers have their own income, they can provide sufficient services and quality of life and improve the standard of living, and also they can improve their children's survival rate. In line with this, a study in India showed that the better standard of living reduced the child mortality [17]. On the other hand, they become busy to give care of their children. Children of mothers aged above 16 had reduced under-five mortality rate than those of below 16 years old. It coincides with the previous studies in which mothers at a younger age less than 16 years increase the risk of death for children at all age levels under five [18]. Breastfeeding significantly reduces the child mortality rate and it is the basis of the child's survival in India [17], developing countries [19] and Ethiopia [20]. Due to mothers milk protects from infection, duration of breastfeeding of children is the significant determinant factor of childhood mortality in Ethiopia [21]and Bangladesh [22]. World Health Organization (WHO) also recommends breastfeeding for children until 6 months old is mandatory. Since breast milk is the natural organic first food for babies, it provides all the energy and nutrients that babies need for the first six months of life [23]. In Ethiopia, 99% of children are breastfed, and only 52% of children are exclusively breastfed with in the first six months [12]. But, the overall prevalence of breastfeeding in Ethiopia compared to the global recommendations was significantly lower [24]. The highest prevalence of breastfeeding in Ethiopia was observed in the Afar region, about 65.6% [24].

Most mothers from rural parts of the country are under the risk of under-five child mortality. The study finds out that mothers from rural areas were more than double under risk of child mortality than of urban resident mothers. The nationwide DHS reports supported this evidence that child mortality was the highest in rural areas than in urban areas [8, 10–12]. This may be due to the following reasons: mothers in the rural parts of the country are under lack of accessible health centers; presence of high illiterate mothers; low-economic status; presence of delivery of the child out of health centers (in-home); and inaccessibility to adequate facilities such as improved sources of water and toilet.

The study showed that vaccinated children were at a lower risk of mortality than those nonvaccinated. Vaccination increases the immunity level of the child to protect the body from new infections and hence it reduced the mortality rate. It is also in line with the global evidence that vaccination has reduced the mortality rate of children than those nonvaccinated [25] , regardless of the doses. Vaccination not only reduces the child mortality but also helps to protect the child health by preventing them from contagious diseases.

Households with large family sizes have shown a significant reduction in child mortality. It may be because

family members share household activities and mothers would have enough time to take care of their children. Additionally, families with high-income groups significantly reduced the under-five mortality rate. A study in Bangladesh stated children born in high-income groups will get access to the needs and services such as health facilities, quality of life, quality water, and improved sanitation availability [26]. UNDP Sustainable Development Goals report children from the low-income group families have higher mortality than those in the medium and rich families [27]. Antenatal visits and follow-up shall improve significantly the survival of children. Mothers at the antenatal period shall visit health centers for the better survival of their children. Based on WHO recommendation, good care during pregnancy is important for the health of the mother and the development of the unborn baby [28], and a higher number of ANC visits will give more opportunities to reiterate the educational messages and affirm the benefits that can be reaped by continued interaction with the health system [29]. A study on the effectiveness of antenatal care services in reducing neonatal mortality in Kenya stated lack of check-ups for pregnancy complications was associated with neonatal mortality in the country [30].

5. Conclusions

In conclusion, under-five mortality was determined by different maternal, paternal, child, and other socioeconomic and demographic related factors. Based on our investigation, born as twins, mothers who had given the first birth at age 16 and below, no breastfeeding, mothers from rural areas, no use of contraceptive methods, not yet vaccinated the child, born from poor families, an older age group of mothers, and no antenatal visits during pregnancies are the determinant factors of under-five mortality in the area. It is recommended that the local, regional, and national governments and other supporting organizations shall improve the survival of children by providing awareness to the community and specifically to the mothers: not giving birth at an early age, increasing the coverage and quality of health access in the rural areas, improving breastfeeding culture, increasing the accessibility to low-cost contraceptive methods, improving the skill of mothers how advantageous is vaccination to a child for child survival, improving the economic status of households by providing training on how they can generate income by the local materials and providing techniques of how mothers shall improve antenatal visits through health extension workers with inline of the country strategies and policies of health on the emphasis of reducing child mortality by 2030 meeting with the global SDGs.

6. Limitations

The study was conducted with the data collected at a time and only on the available mothers at the time of data collection. Thus, the current study does not view the long-term effects of the factors of child mortality. The risk factors on children from the mothers who were not alive at the time of survey were also not considered.

Abbreviations

ANC: Antenatal care
AOR: Adjusted odds ratio
CI: Confidence interval
COR: Crude odds ratio
CSA: Central Statistics Agency
EDHS: Ethiopian Demographic and Health Survey
MDGs: Millennium Development Goals
SDGs: Sustainable Development Goals
SSA: Sub-Saharan Africa
UNDP: United Nations Development Program
UNICEF: United Nations International Culture and Education Fund
U5M: Under-five mortality
WHO: The World Health Organization.

Data Availability

The data for this study were sourced from Demographic and Health Surveys (DHS) and are available at http://www.dhsprogram.com/data/available-datasets.cfm.

Conflicts of Interest

The authors declare no conflicts of interest.

Authors' Contributions

SG conducted the literature search, planned the study, carried out the data extraction, performed the data analysis and interpretation, and drafted the manuscript. SM carried out the data extraction. Both authors read and approved the final manuscript.

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