Original article

Determinants of Fertility Rate among Reproductive Age Women (15-49) in Gonji-Kollela District of the Amhara National Regional State, Ethiopia

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Abstract

Background: The low levels of education associated with low use of contraceptive methods are the major factors for high fertility rate in many developing countries including Ethiopia. Ample research works indicated that nearly two million people are added to the population of Ethiopia each year. The implication is that uncontrolled fertility rate affects the socio-economic, demographic and environmental situations of the country. The general objective of the study was to identify demographic and socio-economic determinants of fertility among reproductive-age women in Gonji-Kollela district of the Amhara Region.

Methods: The study employed survey research design of a quantitative approach. Multi-stage sampling techniques were employed to select the required sample for the study. The data were collected using structured questionnaire and presented with the help of frequencies, percentages, and tables. SPSS version 20 was employed for data analysis. Multiple linear regression model was applied to identify determinant factors affecting the number of children ever born in the study area.

Results: The total fertility rate (TFR) in the study area was 5.3 children per woman, which is higher than the TFR of the country (4.1 children per woman). The study pointed out that the total fertility rate of women with no education was 7.0 against 3.6 with secondary educational level. This means that respondents with no education have a large number of children ever born (CEB) than those who have some formal education. The marital status of the respondents revealed that 47% and 22.4% established marriage less than 15 years and 15-17 years of age, respectively. The study noted that fertility was the lowest among mothers who do not worry about sex preference. The results of the linear regression model also evidenced that sex preference, age at first birth, low educational levels of mothers and age at first sexual intercourse were the determinant factors for a high number of children ever born in the study area.

Conclusions*:* The study found out that early marriage, low level of formal and informal education, parents motive to have a large number of children and inaccessible in the use of contraceptive methods were the major factors for high fertility rate in the study area. Hence, continuous awareness creation about the negative consequences of early marriage has to be promoted by the district health offices, Region's bureau of women affairs and other stakeholders. [*Ethiop. J. Health Dev.* 2018;32(3):144-155]

Keywords: Fertility determinants, contraceptive use, children ever born, sex preference, reproductive age, total fertility rate, Amhara Region

Introduction

The United Nations report reveals that the world population is estimated to grow from 6.8 billion in 2009 to 9.2 billion in 2050 (1). Park (2) indicates that three-fourths of the world's population lives in developing countries where technology is the least developed, fertility is the highest recorded and their livelihoods depend on nature. According to World Bank (3), the average number of births per woman in Sub-Saharan Africa (SSA) is 5.1, which is almost twice that of South Asia (2.8), Latin America and the Caribbean (2.2). On the other hand, average contraceptive prevalence for SSA is 22%, which is much lower than South Asia (53%) and East Asia (77%). This made SSA be the highest in population growth rate (more than 2.3%) as compared to Asia and Latin America (1.1% each) (4). The economic value of children, the extended family system and its socio-cultural norms as well as its development are the major reasons for high fertility in SSA (5). Hence, the average total fertility rate (TFR) worldwide ranges from 1.7 children per woman in more developed countries to 4.6 in many developing countries (4). The demographic patterns of SSA countries are characterized by high fertility and high infant mortality (6) where Ethiopia is located. Fertility is the most dynamic element in determining the size, rate of growth and the age-sex structure of a population. Anteneh (7) also reports that fertility is one of the three principal determinants of the size and structure of the population of a country (the other two being mortality and migration). In the absence of substantial migration, at any given level of mortality, changes in fertility causes variations in the rates of natural increase and exert a powerful influence on the age structure of a population (8). It is a major expanding force in population dynamics and a major neutralizing force to population reduction through mortality. Fertility is also a vital factor in the determination of the social, economic and political features of a nation (6, 9). Fekadu (10) reports that the most important component of population dynamics that could play a leading role in changing the size and structure of the population is the total fertility rate of a nation.

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The population of Ethiopia was 29.5 million in 1970, grew to 41.5 million in 1985 and reached to 65.3 million in 2001 and approaches to 100 million in 2013 (5, 11). In other words, the population growth rate increased from 2.3% in 1970 to its climax (3.2%) in 1990 and then declined to 2.7% in the present decade (5, 11). The current growth rate (2.7%) means that Ethiopia would take 23 years to double its population. Ample scientific works (12, 13, 14) point out that TFR of Ethiopia shows a declining trend in some regions and an increasing trend in other regions. For example, Tigray, Amhara, Oromiya and SNNP regions show a declining trend in total fertility rate whereas regions such as Somali and Afar are moving to the opposite direction, and Gambella, Harari, and Benishangul-Gumuz regions show no change in fertility rate (12). Though TFR is high in rural areas of Ethiopia, there is a declining trend (6.0 in 2000 to 5.5 in 2011). Though, urban areas of Ethiopia experience low TFR, there is an increasing trend at the present situations (for example, 2.4 in 2005 to 2.6 in 2011) (12). The government of Ethiopia recognized that population growth rate is one of the main challenges in poverty reduction and sustainable development (15). Considering the situations, the government adopted a national population policy (NPP) in 1993 with the objective of equitable balance between population and resources and raise the contraceptive prevalence rate among currently married women. In this regard, the current contraceptive prevalence rate has increased from 4% in 1990 to 44% by the year 2015 (15). This could be the reason that the awareness of modern contraceptive methods is significantly high (94%) among married women of reproductive age (16). However, the actual utilization of these methods is very low for married women (23%). This is associated with the socio-cultural, socio-economic and lack access to contraceptive methods (16).

Several studies indicate that the variation in fertility level among married women in Ethiopia is attributed to four proximate determinants which include marriage, contraception, abortion, and postpartum in fecund ability (17, 18). Although contraception is gaining influence through time in many rural areas of Ethiopia, still postpartum insusceptibility is the most important determinant of fertility (12). Other factors affecting the use of contraception methods include knowledge of contraception, desired numbers of children, access to family planning, spousal communication either to limit or to space children and women empowerment (4, 19). Davis and Blake (20) and Bekele (6) stated factors that determine fertility to include proximate determinants and indirect (background determinants of fertility). Among others, the direct determinants of fertility include marriage, post-partum amenorrhea, and spacing births. The indirect determinants of fertility on the other hand include education, age, marital status and occupational status of mothers.

The population of the Amhara Region is over 19 million with annual growth rate of 1.8%, accounts for over 25% of the total population of the country and the second most populous region in Ethiopia next to Oromia Region (12, 21). The region is characterized by poor socio-economic status. Most of the people reside on the highland plateaus, which have been terribly affected by land degradation and erratic rainfall for many decades. Low adult literacy, high infant and child mortality are common in the region (9, 22). According to Farina et al (5) and Fitaw et al (23), the TFR of the Amhara Region shows a declining trend and the use of contraception in the region has increased nearly five-fold from single digits in 2000 to over 33% at the present time. In general, the specific factors that explain the overall decrease in the current fertility rate in the Amhara Region are not well unknown. In other words, the motive to have a small number of children is decided by the household or whether it was influenced by socio-economic development discourse or it is shaped and regulated by health extension workers are not purely known that needs further research. That is, detailed studies on the nature and paces of fertility in the Amhara National Regional State is valuable as a major input for planning, implementation, and evaluation of population and development spectrum. More importantly, the study of differentials of fertility in the region is relevant in detecting important variables for interventions.

Ample writers (4, 16, 17, 24, 18, 19, 22, 24) investigate the problems associated with fertility differentials in different parts of Ethiopia. Their study focused on the influence of socio-economic, demographic and reproductive related variables to mothers' fertility status. However, fertility by its nature is dynamic, which varies spatially and temporarily that demands up-to-date information for policy makers. More importantly, as far as the writer's knowledge is concerned, such kind of study has not been done so far in the selected district. Hence, this study tries to fill this gap. The general objective of the study was, therefore, to identify socio-economic, demographic, and proximate determinants of fertility among reproductive-age women in Gonji-Kollela district of the Amhara Region.

Conceptual Framework of the Study: As shown in Figure 1, socio-economic, demographic, and biological and sex-related variables affect the number of children ever born in the study area. In the conceptual framework (CFW), the socio-economic and demographic variables are indirect determinants and the rest of the variables are proximate determinants of fertility. In the CFW, independent variables include desired number of children, place of residence, age at first marriage, sex preference, contraceptive use, and breastfeeding duration, age at first marriage, age at first sexual intercourse, occupation, induced abortion and educational levels of women. The number of children ever born is the dependent Variable of the framework.

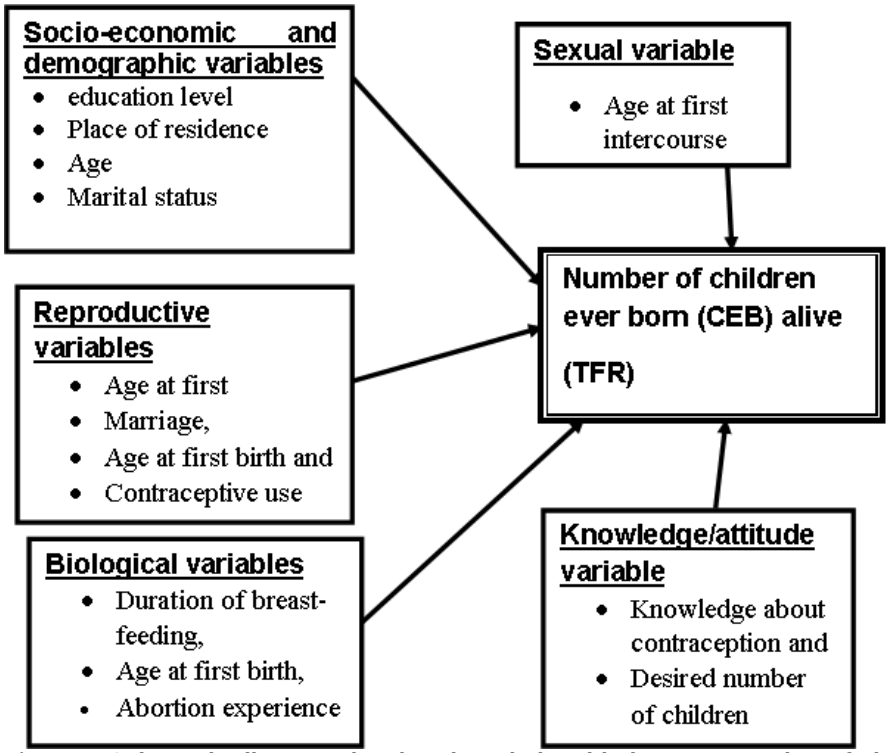

Figure 1: **Schematic diagram showing the relationship between number of children ever born and predictor variables**

Description of the study area: Gonji-Kollela is one of the 15 rural districts found in West Gojjam zone of the Amhara region. The study district covers a total area of 662.23km^2 with a total population of 113,803 with a population density as high as 172 people per km^2 (25). About 96% of the total population resides in rural areas. From the total population of the district, 56,525 (49.7%) were females. Among this, a total of 29,646 (52.4%) were in the reproductive age group (15- 49 years) (26) and this group of population was the subject of the study.

Methods

Research Design: The study employed the survey research design of a quantitative approach. The actual survey began in mid-January 2011 and continued to the end of April 2011. These months were selected purposely because the principal researcher and enumerators could easily move in the study area crossing the river valleys, which could be problematic during the rainy season.

Sampling procedures: Gonji-Kollela district was selected purposively for the study mainly due to principal investigator's familiarity with the issue selected for the study. More importantly, communication was not a barrier to collect the necessary data since the author's place of birth is Gonji-Kollela district. Multi-stage sampling techniques were employed to collect the required data. Initially, the 25 rural *kebele* administrations (RKAs) of the district were clustered into two major sub-groups. The first cluster includes seven RKAs that are found within the Abay (Blue Nile) gorge and the second cluster includes eighteen RKAs that are found out of Abay gorge. From the seven RKAs that are found within the Abay gorge, two RKAs (Garginbit and Shebelie) were selected randomly for the study. Similarly, from the eighteen RKAs that are found out of the Abay gorge, four RKAs (Geregera, Abedray, Adisalem, and Sheba) were selected randomly taking into consideration their homogeneity. In both clusters, a total of six RKAs were included for the study.

During the survey, the number of reproductive women aged 15-49 years living in Gonji-Kollela district was 29,646 (21). Among the total reproductive age women residing in the 25 RKAs, 7,017 women living in the selected six sample RKAs were taken as the sampling frame. The study population was reproductive women in the age group of 15-49 who were permanent dwellers in the selected study site. A woman was considered as a permanent dweller if she had been living in the area for at least a year.

Sample size determination: Using (27) sample size determination formula, the total sample size (*n*) for the study was determined as:

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

n = the sample size,
N= the population size (N= 7,017),
e = sample size for precision (7% margin of error was used; considering the homogeneity of study population)

Using this formula, 201 women aged 15-49 years were determined from the six RKAs to fill out the questionnaire. However, fear of missing data/non-response rate, the sample size was determined to be 221, an increment of 10%. In relation to this, Naing et al (28) contend that it is wise to oversample 10% - 20% in the case when there is a non-response rate. Put differently, 10% -20% could be added to the already

calculated sample size to compensate for those that are unable to contact or not properly filled with (29). Finally, 221 women aged 15-49 were sampled for the structured interview from the six RKAs based on the sampling frames obtained from the RKA offices (see Table 1). Nonetheless, nineteen questionnaires (~ 8% of the total sample) were not correctly filled for the final analysis. This made the total respondents be 201 in the selected RKAs. Glenn (29) substantiated that the minimum sample could be leveled as 30 and upper limit in many cases could reach to 1,000. In between these limits, the sample selected could represent the population taking into consideration the variability of the population. It is to note that the population in the study area is less variable and/or homogenous. Hence, 201 sample sizes were determined to represent the study population taking into consideration its homogeneity. Amugune (30) argues that the degree of variability being measured refers to the distribution of attributes in the population. Amugune (30) further points out that the more heterogeneous a population, the larger the sample size required in obtaining a given level of precision. On the other hand, the less variable (more homogeneous) a population, the smaller the sample size required to represent and generalize the population.

Table 1: **Statistical population and sample size of the study area**

NO.	Name of Kebeles	Number of reproductive age women (15-49years)	Sample size
1	Garginbit	829	26
2	Shebele	555	17
3	Geregera	1955	61
4	Abedray	1445	46
5	AdisAlem	1227	39
6	Sheba	1006	32
Total		**7017**	**221**

Source: Gonji-Kollela District Finance and Economic Development Office, 201

Data collection techniques: The primary data were collected using questionnaire survey; composed of closed and open-ended type of questions. The questionnaire covered various issues: socio-economic and demographic characteristics, fertility levels and preferences, knowledge and use of family planning, child death, marriage, and sex related activities. To assure the quality of the data, different techniques were employed. Among others, the prepared questionnaire was pretested on 20 purposively selected participants adjacent to the study RKAs. This helped to refine and to correct repetitive ideas and ambiguous questions. Since the issue raised is sensitive, female enumerators were selected with cautious for the entire data collection process. The enumerators and supervisors were first trained by the principal investigator on how to present and explain each question to the participants. Specifically, enumerators were advised to inform each participant the purpose of the study. Besides, they were trained to inform some ethical issues that should be kept confidential to the participants before the actual interview. The principal investigator, seven enumerators and two supervisors, all speaking the local language conducted the survey. In the evening, there was a meeting with the enumerators and supervisors to observe the accomplishments and challenges faced during data collection. The principal investigator and the supervisors monitored and cross-checked the way questionnaires are filled for further data analysis. The interviews were conducted by going to each interviewee's homestead. Early morning, late afternoon and Sunday were a convenient time for the interviewees. The time taken to interview the participants were from one to one and a half hours.

Data analysis: Upon completion of the quantitative data collection, the data were coded, edited and entered into SPSS version 20 to analyze the data. Descriptive statistics such as frequencies, percentages, and tables were used to present the data. Besides, inferential statistics were used to test differences and relationships. The study employed multiple linear regression model to identify socio-economic and demographic determinants affecting the number of children ever born in the study area. The multiple linear regression model was selected because the dependent variable (number of children ever born) is a continuous variable. As shown in the CFW, the independent variables or the regression modeling include socio-economic and demographic (income, occupation, education level, marital status, age, place of residence), reproductive (age at first marriage, age at first birth, and contraceptive use), biological (duration of breastfeeding, duration of post-partum amenorrhea, history of child death, abortion experience), and knowledge/attitude variables (knowledge about contraception and desired number of children). The linear relationship between the dependent variable and predictor variables is given as:

$$Yi = \beta 0 + \beta_1 X_{1i} + \beta_2 X_{2i+} \ldots\ldots + \beta p X p i + ei$$

where Yi = is the value of the dependent variable for the *ith* case

P = is the number of predictors

βj= is *jth* coefficient, j =1,...,1p

$\beta 0$ = is the intercept

Xij= is the value of the *ith* case of the *jth* predictor

ei = is the error term in the observed value for the *ith* case

The goodness of fit of the model was checked using an adjusted coefficient of determination (adjusted R^2) and one-way ANOVA.

Ethical Considerations: Before starting the actual data collection, there were in-depth discussions about the issue of confidentiality and the purpose of the study with respondents. In order to facilitate the research, formal letters of support were written by the district administration and district health office to the office of RKA health extension workers and local administration offices. Ethical conditions were also cleared by Bahir Dar University of Social Science Faculty ethical committee.

Results

Demographic and socio-economic characteristics of the respondents: Demographic, socio-economic and proximate variables affect mothers' fertility either directly or indirectly. As indicated in the CFW, the proximate (direct) determinants affecting the fertility status of mothers' include contraception, breastfeeding duration, age at first marriage, sex preference, and a desired number of children. Education, age, marital status and income are indirect determinants of fertility. There are two approaches in measuring fertility: periodic analysis and cohort analysis. Period analyses are those related to events that occur at a specific point in time and affect all people of all ages. Cohort analysis, on the other hand, measures events occurring to a group of people undergoing a common experience. There are many kinds of cohorts including birth cohort (people born in the same year), school year cohort (young women joined school in the same year), and so on. This study employed both periodic analysis and cohort analysis to measure events undergoing a common experience among reproductive-age women in the study area.

Age of respondents: The mean age of respondents was 25 years and the majority (78.4%) was between the ages 15 and 29 years (Table 2). Among the total respondents, the chance of becoming high fertility was almost nil in the age group 15-24; while the chance of becoming high fertility level was increased with increasing age and it was 36.6% in the age group 25-34 against 72.2% in the age group 35-49 years. The ANOVA result also evidenced that there was a statically significant difference between age grouped and total fertility rate at $P < 0.01$.

Educational Status of Mothers: As shown in Table 2, the majority (64.2%) of reproductive women were not able to read and write. This figure is higher than the Amhara Region (52%) and Ethiopia (48%). Respondents' educational status and the number of children ever born were compared using one-way ANOVA. The result showed that there was a statistically significant difference between the educational level of mothers and the number of children ever born at $p < 0.01$. The descriptive statistics also confirmed that the number of children ever born of mothers with no education was 7.0 against 3.6 for mothers with elementary education and above. These results evidenced that there was a close relationship between educational status and fertility level of mothers.

Table 2: **Age, educational level and marital status of respondents**

Age group	**Frequency**	**Percent**	**Cumulative %**
15-19	69	34.3	34.3
20-24	34	17.0	51.3
25-29	36	18.0	69.3
30-34	26	13.0	82.3
35-39	14	7.0	89.3
40-44	10	4.0	93.3
45-49	12	6.0	100
Total	**201**	**100**	
Educational Level			
Cannot read and write	109	54.2	54.2
Elementary	64	31.8	86.0
Secondary+	28	13.9	100
Total	**201**	**100**	
Characteristics		N	%
Marital status	Married	151	75.1
	Divorced	18	9.0
	Never married	32	15.9
Total		**201**	**100**
Age at first marriage	<15 years	105	52.2
	15-17 years	40	19.9
	≥18 years	34	17.0
	Never married	22	10.9
Total		**201**	**100**

Marital Status and Age at First Marriage: The study found out that 80% of respondents were currently married and 7% were divorced. From the total currently married and never-married women, 87% have got marriage through their parents while the remaining was based on their choice. Even though all the respondents' ages were between 15-49 years, the age at first marriage ranges in between 5 and 31 years. The study noted that about 47% had married before the age of 15 years while 22.4% and 17.2% had married

between the age **of** 15-17 and above 17 years, respectively (Table 2). This is a common practice in many rural areas of the Amhrar Region, which could adversely affect the education and health performances of young girls.

Age at First Sexual Intercourse: Age at first sexual intercourse is an important factor in determining the level of fertility, where there is a low contraceptive prevalence rate of mothers. In this study, the majority (74.6%) of the respondents had their first sexual intercourse before the age of 18 years, while about 16% started sexual intercourse after 18 years (Table 3). The percentages of age at first sexual intercourse demonstrate variations based on respondents background information. Among mothers who started sexual intercourse before 18 years, 28% of them had five and more number of children as compared to mothers who started sexual intercourse 18 years and above. The result showed that the level of fertility decreases with increasing age at first sexual intercourse. As shown in Table 3**,** the first sexual intercourse varied among reproductive women having different educational level, age group and places of residences. The Pearson correlation coefficient (r= 0.94) showed that age at first sexual intercourse has a statistically significant association with a total fertility rate of mothers.

Age at First Birth: As can be seen in Table 3, 74.6% of mothers had given their first birth less than 18 years old while 16% of them had given their first birth when they were 18 and above years old. The proportion of age at first birth is varied among respondents who have different educational background and place of residence. The study pointed out that 43% of mothers who could not read and write started their first birth when they were less than 18 years of age against 19% above 18 years of old. The result showed that the majority of illiterate respondents had given birth during their early age as compared to those having a higher educational level. These variations were also tested using one-way ANOVA. The result revealed that there was statistically significant variation between ages grouped and the total fertility rate of mothers at $P < 0.05$. It was also noted that mothers located in remote areas could give birth less than 18 years (31%) against 12% near to the service centers. From the result, it was learned that location and/or accessibility has a strong influence to give birth at the early age of girls.

Table 3: **Age at first sexual intercourse and age at first birth for selected variables in the study area**

Characteristics	**Ages at first sexual intercourse**							
	Not yet started		**< 18 years**		**≥ 18 years**		**Total**	
Place of residence	N	%	N	%	N	%	N	%
Located remote areas	2	5.1	35	89.7	2	5.1	39	100
Located nearby areas	17	10.5	118	72.8	27	16.7	162	100
Total	**20**	**10.0**	**153**	**76.1**	**31**	**15.4**	**201**	**100**
Educational level								
Illiterates	10	7.7	110	85.3	9	7.0	129	100
Elementary	6	11.7	34	66.7	11	21.6	51	100
Secondary and above	5	26.9	9	38.5	7	34.6	21	100
Total	**21**	**10.4**	**153**	**76.1**	**27**	**13.4**	**201**	**100**
Age group								
15-24	15	13.3	80	70.8	18	15.9	113	100
25-34	2	3.4	46	79.3	10	17.3	58	100
35-49	0	0	27	88.9	3	11.1	30	100
Total	**17**	**8.5**	**153**	**76.1**	**31**	**15.4**	**201**	**100**
Characteristics	**Ages at first birth**							
	No first birth		**< 18 years**		**≥ 18 years**		**Total**	
Place of residence	N	%	N	%	N	%	N	%
Located in remote areas	7	18.0	24	61.5	8	20.5	39	100
Located nearby areas	39	24.1	63	38.9	60	37.0	162	100
Total	**46**	**22.9**	**87**	**43.3**	**68**	**33.8**	**201**	**100**
Educational level								
Cannot read and write	6	4.6	86	66.7	37	28.7	129	100
Elementary	27	60.0	2	4.4	16	35.6	45	100
Secondary and above	13	48.1	0	0	14	51.9	27	100
Total	**46**	**22.9**	**88**	**43.8**	**67**	**33.3**	**201**	**100**
Age group								
15-24	42	37.5	30	26.8	40	35.7	112	100
25-34	5	8.2	36	58.0	21	33.8	62	100
35-49	0	0	21	77.8	6	22.2	27	100
Total	**47**	**23.4**	**87**	**43.3**	**67**	**33.3**	**201**	**100**

Sex preferences**:** As can be seen in Table 4, 23% of respondents were not worry about sex preferences while the majority (77%) preferred to have either male or female children. From the author's experience, in many rural areas of the Amhara Region including the study area, preference is given more to male children than female. In this regard, sex preference could be taken as one of the factors that could determine the level of fertility. Independent T-test result also confirmed that there was a statistically significant difference between sex preference and fertility level at $P < 0.05$. The likelihood of becoming high fertility was

the highest among married women who choose either male or female children (25%). On the other hand, the likelihood of becoming high fertility was the lowest among women who were not worry about sex preference (6.7%).

Table 4: **Sex preference and selected variables among reproductive age women**

	Sex preference of women					
Selected variables	**No**	**%**	**Yes**	**%**	**Total**	**%**
Place of residence						
Within Abay gorge	6	15.4	33	84.6	39	100
Out of Abay gorge	33	20.4	129	79.6	162	100
Total	**39**	**19.4**	**162**	**80.6**	**201**	**100**
Age group						
15-24	24	21.2	89	78.8	113	100
25-34	10	18.2	45	81.8	55	100
35-49	5	15.2	28	84.2	33	100
Total	**39**	**19.4**	**162**	**80.6**	**201**	**100**

Contraceptive Knowledge and Attitudes of Respondents: The study revealed that 98% of mothers heard at least one contraceptive method (Table 5). It was also investigated that 85% have a positive attitude towards contraceptive use. However, only 16.3% of respondents who cannot read and write used modern contraceptive methods as compared to elementary and secondary educational levels (23.3% and 33.3%, respectively). The study also assured that 20% of currently married women practiced at least one method of contraceptive through their lifetime. Among the different contraceptive methods used, 19% of respondents practiced injectable, which was much lower than the country's and the Amhara Region's average (31% and 38%, respectively).

Table 5: **Knowledge and attitudes about contraceptive methods in the study area**

Knowledge and attitude about contraceptive prevalence rate	**Options**	**Frequency**	**%**
Knowledge about CPR	I do not know any method	5	2.5
	At least I know one method	196	97.5
	Total	**201**	**100**
Attitude about CPR	Positive attitude towards CPR	171	85.1
	Negative attitude towards CPR	30	14.9
Total		**201**	**100**

Current Fertility Status of Respondents: During the survey, 20 live births have occurred in the preceding 12 months (reference period). This result is crucial to calculate the general fertility rate (GFR) and the age-specific fertility rates (ASFR). The study found out that 86% of the births occurred between the ages of 15-34 years. Age above 34 years accounted for 16% of the total. The highest ASFR (364 children per 1000) was calculated in the age group of 30-34 years while the least ASFR was observed at the age group of 45-49 years (1 birth per 1000). The decline in fertility was mainly observed in the age group 25-29 years with the ASFR of 67 births per 1000, while teenage fertility (15-19 years) was relatively higher ASFR (205 births per 1000). It was also investigated that the estimated TFR (based on Bonga arts framework of proximal determinants) was 5.3 children per mothers.

Number of Children Ever Born (CEB): The study found out that mothers who started childbearing before age 18 years have three births more than those who started childbearing after 18 years. Exposure to the likelihood of the first childbearing at the early age can be associated with a high mean number of children ever born (4.9) as compared to the late entry to first birth (1.9). Mothers who entered into marriage earlier than 18 years of age had 3.6 numbers of children as compared to 1.2 numbers of children who entered marriage at age 18 years and above. Married women have much higher mean children ever born (3.1 children) than those who have never married (0.1 children). Respondents with no education have the highest average CEB (4 children) than educated mothers (on average 0.6). More importantly, respondents residing in remote *kebeles* have higher mean number children ever born (3.5) than those residing nearby *kebeles* (2.6 numbers of children). In general, the total calculated mean number of CEB in the study area was 2.8 numbers of children per mothers.

The History of Child Death: Among the total sampled reproductive-age women, the majority (75.4%) were not experienced child death until the survey. As shown in Table 6, the percentage of the history of child death was higher in Abay gorge *kebele* administrations. Likewise, the percentage of child death was higher among the aged respondents (35-49 years) in the study area. Hence, the study noted that the percentage of the history of child death was lower (1.3%) among young

age cohorts (15-24 years). However, the percentages of the history of child death among the late age cohorts (35-49 years) were 77.8% (Table 6). The study also pointed out that the chance of becoming high fertile was only 3% among mothers who have not experienced child death. On the other hand, the chance of becoming high fertile was the highest (75.8%) among mothers who have experienced one and above child death throughout their lifetime.

Table 6: **Child death and other selected variables among reproductive age women**

	History of child death									
Selected variables	**0**	**%**	**1**	**%**	**2**	**%**	**3**	**%**	**Total**	**%**
Place of residence										
Within Abay gorge	24	63.2	4	10.5	7	18.4	3	7.9	38	100
Out of Abay gorge	126	77.7	29	17.9	7	4.3	1	0.6	163	100
Total	**151**	**75.2**	**33**	**16.4**	**14**	**7.0**	**4**	**2.0**	**201**	**100**
Age group										
15-24	110	96.5	4	3.5	0	0	0	0	114	100
25-34	35	57.4	22	36.1	4	6.5	0	0	61	100
35-49	5	19.2	7	27.0	10	38.4	4	15.4	26	100
Total	**151**	**75.2**	**33**	**16.4**	**14**	**7.0**	**4**	**2.0**	**201**	**100**
Mean children ever born	***1.6***		***5.2***		***8***		***9.3***		***2.8***	

Determinants of Number Children Ever Born in the Study Area: A range of socio-economic and demographic factors generally influences TFR (number of children ever born) in the study area. For this study, a number of children ever born (CEB) are a continuous variable and is taken as a proxy for fertility outcomes and hence the dependent variable for the regression modeling. As shown in Table 7, thirteen explanatory variables were selected for the model. Ten variables are significant at 1%, 5% and 10% probability levels. The maximum likelihood estimates of the multiple linear regression models showed that educational level, age at first birth, place of residence, breastfeeding duration, the age of respondents, desired number of children and child death are determinants influencing the number of children ever born in the study area. The model showed that 93% of the variations in TFR is explained by the independent variables. The ANOVA result ($P < 0.01$) revealed that there is a strong linear relationship between the dependent and independent variables in the model. All these evidenced that the model is fitted.

As shown in Table 7, being other variables constant, respondents with elementary and secondary education are less likely to increase the number of children ever born as compared to those who cannot read and write by the coefficients of 0.528 and 0.671, respectively. A unit increase of breastfeeding duration decreases the number of children ever born by the coefficients of 0.049. This is also significant at $p < 0.05$. Likewise, age at first birth of 18 years and above are less likely to have more number of children ever born as compared to those mothers less than 18 years of age by the coefficients of 0.651, held other variables constant. The model revealed that the desired number of children and number of children ever born have a positive relationship. A unit increase in the desired number of children of mothers increases the number of children ever born by a factor of 0.216 at $p < 0.001$, being other variables adjusted for. The result of the model also noted that a unit increase in child death increases the number of children ever born by the coefficients of 1.115. This is also statistically significant at $P < 0.01$

Table 7: **Results of multiple linear regression model**

Explanatory variables		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	.577	.168		3.424	.001***
Educational level	Illiterates'-RC					
	Elementary	-.528	.229	-.081	-2.301	.033**
	Secondary+	-.671	.300	-.084	-2.234	.047**
Age at marriage	< 18 years –RC					
	18 years and above	-.100	.335	-.014	-.239	.766
Age at first sexual	< 18 years-RC					
intercourse	18 years and above	-.086	.320	-.011	-.269	.789
	Not start	-.039	.377	-.004	-.102	.919
Age at first birth	< 18 years-RC					
	18 years and above	-.651	.216	-.113	-3.007	.000***
	No first child	-.526	.444	-.081	-1.184	.539
Occupation	House wife-RC					
	Others	.110	.246	.020	.449	.254
Marital status	Married-RC					
	Divorced	.219	.297	.020	.738	.062
	Never married	-.108	.380	-.013	-.283	.678
Cont. ever use	Use-RC					
	Non-user	-.016	.176	-.003	-.093	.826
Sex preference	Yes-RC					
	No	-.151	.166	-.023	-.913	.363
Age		.136	.016	.387	8.731	.000***
Breast feeding duration		-.049	.020	- .166	2.406	.028**
Desire number of children		.216	.046	.153	4.711	.000***
Child death		1.115	.146	.293	7.639	.000***

= Significant at 0.05, * =Significant at 0.01, RC= Reference category

Discussion

The study was conducted in 201 reproductive age women in Gonji-Kollela District of the Amhara Region. A range of factors from socio-economic to demographic determines the fertility status of women in the study area. Respondents' educational status, age at first marriage, age at first sexual intercourse, age at first birth, use of contraceptive methods and sex preference were determinant variables affecting the fertility status of mothers in the study area. The study revealed that the chance of becoming high fertile was almost nil in the age group of 15-24 years while the chance of becoming high fertile increased with old age. Hence, the age group 25-34 years accounted for 36.6% and the age group 35-49 years accounted for 72.2%. Getu (31), EDHS (9) also find a similar result, that is, the number of children ever born increases significantly with increasing mothers' age. This is related to parental motivation to have a large number of children in many rural areas of the country partly associated with the cultural norm of the society considering children as a source of labor.

The study demonstrated that TFR of women with no education was 7.0 against 3.6 for reproductive women with secondary education and above. This showed that low educated women in rural areas entered into marriage at an earlier age. This result was reported by EDHS (9), Getu (31) and Samson (32) and concludes that educational attainment of mothers significantly and negatively affects the number of children ever born. Farina et al (5) and Hailemariam (12) supplement that educational attainment is observed to bring variations in TFR of mothers and is inversely associated with TFR of childbearing women. The relationship between education and fertility is also reported by Getachew (8) which indicates that the proportion of reproductive age who had at least a primary level of education increase the use of contraceptive methods by more than twofold from 16.5% to 38.6%.

The study revealed that 80% of the subjects of the study were currently married and 7% were divorced. The result was much higher than the country's average which was 60% married (9). This showed that marriage is stable in the study area. The study identified that 47% of women were married before the age of 15 years while 22.4% were married between the age of 15 and 17 years of age. A study by Muthengi and Erulkar (33) document that 50% of young girls were married by the age of 15 years and 80% were married by the age of 18 years in the rural areas of the Amhara Region. Farina et al. (5) on the other hand, note that early marriage limits a girl's opportunities for schooling, skill acquisition, and personal development. Among the study participants, age at first marriage ranged between 5 and 31 years of age. Likewise, Tiziana et al (34) indicate that the median age of marriage was 16 and the first marriage was 3 years of age. The same authors further point out that almost one-third of all girls in the Global South are married before their eighteenth birthday,

often against their will. The chance of having a higher fertility was the highest among mothers who prefer their children to be male or female. Put differently, fertility was low among child bearing women who had no sex preference for their children. A previous study made by Tiziana et al (34) in Nepal show that sex preference is a barrier to use contraceptive in lowering fertility.

The study showed that 20% of currently married women practiced at least one contraceptive method through their lifetime. A larger result was reported by Alemayehu (35) which was 51.1% of currently married women use some methods of family planning. Of those, 49.8% use modern methods and only 1.3% practice traditional methods. According to EDHS (9), 42% of currently married women practice contraceptive methods in Ethiopia vs. 49.1% of the Amhara Region. The study revealed that 19% of respondents practiced an injectable method which is much lower than the country's average (31%) and the Amhara Region (38%) (9). Alemayehu (35) indicates that among currently married women, the most popular method is injectable (used by 29.5%) followed by implants (10.7%). The result obtained by Gashawbeza (36), a study made among refugees in Ethiopia reported a much higher result (40.3%) than the indicated one.

The decline in fertility was mainly observed in the age group 25 - 29 years with the ASFR of 67 births per 1000 while teenage fertility (15- 19 years of age) was relatively higher ASFR (205 births per 1000 reproductive age). This result is quite different from (9) report, which was 104 births per 1000 women. In the study area, the estimated TFR, based on the Bongaarts framework of proximal determinants was 5.3 children per woman who is higher than the TFR of Ethiopia (4.1 per woman) (9). However, Bekele (6) have reached more or less similar result, which was 5.4 children per woman. Mothers' with no education have the highest average CEB than mothers' who have some formal education. An inverse relationship between mothers' education and level of fertility was documented by Eshetu and Habtamu (37) and Samson (32). The average number of CEB in the study area was 2.8 children. This result is much higher than in the previous study by Amugune (30) which was 1.72 children and a little lower than the work of Gashawbeza (36) which was 3.4 children. Teenage (15-19 years) accounted for 40% of the births and ages above 39 contributed for only 5% of the total births. The highest ASFR (364 children per thousand) was calculated in the age group of 30-34 years while the least ASFR was calculated at the last age group (45-49 years). A previous study reported by Getachew et al (8) in the Amhara Region of Ethiopia note that the older age group (45-49 years) had a very low rate (less than 100 births per 1000 women).

Conclusion:

Ample scholars agree that for the last couple of years, the greatest fertility decline was observed in Amhara National Regional State. However, the secret behind for this dramatic fertility decline is not well known that needs further research. The study revealed that mothers with some form of education have a lower chance of having high fertility compared to mothers who have no education. This showed that there is a close relationship between the educational attainment of and changes in TFR. However, the majority of the respondents for this study cannot read and write during the survey. The study also noted that early marriage plays a role in increasing fertility and exposes girls to different risks. From the study, it was learned that accessibility of contraceptive methods decreases with increasing distance from the service centers. Accordingly, mothers who are living in Abay gorge have higher fertility rate and lower contraceptive use than places located outside the Abay gorge where infrastructure is better developed. In the study area, almost all sampled reproductive age women have some awareness about one or more contraceptive methods. However, when it comes into practice, a small percentage of reproductive women were found to be users of contraceptive methods. This is due to the frustration of its adverse effects and partly inaccessibility of the preferred contraceptive methods.

It was indicated that breastfeeding has a role to delay pregnancy and health of a child; hence, its implementation has to be promoted. Though TFR is the lowest in the Amhara Region, it was the highest in the study area. Accordingly, family planning programs have to be strengthened by the concerned bodies. This means that reproductive health programs have to focus on the use of contraceptive methods to alleviate the high fertility rate in the study area in particular and the region at large. It was found out that early marriage and girls' low educational attainment were major factors responsible to have many children in the study area. Hence, continuous awareness creation about the negative consequences of early marriage has to be promoted by the district health experts, Region's Bureau of Women Affairs and other stakeholders. For that reason, formal and informal education has to be given top priority by the Region's Education Bureau for those residing in remote and inaccessible areas.

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