Original article

Determinants of adolescent fertility in Ethiopia

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Abstract

Background: Worldwide, adolescents suffer from a disproportionate share of reproductive health problem. Throughout the world, over 14 million adolescents aged 15-19 years give birth annually. The purpose of this study was to assess the level and identify proximate and other determinants of adolescent fertility in Ethiopia.

Methods: Raw data collected from all part of the country using stratified cluster sampling method by the Ethiopian Demographic Health Survey 2005 (EDHS-2005) was used. After the data for adolescents aged from 15 to 19 years were extracted from the large data set, Multivariate logistic regression model was applied to identify socio-demographic and economic determinants whereas Bongaarts model was used to determine proximate determinants fertility.

Results: Of the 3,266 adolescent women, 443 (13.6%) had given birth at least once prior to the survey and 133 (4.1%) were pregnant. Of the 443 adolescents who had at least given birth, the majority (72.7%) had one child while about a quarter (23.2%) had 2 live births and the rest 1.0% gave four live births with a mean number of child ever born of 1.33±0.6. The major factors associated with adolescent fertility were age, educational status, place of residence, employment, marriage, contraceptive use and postpartum infecundability. The odds for increased adolescent fertility was significantly higher in early adolescents (AOR=7.6; 95% CI=6.0 to 9.9), had lower education (AOR=6.7; 95%CI=4.1 to10.9), among rural teens (AOR=3.6; 95%CI=1.9 to 6.9) and currently not working (AOR=1.7; 95%CI= 1.3 to 2.2) than their counterparts. The observed fertility rate of 0.52 children per woman obtained from Bongaarts model of fertility indicated about 1.98 births per woman were averted due to non-marriage, delayed marriage, contraceptive use and postpartum infecundability.

Conclusion: Since adolescent fertility is felt to be a problem, concerted efforts are needed to empower adolescents to fight early marriage, promote education and encourage the utilization of family planning targeting the rural teenagers.
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Introduction

Adolescence is a transitional period from childhood to adulthood characterized by significant physiological, psychological and social changes. World Health Organization defines the age group of 10-19 and 15-24 years of age as adolescents and youth respectively. Those segment of population aged from 10-24 years are labeled as young people (1). Worldwide, adolescents suffer from a disproportionate share of early marriage, unwanted pregnancies, unsafe abortions, sexually transmitted infections (STIs) including HIV/AIDS, female genital mutilation, malnutrition and anemia, infertility, sexual and gender based violence, and other serious reproductive health problems (2). Adolescent fertility also known as teenage fertility refers to a condition where woman has given live birth before the age of 20 years. Teenage fertility rate is calculated as the proportion of women aged 15-19 who have ever given live birth by the time of interview (3). The average fertility rate among teenagers in the least developed countries is five times greater than that of the more developed regions. On average, one third of young women in developing countries give birth before age of 20 years.

According to UNFPA report, each year, an estimated 14 million adolescents between the ages of 15 and 19 give birth globally and more than 90% of these live births occur in developing countries (4). An estimated 70,000 teenaged girls die each year during pregnancy and childbirth and more than one million infants born to adolescent girls die before their first birthday. Because of such a grave health consequences teenage pregnancies are termed a death sentence in poorest countries. About 2 millions or more of them suffered chronic illness or disabilities, shame and abandonment. Moreover, each year 2.2 to 4 million adolescents resort to unsafe abortion (4-6).

Adolescent pregnancy and childbearing have distinct and important deleterious consequences at global, societal and personal levels. Globally, population growth is more rapid when women have their first child in their teenage as early initiation of giving birth lengthens the reproductive period and subsequently increases fertility. At the societal level, the strong association observed between adolescent childbearing and low levels of educational achievement brings a negative impact on their position and potential contribution to society. Individually, adolescent fertility is associated with adverse maternal and child health outcomes including obstructed labor, low birth weight, fetal growth retardation, and high infant and maternal mortality rate (4, 7).

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On the other hand, important consequence of a rising age at marriage combined with a decline in the age at menarche is also a substantial increase in the number of year between menarche and marriage. The trend resulted in increased number of sexually mature but unmarried adolescents. This potentially leads to higher prevalence of sexual activity among unmarried girls and expose them to unplanned pregnancies, unsafe abortion and contracting STIs including HIV/AIDS (8).

Some studies conducted in Ethiopia have also shown that teenage pregnancies and delivery are common practice. According to some studies conducted in various parts of the country among sexually active students aged between 15-49 years, 50% of teenage girls had history of pregnancy at least once in Koladiba, 15% in Harar and 18% in Addis Ababa. Subsequent study done in East-Gojam among out-of-school teenagers girls revealed 43% of them had at least one pregnancy (9-12). Whereas according to the study done in North Gonder among reproductive aged women, 78.2% of them were pregnant before the age of twenty. This study also showed that their age at first pregnancy was significantly associated with their place of residence (13). A more representative study of EDHS-2005 also has reported 17% of adolescent girls had a child or were currently pregnant (3).

Determinants of fertility

In 1978, John Bongaarts published a simplified model that shows the proximate determinants of fertility by modifying previously proposed fertility determinants of Davis and Blake in 1951. According to him, any detailed and comprehensive analysis of factors influencing fertility requires the distinction to be made between two classes of determinants: namely proximate variables (also called direct or intermediate determinant of fertility) and socioeconomic and environmental "background" variables. The latter include the social, cultural, economic, institutional, psychological, health, and environmental variables (14).

Bongaarts has presented evidences that most of the variation in fertility level among national population is attributable to four proximate determinants that included marriage, contraception, abortion and postpartum infecundability. Later he added a fifth variable called primary sterility as a proximate determinant of fertility in areas where the prevalence of sterility is high. The model envisages that any factor be it environmental, social, economical or cultural which affect fertility, must go through one or more of these proximate determinants (14-16). Besides these proximate determinants, fertility is also affected by various socioeconomic and demographic variables. Education, place of residence employment, media, ethnic group, and religion, are also important deferential of adolescent fertility, given that these characteristics are not only fundamental in defining sexuality, marriage and reproductive behaviors, but also for the definition of the role of adolescents in society (8).

Various local and international studies have shown that socio-demographic characteristics of the adolescents to have an association with adolescent fertility. For instance, age, education and place of residence of adolescent girls are reported to have close association with fertility (17, 18). Education affects fertility through delay in age at marriage, improving knowledge and access to effective family planning methods and ability on decision making on number of children needed (17, 19). In contrast to this, other studies have shown that educated women are less likely to breastfeed than uneducated women that affects fertility in contrary direction (14).Other variables that had shown mixed effect on fertility are access to media, economical status, working status, religion, and ethnicity (17-21).

Therefore, the objective of this article was to identify the proximate as well as other determinants of adolescent fertility in Ethiopia.

Methods

This paper was based on demographic and health survey of a representative sample of women of reproductive age in nine out of the eleven regions of Ethiopia: Tigray; Afar; Amhara; Oromiya; Benishangul-Gumuz; Southern Nations, Nationalities and Peoples (SNNP); Harari regions; Addis Ababa and Dire Dawa city administrations. The data was collected from April 27 to August 30, 2005 by properly trained data collectors using standardized, structured and pre-tested questionnaire. The detail of the EDHS methodology is available in EDHS-2005 report (3). Prior to the extraction of the eligible adolescents from the EDHS-2005 women data, permission was obtained from the owner of the raw data, ORC macro international and also approved by the institutional review board of the Medical Faculty. All female adolescents aged from 15 to 19 years from the women data were selected and analyzed using 2 types of models namely multivariate logistic regression model (applied to identify socio-demographic and economic determinants) and Bongaarts model (used to determine the proximate determinants among adolescents).

Based on Bongaarts model, each of the proximate determinants were represented by five indices: the index of proportion married ($C_{m)}$, index of contraception **(**C_c), index of induced abortion (C_a), index of postpartum infecundability (C_i) and index of primary sterility (C_p). Each of the indices assumed a value between 0 and 1. When an index is close to 1, it will have a negligible inhibiting effect on fertility, whereas when it takes a value of 0, it will have the maximum inhibiting effect. The original mathematical model is represented as (14, 16);

$$TFR = C_m \times C_c \times C_a \times C_i \times C_p \times TF \quad \text{---------- (1)}$$

Where : TFR= total fertility rate and
TF = total fecundability (the maximum biologically achievable level of fertility)

This aggregated model was adapted for other application related with determinants of fertility at total or sub-total population level (determinants of age specific fertility or trend over time). If information is missing or not available for some of the indices, the model can be used with the available information. For instance, if index of abortion could not be calculated because of absence of adequate information, the model can be applied by considering the index of abortion as 1 (14, 16).

The basic mathematical equation shown above was used for analysis of age specific fertility determinants with the following formula for the age group 15-19 years of age adolescents (16).

$$ASFR = C_{m\,(15-19)} \times C_{c\,(15-19)} \times C_{a\,(15-19)} \times C_{i\,(15-19)} \times C_{p\,(15-19)} \times AF \quad \text{---------- (2)}$$

Where
$C_{m\,(15-19)}$ = index of marriage for the age group 15-19 years
$C_{c\,(15-19)}$ = index of contraception for the age group 15-19 years
$C_{a\,(15-19)}$ = index of abortion for the age group 15-19 years
$C_{i\,(15-19)}$ = index of post-partum infecundability for the age group 15-19 years
$C_{p\,(15-19)}$ = index of primary sterility for the age group 15-19 years
AF = age specific fecundity rate (the maximum biologically possible fertility)
ASFR =Age specific fertility rate

The age specific fecundability (AF) of women aged 15-19 years is 511 per 1000 woman (as 511 per 1000 is for five year age group, multiplying it with five will gives 2.5 children per woman per year) (16). Age specific fecundability of 2.5 per woman means theoretically an adolescent who remained married continuously from age 15 to 19 and who did not breastfeed, as well as did not use family planning would have the maximum potential to give 2.5 births by the age of 19 years. If the age specific fecundability (AF) is substituted with 2.5, equation 2 would become;

$$ASFR = C_{m\,(15-19)} \times C_{c\,(15-19)} \times C_{a\,(15-19)} \times C_{i\,(15-19)} \times C_{p\,(15-19)} \times 2.5 \quad \text{---------- (3)}$$

Abortion is usually under reported in areas where abortion is legally not allowed, which is the case in Ethiopia. Therefore the index of abortion is considered as having no effect for adolescents. Similarly, the index of primary sterility is considered as having negligible effect on fertility (16).

Each of the index described above were calculated with the following formula (16).
$C_{m\,(15-19)}$ = m (20-24) * 0.75
Where
m (20-24) is proportion married among women age 20-24 years
0.75 = this constant is used because in the age group 15-19 the incidence of premarital conception was not negligible. In addition, the married women in the 15-19 age groups were mostly 18 or 19 years old at the time of marriage, and they were, therefore, not representative of the entire age group. To avoid these problems the proportion of 15-19 who have married was set equal to 0.75 X m (20-24) for all populations. (14, 16)
$C_{c\,(15-19)}$ = 1 – c*u/f
Where
C = average effectiveness of contraception (which is usually 0.61 for those aged less than 24 years). The value of contraceptive effectiveness was considered 0.61 because young women were more likely to use less effective methods of contraceptive than older women. (16)

U = proportion currently using contraceptive among married woman (in this study case proportion of currently married adolescents who were currently using contraceptive)

F= proportion currently believed to be fecund (which was usually 0.98 for those aged less than 24 years of age).

$C_{a\,(15-19)}$ = this index is usually under reported specially in countries where abortion is not legalized and even reported its impact on fertility is minimal in developing countries (14). In Ethiopia abortion is not permitted but for medical cases at time of the data collection. So for this analysis, as recommended by Bongaarts, the value has been taken as 1 (which means induced abortion has negligible effect on reduction of fertility)

$C_{p\,(15-19)}$ = index of primary sterility in this analysis considered as 1, because the effect of primary sterility is very minimal in Eastern African countries.

$$C_{i\,(15-19)} = \frac{20}{18.5 + i(15-19)}$$

Where

i(15-19) = duration of postpartum or lactational infecundability (in months) which is calculated from average duration of breast feeding as in the next equation
$i = 1.753e^{0.1396B - 0.00187B^* B}$
Where B = mean duration of breastfeeding in months.

Results

Table 1 shows the socioeconomic and demographic characteristics of women aged 15-19 years at the time of interview. A total of 3,266 adolescent females aged 15-19 years participated in the EDHS-2005 survey. Of these, 1953 (59.8%) were young adolescents (15-17 years) and the rest 1313 (40.2%) were older adolescents (18-19 years). Their mean age (SD) was 16.9 (1.4) years. The major ethnic groups were Oromo (32.7%), Amhara (32.1%) followed by Tigre (7.3%) and Gurage (4.9%). About half (52.1%) were Orthodox Christian followed by Moslems (26.3%). The majority (78.4%) of them were living in rural areas. Most (73.3%) have never been married. Two out of five adolescents (40.0%) had no formal education and the proportion of adolescents who had primary, secondary and higher education was 43.0%, 15.0% and 0.5% respectively. About one third (31.3%) were from highest wealth index and three fourth (76.4%) of them were not working group at the time of interview.

Table 2 shows teenagers (15-19 years) pregnancy, fertility and who gave live birth. The proportion of teenagers that had given birth at least once prior to the survey and that were pregnant at the time of interview were 443 (13.6%) and 133 (4.1%) respectively. Of the 443 teenagers, 100 (3.1%) of them were pregnant for the first time. The majority (72.7%) had given a birth to one child while the rest 103 (23.2%) and 18 (4.1%) had given birth to 2 or more than 2 children respectively. The mean number of child ever born among fertile adolescents was 1.33±0.6. Nearly two-third (65%) had given their first birth between the age of 15 and 18 years. The earliest age reported at first birth was 12 years of age. The mean ± SD and median age at first birth was 16.2±1.5 and 16 years respectively.

Table 3 displays the proximate determinants of fertility based on Bongaarts model. The current observed age specific fertility rate (ASFR) of 0.52 children per woman indicated that about 1.98 births per woman were averted from maximum potential fertility of a teenager due to non-marriage, delayed marriage, contraceptive use and postpartum infecundability (shown in equation 3). In urban areas, 2.32 births per woman were averted from its biological maximum of 2.5 births per woman while in rural area the number of prevented births was 1.89 because of these proximal determinants. The index of marriage (*Cm*) for teenagers was 0.46, which means delayed marriage and non marriage reduced fertility by 54% below what it would otherwise be if marriage was universal among all teenaged women (15-19 years). The index was lower for urban (0.42) than rural (0.52).

Table 1: **Socio-demographic characteristics of studied women aged 15-19 years, Ethiopia, 2005**

Variable	Frequency	%
Current age		
15-17	1953	59.8
18-19	1313	40.2
Mean age ±SD= 16 .9 ±1.4 years		
Ethnicity		
Oromo	1067	32.7
Amhara	1049	32.1
Tigre	239	7.3
Gurage	159	4.9
Sidama	98	3.0
Others	653	20.0
Religion		
Orthodox	1703	52.1
Muslim	859	26.3
Protestant	606	18.6
Other	98	3.0
Place of residence		
Urban	703	21.5
Rural	2562	78.4
Current marital status		
Never married	2394	73.3
Married	689	21.1
Living together	21	0.7
Widowed	8	0.2
Divorced	132	4.0
Not living together	20	0.6
Educational level		
No education	1308	40.0
Primary	1423	43.6
Secondary	519	15.9
Higher	16	0.5
Wealth index		
Lowest	448	13.7
Second	566	17.3
Middle	627	19.2
Fourth	603	18.5
Highest	1022	31.3
Current working Status		
Not working	2494	76.4
Working	770	23.6
Total	**3266***	**100.0**

* Since the sample was weighed, the sum may deviate slightly from 3266 sometimes

Postpartum infecundability, secondary to breastfeeding, was another important determinant of adolescent fertility and has reduced 48% of natural marital fertility in the country among this age group. But its effect was stronger in rural than in urban areas. The use of contraceptive has also reduced fertility only by five percent of total marital fertility. But there was visible difference between urban and rural areas in the inhibitory effect of contraception. In urban areas, 24% of marital fertility was prevented because of family planning use while the corresponding rate was only four percent for teenagers living in rural areas.

Table 4 indicates the socioeconomic and demographic determinants of fertility based on multivariate logistic regression models. In the model, education, place of residence and current age were found to be strong deferential of adolescent fertility followed by working status after controlling for selected socio-demographic variables. Women who had no education were nearly seven times (AOR=6.7; 95%CI= 4.1 to 10.9) and who had attended primary school, three times (AOR=2.8; 95%CI=1.7 to 4.5) more likely to be fertile than those who had secondary and above education.

Women living in rural areas were more likely to be fertile than their counterparts living in urban area. As compared to those living in Addis Ababa, adolescents living in rural (AOR=3.6; 95%CI=1.9 to 6.9) and other urban area outside Addis Ababa (AOR= 2.1; 95%CI=1.1 to 3.9) were four and two times more likely to be fertile respectively.

Table 2: **Fertility and pattern of childbearing of female adolescents aged 15-19 years in Ethiopia, 2005**

Fertility characters	Frequency	%
Ever has given birth (n= 3266)		
No	2823	86.4
Yes	443	13.6
Currently pregnant (n=3266)		
No	3133	95.9
Yes	133	4.1
Pregnant for the first time (n=3266)		
No	3166	96.9
Yes	100	3.1
Number of child ever born (n= 443)		
1	322	72.7
2	103	23.2
3	13	3.0
4	5	1.1
Mean birth ±SD = 1.33 ±0.6		
Age at first birth (n= 443)		
<15 years	57	12.9
15-17 years	288	65.0
18-19 years	98	22.1
Mean ± SD =16.2+1.5 years		
Median =16 years		

Table 3: **Indices for Proximate Determinants of female Adolescent Fertility, Ethiopia, 2005**

Index/measure	Urban	Rural	Total (Ethiopia)
C*m*	0.42	0.52	0.46
C*c*	0.76	0.96	0.95
C*i*	0.68	0.53	0.54
Predicted ASFR*	0.54	0.66	0.58
Observed ASFR**	0.18	0.61	0.52

* Predicted by Bongaarts formula

** Estimated using births in the last five year

Table 4: **Socio-demographic and economic Determinants of female Adolescent Fertility in Ethiopia, 2005**

Character	Fertile		Crude OR [95% CI]	AOR [95% CI]
	Yes	No		
Ethnicity	129	701	1.4 [1.1, 1.9]*	0.7 [0.5, 1.4]
Oromo	122	849	1.6 [1.3, 2.1]*	1.1 [0.7, 1.8]
Amhara	37	304	1	1
Tigre	153	957	1.1 [0.7, 1.7]	0.7 [0.4, 1.1]
Others				
Religion				
Orthodox	176	1484	0.7 [0.4, 1.2]	0.8 [0.4, 1.7]
Muslim	189	804	1.3 [0.7, 2.3]	1.3 [0.7, 2.4]
Protestant	62	446	0.8 [0.4, 1.4]	1.1 [0.5, 2.1]
Others	14	77	1	1
Current age				
15-17	96	1827	1	1
18-19	345	984	5.4 [4.4, 6.7]**	7.6 [6.0, 9.9]**
Woman Education				
None	297	913	9.1 [6.2, 13.2]**	6.7 [4.1, 10.9]**
Primary	119	1190	2.9 [2.0, 4.3]**	2.8 [1.7, 4.5]**
Secondary and above	25	708	1	1
Place of residence				
Addis Ababa	16	463	1	1
Other urban	48	625	2.2 [1.2, 4.0]*	2.1 [1.1, 3.9]*
Rural	377	1723	6.3 [3.8, 10.5]**	3.6 [1.9, 6.9]**
Currently working				
No	364	2154	1.5 [1.2, 1.9]*	1.7 [1.3, 2.2]*
Yes	77	653	1	1
Wealth index				
Lowest	117	407	4.4 [3.1, 5.4]*	1.2 [0.8, 1.9]
Second	81	359	3.2 [2.4, 4.2] *	1.1 [0.7, 1.7]
Middle	74	390	2.8 (2.1, 3.8] *	0.9 [0.6, 1.5]
Fourth	74	364	3 [2.2, 4.1] *	1.2 [0.7, 1.9]
Highest	95	1291	1	1
Listen radio/TV at least once a week				
No	370	1826	2.8 [2.2, 3.7] *	1.04 [0.7, 1.5]
Yes	70	982	1	1

* $p < 0.05$ and ** $p<0.001$

Similarly, teenagers who were aged between 18 and 19 years, (AOR= 7.7 and 95%CI= 6.0, 9.9) and currently not working (AOR =1.7 and 95%CI= 1.3, 2.2) were found to be at risk of being fertile than those whose ages were between 15-17 years and currently working respectively. While Ethnicity, religion, wealth index, and listening radio or watching television at least once in a week didn't show any association with adolescent fertility in the adjusted multivariate analysis.

Discussion

The overall female teenagers fertility observed in the present study was 13.6% with an additional of 3.1% pregnant making the adolescent childbearing rate of 16.7% implying that one out of six female adolescents aged between 15 and 19 years were either pregnant or had already given birth. Compared with other Eastern Africa countries, the teenage fertility rate in Ethiopia is relatively lower than the rates documented for Kenya, Uganda, Tanzania, and Malawi which were 18.5%, 19.2%, 19.6%, and 25.3% respectively but higher than some African countries like Eritrea (11.0%) and Rwanda (3.3%) (22). The differences noted could be ascribed to the variations in demographic and socio-cultural conditions of the countries such as marital age, age at first sexual intercourse and use of family planning.

Ethiopia has experienced a decline in TFR of women in reproductive age group from 6.4 in 1990 to 5.9 and 5.4 in the year 2000 and 2005 respectively (3). The age specific fertility rate (ASFR) for the teenagers aged from 15 to 19 has also reduced between the year 2000 and 2005.

However, the share of adolescent fertility to the TFR has increased constantly over the last 15 years. In 1990 ASFR of women age 15-19 accounted for 7.5% of the TFR whereas in 2000 and 2005, the ASFR of the same age groups was 9.3% and 9.6% of the TFR in the respective years. This demonstrated that the rate of decline in adolescent fertility was lower than the rate observed in the general population. However, the teenage fertility rate has slightly increased from 12.8% by the year 2000 to 13.6% in 2005 (3) in contrast to many African countries like Egypt, Kenya, Eritrea, Uganda, Ghana and Nigeria who had showed a decline in teenage fertility (2, 7, 23) suggesting that the issue needs focused attention in order to reduce the teenage fertility and thereby the overall TFR of the country.

In this study, delayed marriage and non marriage were responsible for 54% reduction of the observed ASFR (C*m* = 0.46) was in contrary with some previous studies done in woman of reproductive age group in the country (24, 25). This variation has probably happened as most of the adolescents in the current study had never been married.

The inhibitory effect of family planning observed in this study was only 5%. This finding was lower than some of the previous studies conducted in Awasa, Oromia and Addis Ababa where a contraceptive index value of 0.63, 0.88 and 0.55 respectively was reported (25-27). Again the difference could be attributed partly to the fact that teenagers were less likely to use contraceptives than the general population. According EDHS-2005, the contraceptive prevalence rate for Ethiopia is 14.7% while it was only 8.9% among currently married teenaged women between 15 and 19 years (3). Moreover, even if adolescents use contraceptive, they were less likely to use most effective family planning methods like sterility and long term methods than older woman (data not shown) (16).

Comparatively, the inhibitory effect of contraceptive use and marriage was higher in urban area (C*c*= 0.76 and C*m* =0.42) than rurals (C*c* = 0.96 and C*m*= 0.52) while the protective effect of postpartum infecundity was stronger in rural area. This was consistent with previous studies conducted in the country (24-27). The urban-rural difference was because women living in urban area were more likely to use family planning and experience delayed age at marriage than woman living in rural area. The other possible explanations forwarded in some of the previous study for the urban-rural differences were woman living in urban areas breastfeed relatively for a shorter duration than rural women (25).

Generally, the model (Bongaarts) showed that in urban area, all the three proximal determinants of fertility had strong impact for the reduction of potential biological fertility whereas in rural area the inhibitory effect of family planning was very low. Because most of women captured in the study were rural dwellers, and thus the inhibitory effect of contraceptive was insignificant as utilization of contraception was very low. The predicted ASFR for the rural population was relatively close to the ASFR estimated from information on births in the last five years (0.66 compared to 0.61) suggesting that the proximate determinants included in the model were the principal mechanisms by which fertility was reduced below its biological maximum. However, the predicted ASFR for the urban population was substantially above the observed ASFR (0.54 compared to 0.18). Such variations between the predicted and observed level of fertility observed in urban has been also documented in other studies conducted using the same methodology. The large differences between the model estimate and the observed value was consistent with the omission of important proximate determinant from the model. The absences of abortion from the model, as well as underreporting of contraceptive use, might have been the potential sources of the overestimate of fertility (24-27).

In this study woman education and place of residence were found to be strong determinants of adolescent fertility. Those living in Addis Ababa and other urban area were less likely to be fertile than those living in rural area. Similarly, those who have primary or secondary level of education have lower probability of being fertile during their adolescence period than those who have no education. This finding is similar to other studies conducted in Ethiopia as well as other countries. Repeatedly, researchers have identified the negative impact of Lower educational level education in rural area on teenage fertility (7, 14, 17-19, 26).

Living in an urban area and having a higher education level are expected to be associated with a lower level of adolescent childbearing mainly through the proximate determinants of fertility (15). Female adolescents living in urban areas and having a higher education level are more likely to have access and use contraceptives and abortion in order to avoid or postpone pregnancy (9, 17, 20, 21) More educated female adolescents are also more likely to get married later because increased schooling tends to increase the opportunity cost of marriage for women and that of early childbearing (9, 20,21). Indeed, urbanization and increased education open better economic alternatives (such as a higher education and a paid job) to getting married and bearing children to women, especially the younger ones (7).

In this study teenagers whose age was between 18 and 19 years were about eight times more likely to be fertile than the younger once. This has been also the case in other countries where older teenagers are more likely to be fertile than the younger (7, 17). As the age increases, the risk of exposure to pregnancy and childbearing also increases, because of higher probability of getting sexual relation and marriage. In our study, it was evidenced that more older age group (41%) were married than younger

teenagers (16%) indicating that as the age increased the probability of getting sexual intercourse and marriage increased which were the proximal determinants of fertility (14).

In conclusion about one in six adolescents in Ethiopia either already had child or were pregnant at the time of interview. The two most important proximate determinants of adolescent fertility were delayed marriage or non marriage and postpartum infecundability because of breastfeeding both in rural and urban areas. The effect of family planning as a determinant of fertility was observed only in urban area while it had almost negligible effect in rural area. Education was also identified as strong determinant of adolescent fertility where primary or secondary level educated women were less likely to be pregnant than those having no education. Similarly, adolescent women living in rural area were more likely to be fertile than their counterparts living in Addis Ababa or other urban areas. Since adolescent fertility is felt to be a problem, concerted efforts are required to empower particularly female adolescents to fight early marriage, promote education by designing appropriate behavioral change communication to reduce adolescent fertility and encourage the utilization of family planning targeting the rural teenagers.

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