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Trends and Differentials of Adolescent Motherhood in Ethiopia: Evidences from 2005 Demographic and Health Survey

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Abstract

Adolescent childbearing has undesirable consequences. Dropping out of school, high rates of abortion, maternal mortality and morbidity are noted consequences of adolescent pregnancy and childbearing. The objective of this study, which is based on the 2005 Ethiopian Demographic and Health Survey data, is to analyze the levels, trends and differentials of adolescent motherhood in Ethiopia. A multilevel logistic regression was fitted to analyze the determinants of adolescent childbearing. Adolescent motherhood in Ethiopia has shown a generally declining trend over time. The decline was more marked in the periods following the adoption of the national population policy in the country. Further, it was lower in urban areas and among women who have secondary and above level of education, but higher among women not working and those engaged in agricultural activities. Housewives and women working in the agricultural sector should be given attention to reduce the risks and consequences of adolescent motherhood. (*Afr J Reprod Health 2012; 16[4]: 162-174).*

Résumé

La grossesse chez les adolescentes a des conséquences indésirables. L'abandon des études, les taux élevés d'avortement, la mortalité maternelle et la morbidité maternelle sont des conséquences bien connues de la grossesse et de la procréation chez les adolescentes. L'objectif de cette étude, qui est basée sur les données tirées de l'Enquête Démographique et de Santé de 2005 en Ethiopie, est d'analyser les niveaux, les tendances et les différentielles de la maternité chez les adolescentes en Ethiopie. Une régression logistique a été mise en place à plusieurs niveaux pour analyser les déterminants de la grossesse chez les adolescentes. La maternité chez les adolescentes en Ethiopie a montré une tendance générale à la baisse au fil du temps. La baisse a été plus marquée dans les périodes qui suivent l'adoption de la politique nationale démographique dans le pays. En outre, il a été plus faible dans les milieux urbains et chez les femmes qui ont un niveau d'étude secondaire ou supérieur, mais plus élevé chez les femmes qui ne travaillent pas et chez celles qui sont engagées dans des activités agricoles. Il faut accorder l'attention aux femmes au foyer et aux femmes qui travaillent dans le secteur agricole afin de réduire les risques et les conséquences de la maternité chez les adolescentes (*Afr J Reprod Health 2012; 16[4]: 162-174).*

Keywords: young mothers, teenage fertility, adolescent pregnancy, early marriage

Introduction

Adolescence is a prime period in an individual's life[1]. A number of pertinent social, economic, biological, and demographic changes take place at this stage. The future of adult life is highly dependent upon gains and losses during adolescent age. If young girls take advantages and opportunities for personal growth, and avoid potentially problematic practices related to sexual relations such as unplanned pregnancy and its adverse health effects contributing to early dropout from school[2], they would be more successful in their life. However, a number of adolescents nowadays are more mature physically than mentally. They are often ill-prepared and make unwise decisions that would expose them to serious difficulties affecting their future lives[3]. The problem is widespread among adolescent girls who engage in sexual relations that eventually result in teen motherhood, abortion, or complications associated with pregnancy.

Studies undertaken in the developed world have demonstrated that the age at menarche has decreased at a rate of approximately four months each decade over a period of a hundred years and

that a similar trend is also observed in sub-Saharan Africa[4]. The decline in age at menarche has an effect on early debut in sexual activity and early childbearing[5]. Early sexual activity with poor use of contraceptive exposes many young women to unplanned and unwanted pregnancies[6].

Of the 73.8 million population of Ethiopia, according to the 2007 Population and Housing Census[7], about 45.0% is below age 15, and 56.9% is below age 20. Results of the 2005 Ethiopian Demographic and Health Survey report shows that 46% of the Ethiopian women aged 20-24 years give birth to a child before reaching age 20, while the median age at first birth is 19.2 years for women aged between 25 and 29[8]. What is surprising from the recent Ethiopian Population and Housing Census as well as demographic and health survey is not only that the Ethiopian population is predominantly young but also that the young itself starts reproducing early.

Empirical studies in the United States of America[9] and Sub-Saharan Africa[10] showed that early entry into childbearing elongates the duration of reproductive period and results in larger family size. The long-term demographic effects of adolescent fertility in non-contraceptive societies are not limited to high fertility. There is also increased rate of maternal morbidity and mortality since most of the adolescents attempt abortion and miscarriages[11,6]. According to UNICEF[12] and Mayor[13], adolescent pregnancy is a leading cause of death for young women aged 15 to 19 years globally with complications of childbirth and unsafe abortion being the major factors. The psychological trauma of unwed adolescent mothers has also severe emotional depression and social stress[14] besides social segregation and isolation in traditional societies like Ethiopia [15].

Moreover, adolescent childbearing has tremendous effects on the educational attainments of young women[16, 17] and would ultimately affect their contribution to and status in the society. The success and achievements of young mothers would be halted as they are forced to drop out of school and look after their babies instead of gaining skill and knowledge that would boost up their social and economic positions[18]. Dropping out of school has undesirable consequences for teenage mothers. Frustration and hopelessness often lead them to joining commercial sex work, drug addictions and other undesirable social behaviors[19, 20].

According to Legrand and Barbieri [21], high infant and maternal mortality and morbidity are the most noted consequences of adolescent childbearing in sub-Saharan Africa. Adolescent mothers are more likely to give low weight births that are prone to deaths at infancy[22]. Studies undertaken in Ethiopia have also revealed that maternal mortality is the highest among adolescents[23, 24]. Zabin and Kiragu[4], for instance, documented that adolescents who had not yet celebrated their sixteenth anniversaries had six times more risk of death than those young mothers aged 20-24. A retrospective study undertaken by Gaym[25] in Jimma Hospital, Southwestern Ethiopia, has also shown that 22% of maternal deaths were among adolescent mothers.

Considering the seriousness of consequences of adolescent pregnancy and motherhood, this study attempts to analyze the levels, trends and differentials of adolescent childbearing or motherhood in Ethiopia. Specifically, the study attempts to: (i) look at the levels and trends of adolescent motherhood and (b) identify socioeconomic and demographic factors determining adolescent motherhood.

Theoretical Perspectives

Although a range of theories are available to guide researches on risk factors associated with adolescent pregnancy and childbearing, interactive or socialization theory that posits socialization as an important influence on sexual behavior and childbearing of adolescents[5] and the rational choice theory that emphasizes socioeconomic factors affecting adolescent sexual behavior[26] appear to dominate contemporary studies.

Interactive theory states that adolescent reproductive behavior is a function of sexual behavior among older siblings and other family members that leads to early intercourse and childbearing in a family[5]. East[27], who compared the perception of younger brothers and sisters of pregnant or teenage mothers and never-pregnant teenagers towards teenage pregnancy and childbearing, showed that younger sisters of both pregnant and teenage mothers are more accepting

of teenage childbearing and have a more definite intention of having a child at youth age. Other studies[28, 29] also reported that being a daughter of a teenage mother is associated with an earlier intercourse and teenage pregnancy among girls. The consensus by these studies showed that experiences within the family members have a significant effect on the timing of sexual intercourse and child bearing.

The rational choice model, which considers individuals as rational entities taking choices or actions aimed at optimizing their fixed preferences based on their beliefs in the chosen actions[30], on the other hand, suggests that teenage childbearing is a response to the underlying socio-economic opportunities and constraints of teenagers[26]. Studies conducted in four Latin American countries: Chile, Barbados, Guatemala and Mexico[31] and five developed countries[32] have, for instance, shown that early childbearing is more likely among socially-disadvantaged adolescents than their better off peers. Taffa and Obare[33], who analyzed the 2000 Ethiopian Demographic and Health Survey data, also arrived at the same consensus. According to them, a significantly larger proportion of adolescent mothers in Ethiopia were from rural areas, belonged to poor households, were less educated, and had no history of marriage. Economic and social deprivation appears to expose Ethiopian adolescents to early and unsafe sexual relations resulting in teen motherhood.

As indicated above, adolescents' decision to have children is partly dependent upon their family status, the environment in which they were raised, the economic and school opportunities they have, and personal characteristics to be developed in due course. Consequently, this paper uses the rational choice model to analyze the levels, trends and differentials of adolescent motherhood. Distinction of two groups of variables by Bongaarts[34]; that is, the proximate determinants of fertility and background characteristics of respondents in analyzing factors influencing fertility have also been adopted to serve as analytical framework of this study.

As clearly shown by Bongaarts[34], the background variables are expected to have both direct and indirect effects on adolescent motherhood while the proximate determinants play significant roles. It is, however, unfortunate that most of the proximate determinants of fertility indicated in the Bongaarts's model such as lactational infecundability does not apply to women who do not have previous child and sterility; spontaneous and induced abortions are not considered since there were inconsistency and incompleteness for most of the cases in the data.

Much emphases are, however, made to see whether (a) adolescent motherhood is higher in rural than in urban areas, (b) there is an inverse relationship between adolescent motherhood and educational attainment of women, and (c) adolescent motherhood has shown a declining trend among younger cohort women.

Data and Methods

This study was carried out using quantitative data obtained from the 2005 Ethiopian Demographic and Health Survey (EDHS). The statistical analysis includes adult women in their reproductive age (i.e. 20-49 years) as fertility of women in the 15-19 age group provides incomplete information on adolescent maternal situation; and since this cohort has not yet lived through the complete years of teen for which the risk of motherhood is analyzed. The unit of analysis considered in this study is, therefore, adult women who have celebrated their 20th anniversary. A total of 10,818 such women were included in the analysis.

The Model

Multilevel modeling procedure was employed in this study to examine the extent to which cluster variations in the risk of teenage motherhood exists[35]. Both theoretical and empirical considerations of the distribution of a binary response variable suggest that the shape of the response function will be sigmoidal with respect to the parameters[36] and for a two level random intercept model, it takes the form:

$$\log\left(\frac{P_{ij}}{1-p_{ij}}\right)=\beta_{oij}+\beta_1 x_{1ij}+\beta_2 x_{2ij}+\ldots+\beta_p x_{pij}$$

where $\beta_{0\,ij} = \beta_o + \mu_{oj} + \varepsilon_{oij}$

P_{ij} is the probability of having a positive event for the i[th] individual in the j[th] cluster, **βs** are parameters of the model, **Xs** are regressors, μ_j is the effect of cluster j on the log odd of a positive event and ε_{oij} is a level 1 residual. This model is referred to as a multilevel binary logistic regression model with a random intercept. In this study, the proposed outcome variable, that is, adolescent motherhood was a dichotomous variable to be fitted into the model.

Intra-cluster correlation, a useful measure that may be used to evaluate the extent of level 2 variation that may occur due to unobserved factors operating at cluster level, was computed as:

$$\rho = \frac{\text{var}(\mu_{oj})}{\text{var}(\mu_{oj}) + \frac{\pi^2}{3}}$$

Where $\frac{\pi^2}{3}$ is the variance for the standard logistic distribution[35]. MLwiN version 2.02 software was used to estimate the parameters of the models. Two approximate estimation procedures are available in MLwiN to fit multilevel models to discrete response data: marginal quasi-likelihood (MQL) and predictive quasi-likelihood (PQL). The MQL procedure tends to underestimate the values of both the fixed and random parameters of the model, especially where the sample taken from each cluster is small. In addition, greater accuracy is obtainable if the second order Taylor series approximation, rather than the first order, is used[35]. Therefore, PQL2 procedure was used to estimate the parameters of the models in this study.

The coefficients in the model can be described as the log odds for a given category of variable over the odds for the base category of the same variable. To simplify interpretation, results were expressed in terms of odds ratios calculated by exponentiation of the parameter estimates. A ratio greater than unity implies that an individual in a given category is more likely to have a positive event compared with a counterpart in the base category. A ratio lower than a unity signals that an individual in a given category is less likely to experience the event compared with his/her counterpart in the base category[36].

It is also worth noting that this study is heavily dependent on the information pertaining to the timing of events such as age at first marriage, age at first sexual intercourse and age at first delivery that are not immune to errors such as memory lapses and misreporting of events (both deliberate and unintentional). Readers are thus advised to cautiously interpret the results.

Results

Levels and Trends in Adolescent Motherhood

The results displayed in Table 1 provide number and percentage of sampled women aged 20-49 by different socio-economic and demographic characteristics. About two-third (64%) of the sampled women in EDHS 2005 were those belonging to maternal cohorts of the 1970s and early 1980s. Three out of five of these women were sexually experienced before age 18 and more than half of them started having sexual relations between age 15 and 17. Nearly 60% of them were victims of early marriage although the National Population Policy of Ethiopia[37] and the Family Code[38] sets the minimum age at first marriage to be 18. A quarter of these women got married before the age of 15, while a third of the remaining started marital life when they were between 15-17 years of age. For most of the women (especially those living in rural areas), first sexual intercourse and marriage date coincides as virginity still has high value and is considered as reflection of the 'family honor'[39].

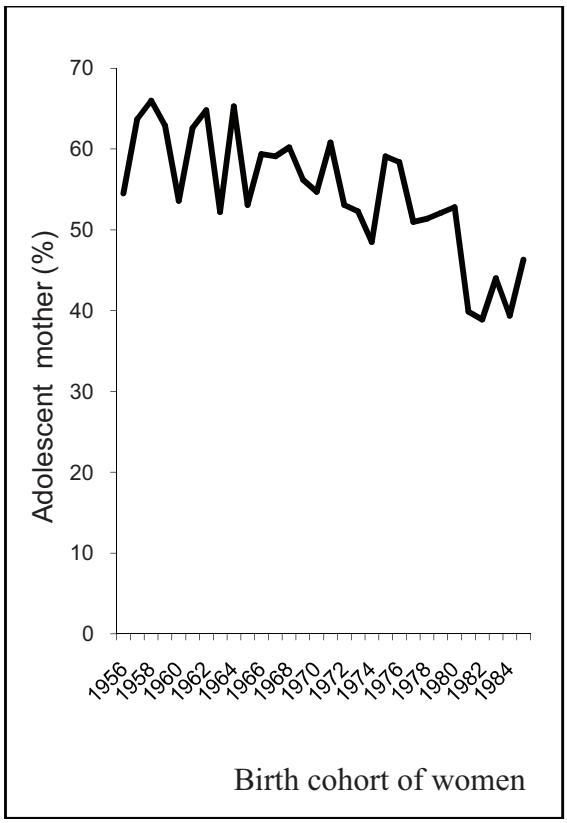
About three-fifth (59.9%) of the sampled women in the age range of 20-49 were illiterate while only less than 20% of them had secondary and above level of schooling. Further, marginal majority (52%) of the sampled women had no access to media: radio, newspaper or TV. Nearly half (48%) of these women follow Orthodox Christianity while a third (33%) of them are Moslems. A good majority (63%) of the sample was not working at the time of the survey and only 24% of those claiming to work were engaged in non-agricultural sectors (Table 1 Panel I). Most of the respondents (70%) were living in rural areas. Their history shows that nearly three-fifth (57.1%) of them were residing in Oromia, South Nations, Nationalities and Peoples (SNNPs), Amhara, and Addis Ababa regions.

Table 1: Number of women aged 20-49, percentages of adolescent mothers, those who had had sexual experience before age 18 and those who got married before age 18, EDHS 2005

	Variable	I	II	III	IV	V	VI
		Number of women aged 20-49	Had birth before age20	Married before age 15	Percentage of women who married before age 18	Start sex before age 15	Start sex before age 18
	1981-1985	2617	42.9	21.1	45.1	19.4	47.2
Maternal age cohort	1976-1980	2557	52.6	27.6	55.8	25.4	58.0
	1971-1975	1754	56.2	31.3	61.5	28.6	63.7
	1961-1970	2810	56.9	32.3	64.7	30.8	67.8
	1956-1960	1080	58.7	34.3	68.6	33.1	71.7
Education	No education	7281	59.9	34.2	67.5	32.2	69.5
	Primary	2171	49.4	23.5	51.0	21.2	54.7
	Secondary +	1366	18.2	6.3	16.3	5.6	19.5
	Not at all	5566	59.9	33.8	67.1	31.8	69.0
Exposure to media	Infrequent	2544	52.0	27.9	56.6	25.5	58.6
	Frequent	2682	37.7	18.1	39.3	17.1	43.5
	Orthodox	5149	51.8	33.4	58.9	32.0	62.1
Religion	Protestant	1793	51.2	21.4	51.2	18.4	54.0
	Moslem	3529	54.2	25.1	59.3	22.8	60.4
	Others	343	53.6	28.0	58.9	28.3	62.7
	Not working	6744	55.3	29.4	60.3	27.6	62.2
Occupation	Agricultural worker	1487	61.7	39.5	71.9	37.2	73.8
	Non-agricultural worker	2566	39.9	20.1	42.9	18.2	47.2
Place of residence	Urban	3271	35.4	17.0	37.4	15.9	41.8
	Rural	7547	60.0	33.5	66.6	31.3	68.2
	Tigray	947	59.9	38.3	70.9	39.4	74.7
	Afar	629	49.4	27.2	60.3	26.3	62.9
	Amhara	1486	65.6	56.3	82.4	53.0	83.7
	Oromia	1696	55.7	23.4	56.6	19.4	58.9
	Somali	564	50.5	16.7	51.4	14.0	50.4
Region	Benishangul-Gumuz	660	69.4	45.0	78.3	42.4	78.2
	SNNP	1628	52.3	21.1	53.5	19.1	53.6
	Gambela	594	63.8	35.5	67.0	30.7	75.5
	Harari	618	40.5	13.8	42.9	12.5	43.9
	Addis Ababa	1372	27.8	12.5	27.6	12.6	33.7
	Dire Dawa	624	45.5	18.8	47.0	19.6	50.2
	Married before age 15	3087	85.5	-	-	-	-
Marital Status	Married between age 15-17	3160	77.2	-	-	-	-
	Not married before 18	4571	13.3	-	-	-	-
	Active before age 15	2878	83.9	-	-	-	-
Sexual experience	Active between age 15-17	3632	73.4	-	-	-	-
	Not active before 18	4297	13.9	-	-	-	-
	Total	10818	52.6	28.5	57.7	26.6	60.2

Source: Computed by the authors using the 2005 EDHS

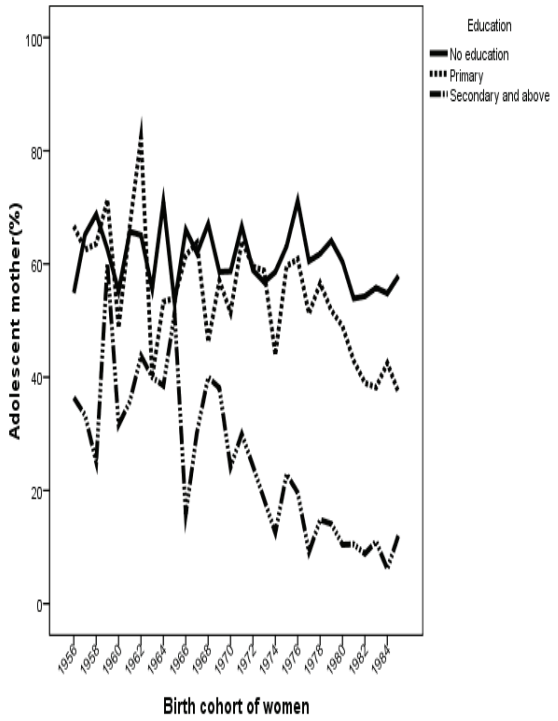
Figure 1 presents the trend in the proportion of adolescent mothers according to birth cohorts of women. The level of teenage motherhood has shown a declining trend over 30 years preceding the survey. This could be attributed to the decline in the level of early marriage and early sexual relations among respondents (see Table 1 panel IV and VI). As can be seen from Figure 1, there was a slight decline in the level of teenage motherhood cohorts between 1958 and 1975, while the decline was nearly continuous between the cohorts of 1975 and 1982.



Source: Computed by the authors using the 2005 EDHS

Figure 1: Line graph showing percentage of adolescent mothers across different birth cohort of women, EDHS

The proportion of adolescent mothers according to educational level of birth corhorts showed marked difference (Figure 2). For older cohorts (earlier than the 1970s), the difference in the level of adolescent motherhood among women of different educational levels was smaller. However, a declining trend in adolescent motherhood was observed among cohorts after 1976 having primary education. Moreover, a declining trend was observed among women with secondary and above level of education from earlier time. In contrast, the level of teenage motherhood for women with no education remained stable at about 60%. Women with secondary education and above reported having started sex late and giving birth at relatively older age (Table 1 panel II). This could most probably be due to the fact that they used contraceptives more effectively and efficiently than those who had never been to school or had less education.

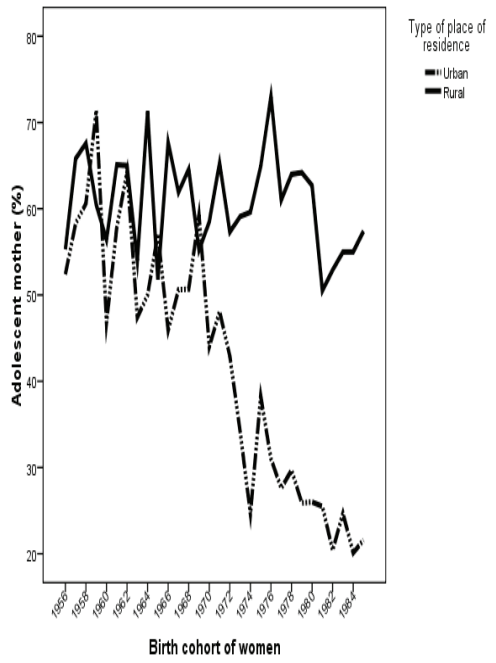


Source: Computed by the authors using the 2005 EDHS

Figure 2: Line graph showing percentage of adolescent mothers for different birth cohort of women by educational level, EDHS 2005

The proportion of adolescent mothers for different birth cohorts of women by type of place of residence was shown in Figure 3. The figure shows a declining trend in adolescent motherhood for cohorts of women between 1958 and 1985 residing in urban areas although the level was

stable at about 60% for rural cohorts between 1956 and 1975. It is, however, evident that the final segment of the graph signals that there is a wider gap in teenage motherhood in rural and urban settings among recent cohorts. For older cohorts, the gap in the percentage difference of teenage motherhood is, however, smaller among urban and rural residents. Availability of contraceptive use and other means of regulating pregnancy such as abortion could be factors contributing to a wider gap in the level of teenage motherhood in urban and rural areas of Ethiopia.



Source: Computed by the authors using the 2005 EDHS

Figure 3: Line graph showing percentage of adolescent mothers for different birth cohort of women by type of place of residence, EDHS 2005

Determinants of Adolescent Motherhood

Variables expected to have both direct and indirect effect on adolescent motherhood and age of women such as education, exposure to media, religion, rural-urban setting, administrative region, and occupation of respondents are considered as background variables of control. Since the 2005 Ethiopian Demographic and Health Survey data on which this study is based had no complete information on age at first use of contraception, we have not considered use of family planning in this analysis. Marital status and sexual activity status of respondents during adolescence were, however, included as proximate determinant variables in parallel models as they were found to have strong correlation ($r=0.866$, $P<0.01$). To avoid problem of multicollinearity[36] that exists between rural-urban setting and administrative region[1], as Ethiopia follows a federal government system that has nine regional states and two city administrations, different models were also fitted than dropping one of the collinear variables[40].

The crude effect of each of the predicting variables is also shown in the gross effect model (Table 2). The odds of teenage motherhood among women who experienced sexual intercourse before age 15 are at least six times greater compared to those who delayed sexual debut to later ages. Given that Ethiopia is one of the developing countries where tradition persists and virginity is still considered as honor to the family[41], sexual initiation and age at first marriage have strong relationship. Results of regression analysis also showed that the risk of adolescent motherhood is more than seven times higher among women who married before age 15 than others (Table 2). About 85% of the women who got married before age 15 were also observed having a child before age 20 (Table 1 Panel II).

Results of the study also showed a steady decline in adolescent motherhood among women of younger cohorts. The odds ratio estimates for birth cohorts of women indicate that the risk of teenage motherhood has progressively declined among younger cohorts and the results are statistically significant for all categories of the cohort. Controlling for the effects of other variables, the contribution of maternal age cohorts in explaining the variation in teenage motherhood was noteworthy and kept the estimates of odds ratios nearly stable.

Women who attained primary and secondary level of education were observed to have less risk of teenage motherhood in the gross effect model, but the importance of primary level of education was not maintained when other variables were included in the model. The effect of secondary and above education has, however, continued to be statistically significant indicating that longer stay

Table 2: Estimates of unadjusted and adjusted odds ratio of parameter estimates from multilevel logistic regression model for teenage motherhood for women age 20-49, EDHS 2005.

Variable	Gross Effect Model	Place of residence		Administrative Region	
		Model I	Model II	Model III	Model IV
Sexual experience					
Active before 15	7.40***	6. 30***	-	6.23***	-
Not active before 15 **(r)**	1.00	1.00	-	1.00	-
Marital status					
Married before 15	9.21***	-	7.84***	-	7.77***
Not married before 15 **(r)**	1.00	-	1.00	-	1.00
Maternal age cohort					
1981-1985 **(r)**	1.00	1.00	1.00	1.00	1.00
1976-1980	1.46***	1.36***	1.35***	1.38***	1.36***
1971-1975	1.68***	1.46***	1.43***	1.48***	1.43***
1961-1970	1.72***	1.42***	1.42***	1.42***	1.42***
1956-1960	1.86***	1.39***	1.39***	1.39***	1.39***
Education					
No education **(r)**	1.00	1.00	1.00	1.00	1.00
Primary	0.69***	0.92	0.92	0.87*	0.87*
Secondary+	0.17***	0.31***	0.32***	0.30***	0.30***
Exposure to media					
Not at all **(r)**	1.00	1.00	1.00	1.00	1.00
Infrequent	0.81***	1.02	1.01	1.00	0.98
Frequent	0.51***	1.02	1.03	0.99	0.99
Religion					
Orthodox **(r)**	1.00	1.00	1.00	1.00	1.00
Protestant	0.90	1.00	1.01	0.94	0.95
Moslem	1.08	0.98	0.99	1.03	1.04
Others	0.90	0.82	0.88	0.76	0.81
Type of Occupation					
Not working **(r)**	1.00	1.00	1.00	1.00	1.00
Agricultural worker	1.14	0.93	0.91	0.88	0.87*
Non-agricultural worker	0.64***	0.85**	0.84**	0.82***	0.80***
Place of residence					
Rural **(r)**	1.00	1.00	1.00	-	
Urban	0.36***	0.67***	0.69***	-	
Region					
Tigray	1.19	-	-	0.87	0.93
Afar	0.76*	-	-	0.57***	0.59***
Amhara	1.54***	-	-	0.85	0.80*
Oromia **(r)**	1.00	-	-	1.00	1.00
Somali	0.81	-	-	0.74*	0.76*
Benishangul-Gumuz	1.82***	-	-	1.35*	1.35*
SNNPs	0.86	-	-	0.88	0.90
Gambela	1.42*	-	-	1.30*	1.25
Harari	0.53***	-	-	0.76*	0.79
Addis Ababa	0.30***	-	-	0.52***	0.55***
Dire Dawa	0.66**	-	-	0.77*	0.84
Random Parameter					
Constant		0.26***	0.34***	-0.15	-0.24**
Intra-cluster variance	-	0.11**	0.12***	0.07***	0.09***
Intra-cluster correlation	-	0.03	0.04	0.02	0.03
Number of cases	10818	10757	10768	10757	10768
Joint Chi-square	-	1509.09***	1690.20***	1581.43***	1741.55***
df	-	16	16	25	25

- not applicable **(r)** reference category *** P<0.1% ** P<1% *P<5% † P<10%

Source: Computed by the authors using the 2005 EDH

in the school system reduces the risk of teenage motherhood. The odds of giving first birth before age 20 among women with secondary and above education is at least 68% lower than women with no education (Table 2 Model III). Similarly, variation in the risk of adolescent motherhood is explained by rural-urban place of residence. Adolescents living in urban areas were found to have lower risk of being exposed to teenage motherhood. The odds of giving birth during adolescence among women residing in urban areas at the time of the survey were at least less by 30% when compared with those living in rural areas (Table 3 Model I & II).

Despite controlling for the effects of education and rural-urban place of residence, women working in non-agricultural sectors were found to have lower risk of being adolescent motherhood. The odds of adolescent motherhood among women working in non-agricultural sectors were less by about 15% than those not working at the time of the survey. This may have implications on the decision making autonomy of women as those working and earning income have better control over their sexuality and make decisions on the timing of having a child.

Although exposure to media has a significant association with the risk of adolescent motherhood in the gross effect model, its relevance had disappeared when other variables were introduced into the model. Religious affiliation of respondents does not appear to have any effect on the adolescent's childbearing as all people following different religions in Ethiopia are bound to observe the tradition of getting girls married quite early as virginity is still important for marriage [15,42].

Region of residence that could serve as proxy indicator of cultural diversity in the country, for the governance structure of the nation is based on ethnic federalism[43] shows some variation in adolescent motherhood. In Afar and Somali regions where marriage is often arranged by the family and endogamy is commonly practiced, the risk of teenage motherhood is relatively lower both in the gross and net effect models. This could be due to predetermined marital relations and strict observation of girl's sexual life; sexual initiation and pregnancy appear to take place at later ages. Unlike this, high risk of adolescent motherhood is observed in Benishangul Gumuz and Gambella regions where a significant proportion of girls start having sexual relations at puberty (Table 2 Model III). Amhara region, where early marriage is common[42], has shown a higher risk of teenage motherhood in the gross effect model but inconsistent results were obtained when other variables were introduced into the model. This could be due to a very high rate of marital instability in the region[44,45] that would reduce the risk of pregnancy as a result of interrupted regular sexual exposure.

Discussion

Results of this study have shown that a number of factors such as early marriage and sexual initiation, attainment of secondary level of education, urban place of residence, women's occupation as a proxy of their decision-making autonomy, and limited access to contraceptive use are determinants of adolescent motherhood in Ethiopia. In conformity with studies made in different parts of the world, early childbearing is more likely taking place among socially-disadvantaged adolescents than their better off peers[31, 32]. Following are discussions of findings of the study.

Adolescent motherhood is a function of early marriage that leads to early sexual relationship: Although early marriage and early sexual initiation have shown a declining trend over time, their contribution to teenage motherhood is still immense. Traditional influences to get girls married at early age, before they engage in premarital sexual relations, is one of the major factors contributing to teenage motherhood. Apart from ensuring that their daughters have got married early, parents are also eager to see them have children soon to ensure the stability of marriage[42]. A married woman gains recognition and acceptance among the in-laws if she starts bearing a child and proves herself 'fertile'. In most of the Ethiopian traditional societies, marriage is not often conformed until a child is born to authenticate the unification[46]. A study done in Brazil and Colombia[47] also indicated that women who have had their first union before age 18 were at higher risk of adolescent childbearing than their

counterparts. The universal nature of adolescent motherhood as a result of early marriage in a number of developing countries has also been attested by Singh[48].

Low level of contraceptive use contributes to a very high risk of adolescent motherhood: Another factor for a very high rate of teenage motherhood in Ethiopia soon after marriage is the low level of contraceptive prevalence rate in the country. Contraceptive prevalence rate was 2.8% in 1990[49] but increased to 8.1% in 2000[50] and 14.6% in 2005[8]. The rate in rural areas where the majority of the population lives and young girls are exposed to the risk of early marriage is paradoxically lower than the overall level indicated above.

Attainment of secondary level education reduces the risk of adolescent motherhood: As the main purpose of education is to produce people who can deal with problems encountered at home and at places of work, the risk of adolescent motherhood is quite lower among those who attained secondary level of education. This could, of course, be due to their awareness about the need to avoid unprotected and unsafe sexual relations through the use of modern contraceptives, as evidenced in the findings of studies undertaken in Brazil[51] and eight sub-Saharan African countries[10]. Avoiding the risk of entering into marital life at early age is also another factor[52, 18]. As illustrated in the works of Bongaarts[34], a social consequence of education is to adapt to modern attitudes and values that reduce any sort of traditional hazards influencing women to have more children and quite early. Poorly designed and swift analysis of Atta[53], however, indicated a contradictory result that education had no influence on teenage pregnancy or motherhood.

Enhanced women's autonomy and their decision making power seem to delay the timing of first birth: Among women with access to fertility regulating mechanisms, the decision to give birth or get pregnant may not necessarily correlate with their exposure to the risk of frequent and regular sexual relations. An autonomous woman can avoid unwanted and unplanned pregnancies even if she is at the risk of conception using effective and efficient contraceptive supplies and/or terminating the pregnancy. Women working in non-agricultural sector are believed to have a better decision making power about their sexuality and timing of birth than their counterparts engaged in agricultural activities or not working at all. The former is believed to have better exposure to modernization elements in which career development and professionalism is preferred to having children to get recognition in the society. Economic self-sufficiency may also trade off the influences of traditional norms and values to be a mother so early.

Recent decline in adolescent motherhood is a sign of behavioral change due to community-based interventions: Results of this study have shown that adolescent motherhood has declined over time. The decline in teenage motherhood for cohorts between 1975 and 1982 was more considerable and continuous than others. It should be emphasized that a tremendous decline in the level of adolescent motherhood was observed in the periods following the adoption of the National Population Policy of Ethiopia that aimed at increasing the minimum age of marriage to 18 years and reduction of fertility through different ways, including provision of modern contraceptive supplies to all women of reproductive age, providing more opportunities for girl's education, and the like[37]. In line with this argument, a study conducted by the Family Health International[54] on youth reproductive health programs in Ethiopia paid due attention to the strong efforts and measures taken by the Ethiopian Government and the international community to improve the situation. Had the policy been adopted earlier and similar practices were in place, the risk of teenage motherhood among older cohorts of women might not have been higher. The different risks of teenage motherhood observed among adolescents living in different African countries have also shown noticeable variation in prevalence rate and decline over time[28]. The different experiences among the different cohorts could often be attributed to the variation in the volume of interventions exerted over time.

Conclusions

This study attempts to investigate the trends, differentials, and determinants of adolescent motherhood in Ethiopia using data from the 2005 EDHS survey. Results of the study revealed that adolescent motherhood is declining recently but at varying degrees among different groups. The risk of being an adolescent mother was found to be lower among teenagers with secondary and above level of education. Further, it was less among those living in urban areas where the means to avoid unwanted and unplanned pregnancies are widely available, and traditional norms and values have little influence on having a child among newly-wed mothers. In such an environment, adolescent mothers can also protect their own interests and make independent decisions. In contrast, teen-motherhood is the highest among disadvantaged women (i.e., those illiterate, residents in rural settings, and those with no work outside the home) who got married at early age and were exposed to the resultant sexual relations. Limited access to contraceptive use particularly in rural areas is also believed to expose young women to early pregnancy and teen motherhood. Millions of Ethiopian girls are still at the stake of early pregnancy and adolescent motherhood that has severe health, psychological, economic, and social hazards.

Widening educational and employment opportunities for young girls and implementing the minimum age at first marriage with strong legal enforcement, besides rigorous campaign to win the attitude of the community towards postponing the wedding of young girls until maturity are expected to reduce the psycho-social, health, and economic catastrophe of young mothers. This issue calls for wider intervention of governmental agencies, non-governmental organizations and civil societies to bring about radical changes both in attitudes and practices aimed at the betterment of young women with bright future

Contribution of Authors

E.G. conceived the study; E.G and T.D. designed research; E.G. guided the analysis while T.D. analysed the data; and E.G and T.D. wrote the paper.

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