Infertility in Ethiopia: prevalence and associated risk factors

Fikrewold Haddis*, Ethiopian Public Health Association*
Daniel Sahleyesus*, University of Colorado at Boulder*
Biruk Tensou, Addis Ababa Mortality Surveillance Program

Abstract

The objective of this study is to estimate the prevalence and identify risk factors of primary and secondary infertility in Ethiopia using the 2000 and 2005 EDHS. The percentage of childless women after at least 5 years of marriage was considered to have primary infertility. Secondary infertility is determined by the percentage of women with no birth at least 5 years subsequent to a previous birth. Logistic regression models were fitted to identify risk factors of primary and secondary infertility. The prevalence of primary infertility has declined from 4.4% in 2000 to 3.3% in 2005 whereas secondary infertility increased from 4.3% in 2000 to 4.6% in 2005. The prevalence of infertility varies by type of place of residence, marital status, age of respondent and age at first marriage and number of unions. Infertility is higher in urban areas and among women married more than once.

Introduction

The cultural practices and attitudes of nations and nationalities in Ethiopia uphold reproduction as the most important function of families. Childlessness remains to be the most undesirable experience within marriage for most couples. Unfortunately, due to the long standing traditional outlooks of the vast majority of the society, women are expected to carry the burden of impaired fertility in a family. Like in many other populations, impaired fertility is an important health concern for Ethiopian women. The national population policy of Ethiopia, adopted in 1993, placed emphasis at improving specific women's health issues, including infertility, maternal morbidity and mortality among its other objectives. The implementation of these objectives requires thorough understanding of the extent, variation, and trends of women's health issues. However, infertility research is particularly lacking in Ethiopia. Among a few available studies on the subject a pioneering study by Abate and Morgan (1986) documented the level of primary and secondary infertility across provinces and birth cohorts for rural Ethiopia. Similarly, Tilson and Larsen (2000) assessed the impact of childlessness and early marriage on divorce in Ethiopia.

The limited number of studies available on the subject in Ethiopia could partly be explained by the greater emphasis by researchers on fertility which is assumed to be the "prime" concern for population research in Ethiopia as elsewhere in Africa. As a result, infertility might have been considered as a less serious issue. The other reason why research on infertility in Ethiopia draws little attention so far could be due to the absence of nationally representative data such as the DHS until recently.

This paper focuses on estimating the prevalence of primary and secondary infertility in Ethiopia using data from the 2000 and 2005 Demographic and Health Surveys. In addition, employing multivariate analyses, the paper assesses associated risk factors and examined changes that occurred between the two surveys. Documenting the prevalence, trends and

associated risk factors of primary and secondary infertility at national and sub-national levels in Ethiopia would contribute to the effective targeting of public health policies and programs.

Materials and Methods

Two nationally representative Demographic and Health Surveys were conducted in Ethiopia in 2000 and 2005. Our analyses here used information from the individual women recode files. The files contained information on women's background characteristics, sexual practices, birth history, fertility preferences and husband's characteristics among many other topics. The 2000 and 2005 surveys contained the same core questions providing data that permit comparative analyses. Rather than complete pregnancy histories that would allow to determine a woman's ability to conceive, the DHS collected complete birth history information, based on which we can be able to determine whether a woman had a live birth. Accordingly, we have adopted the method recommended by Larsen in order to estimate primary and secondary infertility from DHS type data [2]. The percentage of women childless after at least 5 years of marriage was used to estimate primary infertility. Women with no birth at least 5 years subsequent to a previous birth were considered to have secondary infertility.

As the first step in our analysis, we examined trends over the years by employing direct estimation of the level of infertility at the national, urban-rural, and regional levels. This will follow by univariate analysis (simple descriptive statistics of all theoretically relevant variables). Bivariate association between the dependent variables (primary and secondary infertility as defined by whether she is primarily and secondarily infertile) and each of the independent variables performed based on the chi-square test. For the multivariate analysis, we fit logistic regression models to identify the relative contribution of selected independent variables in explaining the total variance in women's infertility. Our interest in estimating the regression models is to identify those factors associated with primary and secondary infertility at the population level.

Results

A total of 15,367 and 14070 women aged 15-49 were included in the 2000 and 2005 Ethiopian Demographic and Health Surveys, respectively. However, those women who had never been married or had been married for less than 5 years reduce the sample to 7,938 and 7,219 for both years, respectively. Thus Information about background characteristics is done using the samples in the analysis of primary infertility i.e women who entered first marriage at least 5 years before the survey date (table 1).

As Ethiopia is a country which about 15% of the population reside in rural areas, our analysis therefore includes more samples (77 %) from women who reside in rural areas and the rest 23 % from urban. Region wise, the samples were selected starting from the lowest 5.42% in Somali to the highest 16.34 % in Oromia. Orthodox Christian religion was found to be the most dominant religion in Ethiopia particularly in Amahara (81%), Tigray (96%) and Addis Ababa (82%).

Education seems highly related with age at a first marriage i.e. non educated women marry much earlier than women who have at least primary education even though most of the sampled women (79% in 2000 and 74% in 2005) are with no education. For instance from non educated women around 91% and 88% marry before age 19 for both years respectively.

Table 1. Demographic and Socio-economic characteristics of ever-married women who entered first marriage at least 5 years before the survey date EDHS 2000 &2005

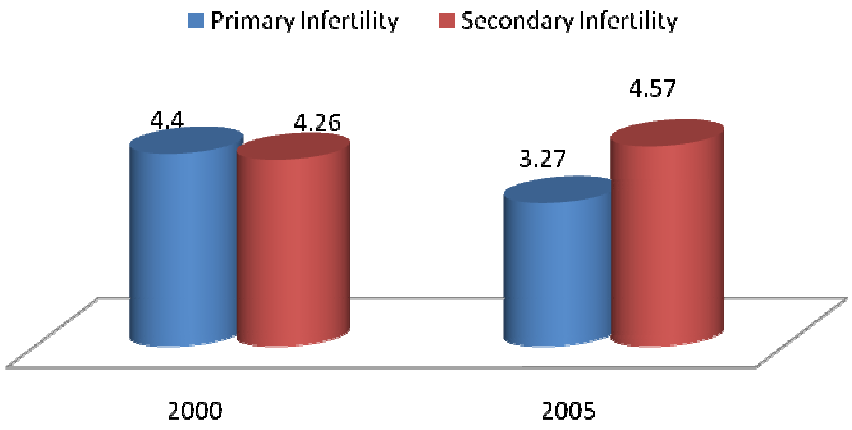
	2000		2005	
Background Characteristics	**N**	**%**	**N**	**%**
Age				
20-24	1,080	13.61	970	13.44
25-29	2,044	25.75	1,925	26.67
30-34	1,776	22.37	1,608	22.27
35-39	1,725	21.73	1,553	21.51
40-44	1,313	16.54	1,163	16.11
Type of Place of Residence				
Urban	1,811	22.81	1,597	22.12
Rural	6,127	77.19	5,622	77.88
Region				
Tigray	778	9.8	692	9.59
Afar	537	6.76	469	6.5
Amhara	1,198	15.09	1,146	15.87

Oromia	1,297	16.34	1,152	15.96
Somali	472	5.95	429	5.94
Ben- Gumz	566	7.13	511	7.08
SNNP	1,019	12.84	1,102	15.27
Gambella	528	6.65	465	6.44
Harari	430	5.42	372	5.15
Addis Ababa	648	8.16	517	7.16
Dire Dawa	465	5.86	364	5.04
Religion				
Orthodox	3,719	46.85	3,252	45.05
Protestant	1,004	12.65	1,193	16.53
Muslim	2,876	36.23	2,529	35.03
Other	339	4.27	245	3.39
Education				
No Education	6,243	78.65	5,345	74.04
Primary	1,030	12.98	1,104	15.29
Secondary and Higher	665	8.38	770	10.67
No Education	5,053	63.66	4,223	58.5
Primary	1,532	19.3	1,620	22.44
Secondary and Higher	1,278	16.1	1,321	18.3
Don't know	75	0.94	55	0.76
Ever Used of any Method				
Never Used	6,127	77.19	5,153	71.38
Ever Used	1,811	22.81	2,066	28.62
Number of Unions				
Once	5,121	64.51	5,377	74.48
More than Once	2,814	35.45	1,840	25.49
Missing	3	0.04	2	0.03
Age at first Marriage				
0-14	2,522	31.77	2,717	37.64
15-19	4,462	56.21	3,470	48.07
>20	954	12.02	1,032	14.3
Number of Other Wives				
No other wife	5,652	85.01	5,323	86.81
1	801	12.05	453	7.39
2+	189	2.84	345	5.63
Don't Know and Missing	7	0.11	11	0.18
Husband Lives in the House				
Yes	6,009	90.37	5,779	93.44
Else where	640	9.63	401	6.48
Missing			5.0	0.08
Is the respondent circumcised				
Yes	1,530	19.27	1,627	22.54
No	6,408	80.73	5,391	74.68
Don't Know			200	2.77
Missing			1.0	0.01
Total	7938	100%	7219	100%

Levels of Primary and Secondary Infertility

Our analysis shows that primary infertility declined from 4.4% in 2000 to 3.3% in 2005 whereas secondary infertility had increased from 4.3% in 2000 to 4.6% in 2005. Childlessness is twice higher among urban residents than rural residents in both surveys. Similarly secondary infertility is higher in urban areas than rural areas. The prevalence of primary infertility ranges from 1.4% in SNNPR[1] to 9.0% in Addis Ababa whereas the prevalence of secondary infertility ranges from 2.5% in SNNP to 15.1% in Addis Ababa. This implies that infertility is less prevalent in the southern parts of the country while widespread in the capital, Addis Ababa. The prevalence of infertility (both primary and secondary) among women increases with the level of women's educational status. The prevalence of primary infertility among women who had ever used contraceptive and never used don't show any significant difference. However, with regard to secondary infertility women who had ever used contraceptive are more infertile than who had never used contraceptive in their life time (Table 2).

Figure1 :Prevalence of Primary and Secondary Infertility in Ethiopia , EDHS 2000 &2005



[1] Southern Nations, Nationalities & People's Region

Table 2. The percentage of women aged 20-44 with Primary and Secondary Infertility who entered first marriage at least 5 years before the survey EDHS 2000 &2005

Background Characteristics	2000 Primary Infertility	2000 Secondary Infertility	2000 N	2005 Primary Infertility	2005 Secondary Infertility	2005 N
Age						
20-24	10.0	4.6	1,080	6.3	7.9	970
25-29	5.3	4.9	2,044	3.2	5.1	1,925
30-34	2.9	4.3	1,776	2.9	3.5	1,608
35-39	2.9	3.9	1,725	2.5	3.5	1,553
40-44	2.3	3.3	1,313	2.3	3.8	1,163
Type of Place of Residence						
Urban	8.0	9.1	1,811	7.0	12.9	1,597
Rural	3.3	2.8	6,127	2.2	2.2	5,622
Region						
Tigray	3.2	3.5	778	3.2	2.6	692
Afar	8.0	4.3	537	3.2	3.6	469
Amhara	6.3	3.3	1,198	3.8	3.8	1,146
Oromia	2.5	2.4	1,297	2.0	2.0	1,152
Somali	1.9	3.0	472	1.9	1.6	429
Ben- Gumz	3.4	3.7	566	2.0	4.1	511
SNNP	1.4	2.5	1,019	1.4	2.5	1,102
Gambella	4.4	6.1	528	5.6	6.2	465
Harari	5.4	5.8	430	6.2	6.7	372
Addis Ababa	9.0	9.6	648	6.6	15.1	517
Dire Dawa	5.8	8.4	465	4.7	11.3	364
Religion						
Orthodox	5.5	5.4	3,719	4.6	6.6	3,252
Protestant	2.7	4.0	1,004	2.3	3.6	1,193
Muslim	3.7	3.0	2,876	2.1	2.7	2,529
Other	4.1	3.5	339	2.0	2.0	245
Education						
No Education	3.8	3.3	6,243	2.6	2.8	5,345
Primary	5.9	6.9	1,030	4.4	6.3	1,104
Secondary and Higher	7.2	9.2	665	6.2	14.6	770
Partner's Education						
No Education	4.1	3.3	5,053	2.9	2.8	4,223
Primary	3.4	4.1	1,532	2.8	3.8	1,620
Secondary and Higher	6.7	8.3	1,278	4.7	10.9	1,321
Don't know	8.0	4.0	75	7.3	9.1	55
Ever Used of any Method						
Never Used	4.49	3.77	6,127	3.75	4.08	5,153
Ever Used	4.09	5.91	1,811	2.08	5.81	2,066
Number of Unions						
Once	3.6	3.6	5,121	3.0	4.5	5,377
Morethan Once	5.9	5.4	2,814	4.1	4.7	1,840
Missing	0.0	0.0	3	0.0	0.0	2
Age at first Marriage						
0-14	5.0	3.3	2,522	3.2	3.8	2,717
15-19	4.0	4.4	4,462	2.7	4.5	3,470

>20	4.8	6.2	954	5.3	6.9	1,032
Number of Other Wives						
No other wife	3.22	3.06	5,652	2.29	2.9	5,323
1	2.75	3.12	801	2.87	2.7	453
2+	1.59	4.23	189	2.32	3.2	345
Don't Know and Missing	0	0	7	0	0.0	11
Husband Lives in the House						
Yes	3.1	2.9	6,009	2.3	2.5	5,779
Else where	3.8	4.8	640	4.2	7.7	401
Missing	0.0	0.0	0	0.0	0.0	5
Is the respondent circumcised						
Yes	4.4	4.4	1,530	3.0	4.2	1,627
No	4.5	3.6	6,408	3.9	5.4	5,391
Don't Know and Missing	0.0	0.0	0	6.5	8.5	200

Risk Factors of Primary Infertility

Results of logistic regression indicate that age, type of place of residence, region, number of unions and age at first marriage are significant predictors ($p<0.05$) of primary infertility for both surveys. (i) Women in the higher age groups are less likely to be childless than women in the age group 20-24; (ii) Women who reside in the rural parts of the country are less likely to be primarily infertile than women who reside in the urban parts of the country; (iii) in 2000, women living in Afar and Amhara regions were highly likely to be childless than women living in Tigray whereas, in 2005 women who reside in Gambella and Harari are more than two times more likely to be childless than their counterparts; (iii) women who have been in union more than one times are three times in 2000 and two times in 2005 more likely to be childless than women who had been in union only once; (iv) regarding to women's age at first marriage, women whose age at first marriage was above 20 are more likely to be childless than women whose age at first marriage was below 15 (Table 3).

Table 3. Odds ratios (OR) of Primary Infertility from Multivariate Models

Background Characteristics	2000		2005	
	OR	95%CI	OR	95%CI
Age				
20-24	1.00		1.00	
25-29	0.43	0.29, 0.64	0.51	0.31, 0.84
30-34	0.28	0.18, 0.43	0.39	0.22, 0.67
35-39	0.26	0.16, 0.42	0.27	0.15, 0.50
40-44	0.23	0.13, 0.40	0.41	0.22, 0.76
Type of Place of Residence				
Urban	1.00		1.00	
Rural	0.35	0.22, 0.54	0.45	0.26, 0.76
Region				
Tigray	1.00		1.00	
Afar	3.63	1.67, 7.91	1.52	0.56, 4.18
Amhara	1.77	0.92, 3.37	0.82	0.39, 1.69
Oromia	1.37	0.66, 2.86	1.12	0.50, 2.51
Somali	0.82	0.27, 2.51	1.52	0.52, 4.48
Ben- Gumz	1.41	0.64, 3.09	1.00	0.40, 2.51
SNNP	0.63	0.26, 1.51	0.72	0.30, 1.76
Gambella	1.40	0.63, 3.10	2.62	1.20, 5.75
Harari	1.48	0.63, 3.51	2.61	1.08, 6.27
Addis Ababa	1.16	0.53, 2.55	0.77	0.30, 1.98
Dire Dawa	1.27	0.54, 3.00	1.67	0.63, 4.42
Religion	NS			
Orthodox			1.00	
Protestant			0.78	0.42, 1.43
Muslim			0.53	0.32, 0.89
Other			0.56	0.17, 1.93
Education	NS		NS	
No Education				
Primary				
Secondary and Higher				
Partner's Education	NS		NS	
No Education				
Primary				
Secondary and Higher				
Don't know				
Number of Unions				
Once	1.00		1.00	
Morethan Once	3.02	2.20, 4.14	2.31	1.57, 3.41
Missing				
Age at first Marriage				
0-14	1.00		1.00	
15-19	1.24	0.89, 1.72	1.25	0.83, 1.90
>20	1.87	1.11, 3.18	3.47	2.06, 5.83
Number of Other Wives	Ns		Ns	
No other wife				
1				
2+				

Missing and Don't Know		
Husband Lives in the House	NS	NS
Yes		
Else where		
Missing		
Is the respondent circumcised	NS	NS
Yes		
No		
Don't Know and Missing		

Risk Factors of Secondary Infertility

The results of the multivariate analysis also shows that age, type of place of residence, region, religion, number of unions are significantly associated ($p<0.05$) with secondary infertility in both surveys. Moreover, age at first marriage in 2000 and education and husband living in the same house in 2005 had also a significant effect on secondary infertility. (i) Women in the higher age groups are less likely to be secondarily infertile than women in the age group 20-24; (ii) Women who reside in the rural parts of the country are less likely to be secondarily infertile than women who reside in the urban parts of the country; (iii) in 2000, women living in Gambella were significantly more likely to be secondarily infertile than women living in Tigray whereas, in 2005 women who reside in all regions are more than two times more likely to be secondarily infertile than women living in Tigray; (iii) women who have been in union more than one times are almost three times more likely to be secondarily infertile than women who had in union only once in both surveys; (iv) regarding to women's age at first marriage, in 2000 women who their first marriage above age 20 are more likely to be childless than women who made their first marriage below age 15; (v) in 2005 women with secondary or higher educational level are also found to be more likely to be secondarily infertile than women with no education; finally it is found that women whose husband lives elsewhere are more likely to be secondarily infertile than women whose husband lives with them (Table 4).

Table 4. Odds ratios (OR) of Secondary Infertility from Multivariate Models				
	2000		2005	
Background Characteristics	**OR**	**95%CI**	**OR**	**95%CI**
Age				
20-24	1.00		1.00	
25-29	0.68	0.43, 1.07	0.54	0.35, 0.83
30-34	0.53	0.33, 0.87	0.35	0.21, 0.58
35-39	0.58	0.35, 0.94	0.20	0.11, 0.37
40-44	0.44	0.25, 0.78	0.45	0.26, 0.78
Type of Place of Residence				
Urban	1.00		1.00	
Rural	0.46	0.29, 0.72	0.38	0.24, 0.62
Region				
Tigray	1.00		1.00	
Afar	2.74	1.15, 6.54	7.33	2.46, 21.86
Amhara	1.11	0.53, 2.31	3.26	1.29, 8.24
Oromia	1.44	0.67, 3.07	2.68	0.95, 7.56
Somali	2.18	0.83, 5.69	2.24	0.51, 9.92
Ben- Gumz	2.32	1.07, 5.05	5.74	2.11, 15.58
SNNP	0.86	0.36, 2.03	4.72	1.74, 12.76
Gambella	2.62	1.21, 5.67	7.98	2.98, 21.40
Harari	1.58	0.62, 4.04	5.20	1.82, 14.91
Addis Ababa	1.95	0.87, 4.35	4.92	1.84, 13.16
Dire Dawa	2.48	1.06, 5.79	6.15	2.16, 17.54
Religion				
Orthodox	1.00		1.00	
Protestant	1.12	0.67, 1.87	0.57	0.33, 0.99
Muslim	0.51	0.33, 0.78	0.58	0.37, 0.92
Other	0.80	0.34, 1.89	0.25	0.06, 1.06
Education	NS			
No Education			1.00	
Primary			1.38	0.86, 2.22
Secondary and Higher			1.98	1.12, 3.51
Partner's Education	NS		NS	
No Education				
Primary				
Secondary and Higher				
Don't know				
Number of Unions				
Once	1.00		1.00	
Morethan Once	3.02	2.21, 4.14	2.72	1.91, 3.88
Missing				
Age at first Marriage				
0-14	1.00		NS	
15-19	1.48	1.05, 2.09		
>20	2.13	1.29, 3.51		
Number of Other Wives	Ns		Ns	
No other wife				
1				
2+				
Missing and Don't Know				

Husband Lives in the House	NS		
Yes		1.00	
Else where		1.94	1.23, 3.05
Missing			
Is the respondent circumcised	NS	NS	
Yes			
No			
Don't Know and Missing			

Discussion

Both Primary and secondary infertility showed an increasing trend as the age of the respondent increases from 20-24 to 40-44 except for the case observed in the age group 40-44 of 2005. This may be because, the probability of women to be involved to those expected factors; which exposed them to infertility in the country setting such as STI, polygamy and using traditional family planning medicines; increases with an increasing age.

Our study result also shows that rural women are less likely to be infertile than their corresponding urban counterparts. The possible explanation for this could be, women which may be referred as Most at Risk Populations (MARPS) to STI and HIV/AIDS like commercial sex workers, waiters, street children, daily labourers and People living with HIV/AIDS (PLWHA) whom their day to day activity highly exposed them to different STIs and AIDS are predominantly found in urban areas only; which by its turn contributes a lot to infertility. Moreover, being late in marriage, sexual involvement with different partners and contraceptive usage (not properly usage of contraceptive) are also highly expanded in urban areas; which may contribute more to infertility for those living in urban areas.

Regarding region of residence women living in Gamblela, Harari, Addis Ababa and Diredawa are relatively highly likely to be affected by infertility compared to those living in other regions. This could be, for instance, in Gambella there is high level of Sexually transmitted diseases like HIV/AIDS which is related to marriage patterns like polygamy [10]. In Addis Ababa, the capital city of Ethiopia, Harari and Dire Dawa whereas women are relatively more educated and also are employed which may resulted in the lateness in marriage and high contraceptive usage.

Moreover, they have a reduced demand of children as they are engaged in different economical activities and increased level of modernization.

The number unions were also another important determinant factor for predicting infertility in Ethiopia. Women who have been in union at least two times were more than 2.5 times more likely to be infertile (primary and secondary). This could be women who have been married more than once do have sexual exposure with different partners which may expose them to different types of sexually transmitted diseases which again exposed them to primary or secondary infertility.

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