

Birth spacing among Ethiopian women between 2000 and 2016: trends and predictors

Ghose Bishwajit¹, Josephine Etowa¹, Asibul Islam Anik², Egbe Etowa³

¹School of Nursing, University of Ottawa, Ottawa, Canada

²Department of Research and Evaluation, SAJIDA Foundation, Gulshan, Dhaka, Bangladesh

³Department of Sociology, Anthropology, and Criminology, Faculty of Arts, Humanities, and Social Sciences, Windsor, Ontario, Canada

Abstract

Introduction: The objective of the present study is to explore the trends and predictors of birth spacing in Ethiopia with a focus on the unmet need for family planning.

Material and methods: We analysed open-access data from 4 rounds of the Ethiopia Demographic and Health Survey (2000, 2005, 2011, 2016), which collected information on various sociodemographic factors, including preceding the birth interval. The primary explanatory variable was an unmet need for family planning, defined as the current unmet need for birth spacing and limiting. Preceding birth interval was the outcome variable and was classified as short (< 33 months) and optimal (\geq 33 months) according to the established guidelines. The sample population for this study was 33,212 women aged 15–49 years. Data were analysed using descriptive and multivariable analyses.

Results: Between 2000 and 2016 there was a marginal decrease in the prevalence of optimal birth spacing (from 77% to 75.4%). Women in lower age groups, especially teenage mothers, are more likely to experience short preceding birth intervals. Having an unmet need for contraception showed a positive association with short birth intervals in the 2000 (OR = 1.201, 95% CI: 1.042–1.384) and 2016 surveys (OR = 1.180, 95% CI: 1.022–1.363). In 2016, women who delivered at a health facility were significantly less likely to have short birth intervals (OR = 0.777, 95% CI: 0.657–0.921).

Conclusions: Our analysis of 4 nationally representative surveys indicates that the prevalence of short birth interval has remained virtually unchanged since 2000, emphasising the need for urgent intervention. The potential areas of intervention may include preventing teenage motherhood, improving women's socioeconomic status, addressing the unmet need for family planning, and promoting the use of health facility delivery.

Key words: birth spacing, Ethiopia Demographic and Health Survey, Ethiopia, reproductive health.

Corresponding author: Dr. Ghose Bishwajit, School of Nursing, University of Ottawa, Ottawa, Canada,
e-mail: brammaputram@gmail.com

Introduction

Both Millennium and Sustainable Development Goals (SDG) place strong emphasis on reducing maternal and child mortality rates and encourage strategic intervention policies to achieve these targets [1–4]. Evidence suggests that since the implementation of MDGs, there has been a significant decline in maternal and under-five mortality rates around the world. However, the progress remains dissatisfactory, especially in many sub-Saharan countries like Ethiopia as the region continues to account for the bulk of the global maternal and child mortality (MCM) burden. At a population level, the reasons behind this unequal progress are complex and manifold but are generally attributed to risky sexual and reproductive behaviour such as low use of family planning services, which can lead to unintended pregnancy, higher fertility, and short birth spacing, which are well-documented risk factors of MCM [5–8]. Despite the widely acknowledged benefits of modern family planning methods in preventing MCM, the healthcare system in Ethiopia, similarly to most other countries in the continent, is struggling to improve contraceptive prevalence rates at a population level.

Literature reviews suggest that Ethiopia ranks among the countries with noticeably high rates of MCM [9]. Growing evidence suggests that the common strategies to tackle MCM are to control pregnancies from occurring too early, too closely spaced, too late, and too many [10], all of which can be greatly minimised through adequate use of family planning methods. Unfortunately, the coverage of family planning is also suboptimal, and as a consequence the rate of unmet need is high in Ethiopia [11]. Given this situation, addressing the unmet need for family planning should be given special priority in all MCM prevention and reproductive health-promotion programs with the purpose of allowing women to gain better control over their fertility choices. The rationale is that having sustainable access to safe and effective family planning methods can enable women to plan the timing and spacing of pregnancy, which itself can help avert unintended pregnancies and thereby contribute to reducing the risk of MCM. Existing literature suggests that both short and long interpregnancy intervals are related to other adverse maternal outcomes [5].

In addition to the unmet need for family planning, short birth intervals can be influenced by various other factors, such as the fertility preference of a couple, the number of living children, and cultural perceptions of the adequate number of children, which themselves are shaped by the contextual sociodemographic and cultural determinants. Regardless of the local contexts and circumstance that determine the timing and frequency of pregnancies, maintaining optimal birth intervals is strongly recommended in all settings because a short interval puts the health of the expectant mother and her baby at greater risk of adverse consequences. Specifically, a short birth-to-pregnancy interval minimises the chance to replenish vital nutrients depleted during the last pregnancy/birth, and also the restoration of the organs to normalcy [12, 13]. Previous studies have reported a range of poor outcomes associated with short birth interval including low birth

weight, small for gestational age, and pre-term (born before the 37th week of pregnancy) [14–16]. A review of the literature indicates that inadequate birth spacing can also have long-term effects on an individual's nutritional status in later life as well as on educational and socioeconomic gains [17].

Given the continued effort to reduce maternal and child survival under the SDGs, research evidence on the risk factors of MCM such as short birth intervals and its predictors are critical. Understanding the nature of the associations between fertility behaviour and sociodemographic factors is important to design evidence-led intervention policies to reduce MCM and mitigate the risk factors. Currently there is no research evidence on birth spacing in Ethiopia, and therefore new data are necessary to inform policy decisions and encourage further studies. The present study is an attempt to address this gap in the literature, and it is based on 4 large-scale national representative surveys conducted in Ethiopia since 2000. The main objectives of this study are to examine the trend in the prevalence of short birth spacing and its sociodemographic predictors, with a special focus on the unmet need for family planning. The underlying theory is that women who lack access to family planning services are more likely to experience short birth intervals compared with those who do not.

Material and methods

Data source and study population

The datasets used in this study were collected from the Demographic and Health Surveys online data repository, which provides nationally representative data on about 90 low-middle income countries. These surveys provide information on a wide range of demographic, socioeconomic, and health-related indicators with the aim of assisting the host countries in making evidence-based policies and measuring progress towards international goals (e.g. MDGs and SDGs) on various maternal and child health issues. The Ethiopia Demographic and Health Surveys conducted since the year 2000 were considered for this study. The study population was women of childbearing age (15–49 years) with histories of childbirth during the preceding 5 years.

Measurements

Outcome measure: Length of preceding birth interval was the outcome variable in this study. The birth interval was classified as short (< 24 months) and optimal (\geq 25 months) as per WHO guidelines [18].

Explanatory variable: The main explanatory variable was unmet for family planning. This was defined as not using a contraceptive method by women who are fertile, currently have no desire for pregnancy, or desire to postpone pregnancy for at least 2 years [19]. This was classified as “Has unmet need (either for limiting or spacing birth)” and “No unmet need”.

Covariates

Several other covariates were considered for the analysis as potential confounding factors affecting the association

between birth spacing and unmet need for family planning. Based on the evidence from previous studies, the following variables were selected from the DHS datasets: Age (45–49, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44); Residency (Urban, Rural); Ethnicity (Amhara, Oromo, Tigrie, Somalie, Others); Education (None, Primary, Secondary, Higher); Wealth quintile (Poorest) Poorer, Middle, Richer, Richest); Occupation (Not Working, Professional/Managerial; Agri/Others); Household head's sex (Male, Female); Unmet need (No, Yes); Facility delivery (No, Yes); Media access (No, Yes) [2, 6, 13, 20–23].

Data analysis

Data analyses were conducted using Stata V.14. The datasets from 4 rounds of surveys were merged into one and cleaned by applying the inclusion criteria (having a history of childbirths, providing data on unmet need, having no desire for more children). Before analysis, the dataset was also adjusted for cluster design by using the sampling weight, primary sampling unit, and sampling strata. Following that, descriptive analyses were conducted to measure the prevalence of unmet need for family planning, and birth spacing. Then multivariate regression analyses were conducted to measure the association between unmet need for family planning and short birth spacing while controlling for the sociodemographic factors. At first, we performed full and parsimonious models on the pooled sample by adjusting for survey years. In the parsimonious model we only included variables that were found to be significant in the chi-square bivariate tests (Table I). Secondly, we ran another set of regression models stratified by year to assess the changes in the predictors over the years. The level of significance was set at $p < 0.05$ for all analyses.

Results

The sociodemographic profile of the sample population is described in Table I. The prevalence of optimal spacing was highest (81.03%) among women aged 35–39 years and lowest (62.03%) in the youngest age group. The prevalence was also higher among women residing in urban areas (81.60%), of Tigrie ethnicity (85.24%), with higher than secondary education (82.61%), from the wealthiest households (80.61%), delivered in a health facility (84.28%), and with media access (79.34%).

As of 2016, more than two-fifths of the babies in Ethiopia are born below optimal spacing period (Figure 1). Since 2000, the prevalence of low birth spacing has remained unchanged (56% in 2000 vs. 56.2% in 2016).

The results of multivariate analysis assessing the predictors of short birth spacing as presented in Table II. Women in the lower age groups showed higher odds of experiencing short birth spacing compared with those in the highest age group of 45–49 years. Those in the middle age groups (30–39 years) did not have any significant association. This was the case for both full and parsimonious models. Women in the Amhara (OR = 0.607, 95% CI: 0.549–0.672) and Somalie (OR = 0.572, 95% CI: 0.501–0.652) ethnic groups had lower

and those in the Oromo (OR = 1.124, 95% CI: 1.034–1.221) and Tigrie (OR = 2.087, 95% CI: 1.865–2.334) ethnicity had higher odds of experiencing short birth spacing. Those in the highest wealth quintile had lower odds (OR = 0.872, 95% CI: 0.772–0.986) of reporting low birth spacing than those in the lowest. Being employed in agriculture/other manual jobs was associated with lower odds (OR = 0.838, 95% CI: 0.776–0.906) of short birth spacing compared with those who had no employment. In the full model, household head's sex being female showed a marginally positive (OR = 0.911, 95% CI: 0.833–0.996) and having unmet needs for contraception showed a marginally negative (OR = 1.112, 95% CI: 1.035–1.195) association with short birth spacing. Having delivered in facility showed a negative association with short birth spacing in both full and parsimonious models.

Results of changes in the predictors of short birth spacing between 2000 and 2016 are shown in Table III. Compared with women in the highest age group (45–49 years), those in the lower age groups generally had higher odds of having short birth intervals. This association was observed for all 4 survey years. Women of Amhara and Oromo ethnicity had higher odds of having short preceding birth intervals, whereas those of Somalie ethnicity showed constantly lower odds. Having education showed no beneficial effect on birth spacing. However, in 2016, women with higher education had significantly higher odds of experiencing low birth intervals (OR = 1.628, 95% CI: 1.042–2.543). Having unmet need for contraception showed a positive association with short birth intervals in the 2000 (OR = 1.201, 95% CI: 1.042–1.384) and 2016 surveys (OR = 1.180, 95% CI: 1.022–1.363). In 2016, women who delivered at a health facility were significantly less likely to have short birth intervals (OR = 0.777, 95% CI: 0.657–0.921).

Discussion

In the present analysis we aimed to explore the trends and predictors of birth spacing in Ethiopia. The findings suggest that about one-tenth of the births in Ethiopia are not adequately spaced, and the situation has remained unchanged since 2000. In the multivariable analysis, women in the lower age groups showed higher odds of experiencing short birth spacing compared with those in the highest age group. Women in their earlier stage of reproductive life were generally more likely to plan for frequent pregnancies than those in their early to late 40s. Place of residence had a significant association with birth spacing behaviour in the bivariate analysis. However, this association was not significant in the multivariable analysis. This is indicative of the fact that being located in a rural area is not a risk for short birth spacing. In the current literature, the urban-rural difference in birth spacing is not clear. There is a general consensus that women in urban areas have a greater advantaged in terms of exposure and access to reproductive care facilities, which are strong determinants of optimal birth spacing. Urban women are also more likely to have better education and employment facilities, which enable them to gain better control of

Table I. Sample description

Variables	Optimal	Short
Age groups:	%–95% CI	%–95% CI
15–19 (<i>n</i> = 312)	62.03 (53.51–69.87)	37.97 (30.13–46.49)
20–24 (<i>n</i> = 3359)	70.84 (68.50–73.09)	29.16 (26.91–31.50)
25–29 (<i>n</i> = 7453)	78.28 (76.91–79.60)	21.72 (20.40–23.09)
30–34 (<i>n</i> = 6723)	80.23 (78.81–81.57)	19.77 (18.43–21.19)
35–39 (<i>n</i> = 6521)	81.03 (79.60–82.38)	18.97 (17.62–20.40)
40–44 (<i>n</i> = 4736)	79.56 (77.89–81.13)	20.44 (18.87–22.11)
45–49 (<i>n</i> = 4108)	78.22 (76.55–79.81)	21.78 (20.19–23.45)
<i>p</i> < 0.001		
Residency:		
Urban (<i>n</i> = 6970)	81.60 (80.10–83.01)	18.40 (16.99–19.90)
Rural (<i>n</i> = 26,242)	77.95 (77.18–78.69)	22.05 (21.31–22.82)
<i>p</i> < 0.001		
Ethnicity:		
Amhara (<i>n</i> = 7824)	83.91 (82.90–84.86)	16.09 (15.14–17.10)
Oromo (<i>n</i> = 8154)	74.42 (73.01–75.78)	25.58 (24.22–26.99)
Tigrie (<i>n</i> = 3594)	85.24 (83.80–86.58)	14.76 (13.42–16.20)
Somalie (<i>n</i> = 2498)	61.8 (58.93–64.59)	38.2 (35.41–41.07)
Other (<i>n</i> = 11,142)	77.32 (76.15–78.44)	22.68 (21.56–23.85)
<i>p</i> < 0.001		
Education:		
No education (<i>n</i> = 24,835)	78.24 (77.44–79.02)	21.76 (20.98–22.56)
Primary (<i>n</i> = 5916)	78.59 (76.90–80.19)	21.41 (19.81–23.10)
Secondary (<i>n</i> = 1865)	80.75 (77.83–83.36)	19.25 (16.64–22.17)
Higher (<i>n</i> = 596)	82.61 (76.32–87.50)	17.39 (12.50–23.68)
<i>p</i> = 0.254		
Wealth index:		
Poorest (<i>n</i> = 7960)	77.64 (75.98–79.21)	22.36 (20.79–24.02)
Poorer (<i>n</i> = 5436)	77.89 (76.48–79.23)	22.11 (20.77–23.52)
Middle (<i>n</i> = 5661)	79.02 (77.66–80.32)	20.98 (19.68–22.34)
Richer (<i>n</i> = 5477)	77.28 (75.85–78.64)	22.72 (21.36–24.15)
Richest (<i>n</i> = 8146)	80.61 (79.10–82.03)	19.39 (17.97–20.90)
<i>p</i> = 0.009		
Occupation:		
Not working (<i>n</i> = 16,462)	75.91 (74.89–76.89)	24.09 (23.11–25.11)
Professional/Technical/Managerial (<i>n</i> = 5209)	78.73 (76.92–80.44)	21.27 (19.56–23.08)
Others (<i>n</i> = 11,536)	81.46 (80.48–82.39)	18.54 (17.61–19.52)
<i>p</i> < 0.001		
Household head's sex:		
Male (<i>n</i> = 25,643)	78.19 (77.44–78.93)	21.81 (21.07–22.56)
Female (<i>n</i> = 7569)	79.56 (78.12–80.93)	20.44 (19.07–21.88)
<i>p</i> = 0.081		
Unmet need for contraception:		
No (<i>n</i> = 25,746)	78.42 (77.63–79.19)	21.58 (20.81–22.37)
Yes (<i>n</i> = 7466)	78.51 (77.18–79.79)	21.49 (20.21–22.82)
<i>p</i> = 0.903		

Table 1. Cont.

Variables	Optimal	Short
Place of delivery:		
Home (<i>n</i> = 19,433)	79.83 (78.95–80.68)	20.17 (19.32–21.05)
Health facility (<i>n</i> = 3748)	84.28 (82.20–86.15)	15.72 (13.85–17.80)
<i>p</i> < 0.001		
Media access:		
No (<i>n</i> = 19,830)	77.87 (76.98–78.73)	22.13 (21.27–23.02)
Yes (<i>n</i> = 13,382)	79.34 (78.31–80.33)	20.66 (19.67–21.69)
<i>p</i> = 0.026		

N.B. *p*-values are from χ^2 bivariate tests.

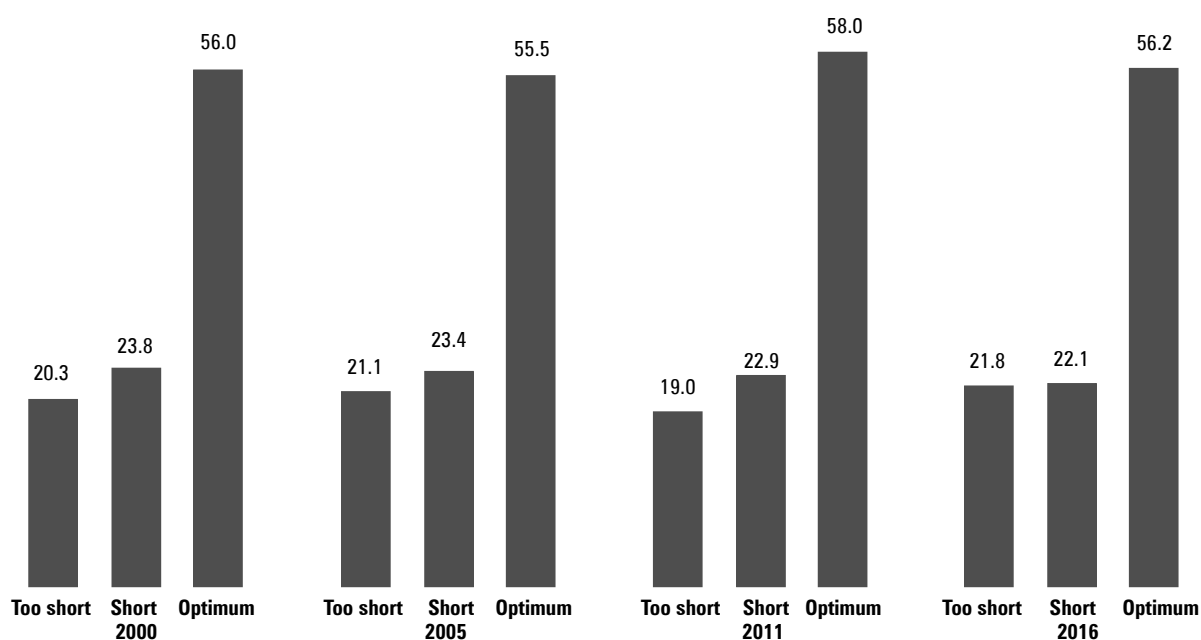


Figure 1. Trends in birth spacing in Ethiopia (%) 2000–2016

their reproductive life and make healthier fertility choices [24–26].

The association between education and birth spacing was found to be somewhat counterintuitive. Women who had higher educational levels had higher odds of having short birth spacing. This pattern was observed in the full and parsimonious models. Interestingly, women in the primary education group had lower odds of short birth spacing than those who had no education. Having secondary education also showed slightly higher odds of short birth spacing, but this was not statistically significant. From this contrast, it appears that having higher education is not a protective factor against experiencing short birth spacing. This association is contrary to the assumption that educated women are more likely to have better fertility indicators [27–29]. The possible mechanisms might be linked to socio-cultural factors such as traditional reproductive values and religious and ethnic norms. In the present study, ethnicity appeared to be a strong predictor of short birth spacing such that those of Amhara and Somalie ethnicity had lower and those in the Oromo and Tigrie ethnicity had higher odds of experiencing short birth spacing. Owing to nature of the

survey, understanding these differences is difficult, especially because of the lack of evidence in the literature. The underlying mechanisms behind these irregularities need to be explored in further studies.

Women who were employed in agriculture/other manual jobs had lower odds of short birth spacing compared with those who had no employment. No significant association was found for those in the Professional/Managerial category. This signifies that women in the agrarian communities may have a better chance of fertility control than those with no employment. From this finding it is suggestible that women's employment programs targeting those in disadvantaged communities may prove beneficial for improving birth spacing behaviour among Ethiopian women. As expected, health facility delivery showed a negative association with short birth spacing. Women who use professional maternity care are more likely to receive vital information and services that help them not only with obstetric care, but also with knowledge behaviour that is linked to reproductive health [30–32]. Ethiopia, similarly to many other countries in sub-Saharan Africa, has made noticeable progress in the areas of maternal and child health. Nonetheless, sub-optimal use of maternity

Table II. Predictors of short birth spacing in Ethiopia

Variables (reference category)	Full model	Parsimonious model
Age (45–49):		
15–19	3.433** (1.560–7.553)	2.218*** (1.693–2.906)
20–24	5.396*** (2.469–11.79)	3.727*** (2.859–4.860)
25–29	6.795*** (3.104–14.88)	4.501*** (3.447–5.878)
30–34	8.016*** (3.649–17.61)	5.300*** (4.052–6.933)
35–39	9.215*** (4.135–20.54)	6.335*** (4.799–8.362)
40–44	9.741*** (4.178–22.71)	6.678*** (4.944–9.021)
Residency (urban):		
Rural	0.923 (0.723–1.177)	0.874* (0.781–0.978)
Ethnicity (others):		
Amhara	2.156*** (1.794–2.591)	1.576*** (1.456–1.707)
Oromo	0.933 (0.807–1.079)	0.790*** (0.736–0.848)
Tigris	1.612*** (1.313–1.978)	1.263*** (1.147–1.391)
Somalie	0.388*** (0.319–0.470)	0.489*** (0.439–0.544)
Education (none):		
Primary	1.106 (0.954–1.282)	1.135*** (1.053–1.225)
Secondary	1.108 (0.833–1.473)	1.036 (0.887–1.210)
Higher	0.518*** (0.352–0.763)	0.789 (0.602–1.035)
Wealth quintile (poorest):		
Poorer	1.195* (1.012–1.411)	1.127** (1.036–1.226)
Middle	1.299** (1.088–1.551)	1.123** (1.033–1.221)
Richer	1.307** (1.080–1.583)	1.036 (0.951–1.129)
Richest	1.696*** (1.307–2.203)	1.288*** (1.163–1.426)
Occupation (not working):		
Professional/Managerial	1.164 (0.969–1.398)	1.014 (0.928–1.108)
Agri/Others	1.112 (0.975–1.267)	1.110** (1.043–1.182)
HH sex (male):		
Female	1.189* (1.031–1.371)	NA
Unmet need (No):		
Yes	0.829** (0.725–0.948)	NA
Facility delivery (No):		
Yes	1.393*** (1.209–1.605)	1.396*** (1.275–1.528)
Media access (No):		
Yes	1.043 (0.902–1.206)	1.004 (0.943–1.069)
Pseudo R ²	0.146	0.211

N.B. Both models are adjusted for years of survey. Exponentiated coefficients; 95% confidence intervals in brackets. **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

care is a persisting problem that deserves special emphasis. Our findings support the fact that using facility delivery services can improve birth spacing behaviour.

In addition to the assessment of the predictors, we were also interested in analysing whether the predictors of short birth spacing have changed over time. Our analysis suggests that adolescent motherhood remained the strongest predictor of short birth spacing, with the odds being about sevenfold in 2016, similar to that observed in 2000 (OR = 6.785, 95% CI: 3.700–12.44). There was no association between urbanicity and media access with birth

spacing in any of the 4 surveys, while association with ethnicity, education, and wealth status remained similar with a few exceptions. The positive association (OR = 1.628, 95% CI: 1.042–2.543) between short birth spacing and higher education was significant for 2016 only. Having an unmet need for pregnancy was positively associated with short birth spacing in the 2000 and 2016 surveys. Furthermore, a negative association between facility delivery and short birth spacing was found in the 2016 survey (OR = 1.180, 95% CI: 1.022–1.363]. These year-to-year comparisons add interesting insights in analysing the predictors of short birth

Table III. Changes in the predictors of short birth spacing in Ethiopia: 2000–2016

Parameter	2000	2005	2011	2016
Age (45–49):				
15–19	2.662*** (1.592–4.449)	2.014** (1.252–3.239)	3.433** (1.560–7.553)	2.196*** (1.676–2.877)
20–24	4.567*** (2.760–7.558)	3.252*** (2.043–5.175)	5.396*** (2.469–11.79)	3.706*** (2.841–4.833)
25–29	4.903*** (2.952–8.142)	3.832*** (2.398–6.122)	6.795*** (3.104–14.88)	4.476*** (3.427–5.846)
30–34	6.539*** (3.921–10.91)	4.145*** (2.587–6.641)	8.016*** (3.649–17.61)	5.300*** (4.051–6.934)
35–39	9.131*** (5.351–15.58)	5.685*** (3.475–9.299)	9.215*** (4.135–20.54)	6.404*** (4.850–8.456)
40–44	7.036*** (3.984–12.42)	6.403*** (3.690–11.11)	9.741*** (4.178–22.71)	6.810*** (5.040–9.202)
Residency (Urban):				
Rural	0.879 (0.677–1.141)	0.907 (0.720–1.142)	0.923 (0.723–1.177)	0.901 (0.805–1.008)
Ethnicity (Others):				
Amhara	1.557*** (1.324–1.830)	1.578*** (1.346–1.851)	2.156*** (1.794–2.591)	1.609*** (1.486–1.744)
Oromo	0.749*** (0.648–0.866)	0.832** (0.724–0.955)	0.933 (0.807–1.079)	0.812*** (0.757–0.872)
Tigrie	0.967 (0.791–1.183)	1.262* (1.045–1.523)	1.612*** (1.313–1.978)	1.255*** (1.140–1.383)
Somalie	0.530*** (0.413–0.680)	0.560*** (0.458–0.684)	0.388*** (0.319–0.470)	0.475*** (0.426–0.529)
Education (None):				
Primary	1.067 (0.902–1.263)	1.276*** (1.118–1.457)	1.106 (0.954–1.282)	1.137*** (1.054–1.226)
Secondary	0.933 (0.681–1.278)	1.250 (0.844–1.852)	1.108 (0.833–1.473)	1.026 (0.878–1.199)
Higher	1.196 (0.544–2.632)	0.853 (0.500–1.456)	0.518*** (0.352–0.763)	0.770 (0.587–1.011)
Wealth quintile (Poorest):				
Poorer	1.294** (1.088–1.539)	0.982 (0.840–1.147)	1.195* (1.012–1.411)	1.148** (1.055–1.249)
Middle	1.145 (0.960–1.365)	1.174 (0.997–1.381)	1.299** (1.088–1.551)	1.148** (1.056–1.249)
Richer	0.978 (0.814–1.175)	0.882 (0.747–1.042)	1.307** (1.080–1.583)	1.063 (0.975–1.158)
Richest	1.189 (0.941–1.503)	1.147 (0.904–1.454)	1.696*** (1.307–2.203)	1.308*** (1.181–1.448)
Occupation (Not working):				
Professional/Managerial	1.023 (0.838–1.251)	0.948 (0.813–1.106)	1.164 (0.969–1.398)	1.002 (0.917–1.096)
Agri/Others	1.036 (0.896–1.198)	1.191** (1.051–1.351)	1.112 (0.975–1.267)	1.107** (1.040–1.179)
HH sex (Male):				
Female	1.117 (0.941–1.325)	1.237** (1.077–1.420)	1.189* (1.031–1.371)	1.178*** (1.093–1.268)
Unmet need (No):				
Yes	0.815*** (0.722–0.919)	0.817*** (0.727–0.918)	0.829** (0.725–0.948)	0.804*** (0.757–0.853)
Facility delivery (No):				
Yes	1.300* (1.029–1.642)	1.416*** (1.159–1.730)	1.393*** (1.209–1.605)	1.372*** (1.253–1.502)
Media access (No):				
Yes	1.019 (0.888–1.168)	1.048 (0.936–1.174)	1.043 (0.902–1.206)	1.004 (0.943–1.070)
Pseudo R^2	0.182	0.235	0.240	0.190

Exponentiated coefficients; 95% confidence intervals in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

spacing. Generally, cross-sectional surveys only allow measurement of temporal associations without any indication of causality or changing trends. In this study, we were able to measure the associations for each of the surveys and show how the predictors change in strength for different sociodemographic groups. This is particularly important for investigating the progress of fertility indicators in the population and identifying vulnerable sub-populations who require special interventions.

In this study, we analysed 4 rounds of DHS data to measure the prevalence and predictors of short birth spacing

in Ethiopia. Our is the first study to do so on large nationally representative surveys in the country. Studies of this kind are important because they can provide crucial information for policymakers to attain the maternal and child health-related targets. One important limitation of the study was that the data were secondary, which prevented us from controlling the selection and measurement of variables. The data were cross-sectional, and hence no causality can be inferred from the associations. Reporting bias is another potential limitation because data were collected from the participants' own reports.

Conclusions

This study concludes that short birth spacing remains a persistent issue in Ethiopia, with the prevalence being virtually the same between 2000 and 2016. There are important sociodemographic differences in experiencing short birth spacing in terms of adolescent motherhood, ethnicity, financial well-being of the household, and use of health facility delivery services. However, these differences are not constant, and noticeable changes were observed in their association with birth spacing across the 4 surveys. In light of these findings, it is recommendable that the healthcare system in Ethiopia pays special attention to the prevention of short birth spacing to improve maternal and child health. Reproductive health programs should take into consideration the sociodemographic disparities in assessing women's susceptibility to making unhealthy fertility choices.

Availability of data and materials

Data are available through the DHS website: <https://dhsprogram.com/>

Conflict of interest

The authors declare no conflict of interest.

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