

BMJ Open Magnitude and associated factors of unmet need for family planning among rural women in Ethiopia: a multilevel cross-sectional analysis

Adugnaw Zeleke Alem ¹, Chilot Desta Agegnehu ²

To cite: Alem AZ, Agegnehu CD. Magnitude and associated factors of unmet need for family planning among rural women in Ethiopia: a multilevel cross-sectional analysis. *BMJ Open* 2021;**11**:e044060. doi:10.1136/bmjopen-2020-044060

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2020-044060>).

Received 22 August 2020

Revised 25 March 2021

Accepted 29 March 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Department of Epidemiology and Biostatistics, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

²School of Nursing, College of Medicine and Health Sciences and Comprehensive Specialized Hospital, University of Gondar, Gondar, Ethiopia

Correspondence to

Adugnaw Zeleke Alem; aduzeleke2201@gmail.com

ABSTRACT

Objective This study was aimed to assess the magnitude and associated factors of unmet need for family planning among rural women in Ethiopia.

Design Cross-sectional study.

Setting Ethiopia.

Participants Reproductive age group women.

Primary outcome Unmet need for family planning.

Methods This study drew data from Ethiopian Demographic and Health Survey, which was conducted from 18 January to 27 June 2016. A total of 8327 rural reproductive-aged (15–49 years) women were included. A two-level multivariable logistic regression model was carried out to identify individual and community-level factors associated with unmet need for family planning. Adjusted OR (AOR) with a 95% CI was used to assess the strength of association between independent and dependent variables.

Results The overall unmet need for family planning among rural women was 24.08% (95% CI 23.17 to 25.01), of which 14.79% was for spacing and 9.29% for limiting. Number of children (AOR=1.15; 95% CI 1.07 to 1.24) and working status of women (AOR=1.18; 95% CI 1.02 to 1.37) were significantly associated with a higher odds of unmet need for family planning. However, women with primary education (AOR=0.87; 95% CI 0.74 to 0.94), women married at age 18 or later (AOR=0.82; 95% CI 0.70 to 0.96), women from households with high wealth index (AOR=0.77; 95% CI 0.64 to 0.94), women who deem distance to a health facility as not a big problem (AOR=0.85; 95% CI 0.73 to 0.99), women from communities with a high percentage of educated women (AOR=0.73; 95% CI 0.59 to 0.89) and women who live in communities with high media exposure (AOR=0.81; 95% CI 0.68 to 0.98) were significantly associated with a lower odds of unmet needs for family planning.

Conclusion Unmet need for family planning among reproductive-aged women in rural Ethiopia was high. Number of children, working status of women, women's education, age at first marriage, household wealth, distance to a health facility, community women's education and community media exposure were significantly associated with unmet needs for family planning. Therefore, to reduce unmet need for family planning, public health policymakers should consider both individual and community-level factors when designing FP programmes and emphasis should be given to high-risk populations.

Strengths and limitations of this study

- This study used nationally representative data, which were collected with standardised and validated data collection tools.
- This study used an advanced model that accounts for the correlated nature of the Ethiopian Demographic and Health Survey (EDHS) data in the determination of estimates.
- The cross-sectional nature of the survey does not show the temporal or causal relationship between independent variables and outcome variable.
- Additionally, due to the use of secondary data, essential factors such as knowledge and attitudes about family planning (FP) methods, fear of side effects, health worker training on FP and men's perspectives on contraceptive use were not available in the EDHS; therefore, these factors were not included in our analysis.

BACKGROUND

Improving family planning (FP) access is fundamental for sustainable development goal (SDG) achievement. It is linked to human rights, gender equality and women's empowerment and has an impact on maternal, newborn, child and adolescent health.¹ Additionally, it has a role in enhancing broad socioeconomic development, improving environmental preservation and reducing poverty.^{1 2} Despite being sexually active and expressing intention to avoid pregnancy, 40.9% of women in low and middle-income countries (LMICs) who do not use any contraceptive methods prefer to space or limit the number of their children.³ This indicates an unsatisfied demand for FP, which is commonly referred to as unmet need for FP. It refers to the percentage of fecund women who are married or living in union and, thus, presumed to be sexually active but are not using any FP methods, who either want to space (when the woman would have wished to delay the birth of her next child by

at least 2 years) or to limit births (women who do not want any more children).⁴

Although the Ethiopian government incorporated FP as one of the essential health services provided at the community level by health extension workers, FP utilisation is low.⁵ In the country, the overall utilisation of FP methods among women was 36% (35% were using a modern method and 1% were using a traditional method).⁴

Unmet need for FP is a major public health concern in developing countries, particularly in sub-Saharan Africa.^{6–8} In developing countries, 225 million women had unmet need for modern FP methods in 2014, and 230 million women experienced unmet need for modern FP methods in 2019.^{6,7} The prevalence of unmet need for FP among reproductive age group women was 18.3% (15.1% for spacing and 3.2% for limiting) in Burkina Faso,⁹ 21.0% (12.6% for spacing and 8.4% for limiting) in Malawi,¹⁰ 46.6% (31.1% for spacing and 15.5% for limiting) in Cameroon¹¹ and 38.9% (27.5% for spacing and 12.2% for limiting) in Ghana.¹² In Ethiopia, the magnitude of overall unmet need for FP varied from 16.2% to 34.6%^{13–18} with 10.3% to 15.8 for spacing and 6.0 to 9.8 for limiting.^{14,18} According to the Ethiopian Demographic and Health Survey (EDHS), overall unmet need for FP declined from 37% in 2000 to 22% by 2016.^{4,19} There was a significant disparity in unmet need by region of residence that varied from 19.1% to 28.0% in rural areas and 7.2% to 15.0% in urban areas.^{4,18,19} Despite Ethiopia introducing an ambitious community health programme, relying on Health Extension Workers to address limited access to health services including FP in rural areas, women in rural areas have higher unmet need for FP compared with women in urban areas.^{18,20} Therefore, this study investigated factors associated with unmet need for FP among reproductive-aged women in rural Ethiopia.

Unmet need for FP reveals issues in supply and demand for FP resources that can have serious implications for women, children, the family and the society as a whole.⁹ Reducing unmet need for FP would significantly reduce unwanted pregnancy, unsafe abortion, closely spaced births, childbearing at a very early age and physical abuse,^{9,21,22} all of which are considered main contributors to preventable high maternal and infant mortality in LMICs.⁹ If all women with unmet need for FP were to use FP, the WHO estimated that maternal mortality could be declined by one-third.²³ Moreover, in Ethiopia, if the unmet need for FP was satisfied, more than 1 million deaths of children under the age of 5 could be prevented and nearly 13 000 maternal mortalities would be avoided over a 10 year period.²⁴ In addition, the use of contraceptives to regulate fertility either for child spacing or limiting childbearing is considered as an effective tool to control population growth^{10,25} and is related to higher female literacy, gender equality and reduced poverty.^{26,27} For these reasons, responding to unmet need for FP has become a crucial global health priority. Ethiopia has

adapted sustainable 145 development goals (SDGs), including goal 3.1, to reduce maternal mortality and goal 146, 3.7 to ensure universal access to reproductive health services, including FP.²⁸ Despite Ethiopia's Health Sector Development Plan's target to reduce maternal mortality to 267 per 100 000 live births by 2015, maternal mortality in the country is 412 per 100 000 live births in 2016.^{4,29}

Studies have assessed factors associated with unmet need for FP including educational status of the women and their partner,^{13,25,30–35} partner attitudes towards FP services utilisation,¹⁵ frequency of healthcare provider home visits,³⁰ discussion about FP with their partner,^{16,36} number of desired children,^{9,17,32} place of residence,^{25,31,32,35} marital status,^{10,16,37,38} previous use of FP,¹⁴ parity,^{15,17,18,38,39} age at first marriage,¹⁴ media exposure,^{17,25,30,32,40} age,^{10,14,17,25,31,32,34,35,41} wealth index/income,^{18,25,32,38} number of living children,^{9,25,30,34,35,40} experience of child death,^{32,35} knowledge about contraceptive methods,⁴¹ working status,³⁸ fear of side effects,²⁵ occupation^{16,31} and the attitude of respondents towards FP use.³⁰ However, inconsistent results have been reported in different settings in Ethiopia. For example, a study conducted in Debre Berhan town revealed that women who discuss FP with their husbands were more likely to have unmet need for FP,¹⁶ while a study in Shashemene town district observed that lack of discussion between partners was more likely to have unmet need for FP.¹³ In addition, while number of desired children >5 were positively associated with total unmet need for FP in Shire-Enda-Slassie,¹⁴ a negative association was observed in Kersa District.¹⁷ These findings indicate that factors associated with the unmet need to FP are area specific in Ethiopia, which motivates to conduct this study in rural areas at the national level.

Unmet need for FP is also associated with household-level and community-level factors.^{10,35} Although these previous studies in Ethiopia have assessed individual-level factors, community-level factors remained insufficiently explored. Additionally, unmet need remains high in rural areas, yet there is a scarcity of information on the factors explaining it in rural Ethiopia. Therefore, understanding the factors for unmet need for FP among women residing in rural households will help public health practitioners working in FP programmes to identify, implement and evaluate evidence-based interventions to tackle the unmet need and expand contraception use by considering the effects of community characteristics.

METHODS

Study design, period and setting

This study was a cross-sectional study conducted using secondary data collected in the 2016 EDHS. The EDHS drew nationally representative samples for the Ethiopian population, which was collected from 18 January 2016 to 27 June 2016. It is the fourth Demographic and Health Survey conducted in Ethiopia that includes data collected from nine regions and two administrative cities.

A detailed explanation of methodological strategies used in the EDHS has been outlined elsewhere.⁴²

Data source and extraction

The study used secondary data from the EDHS 2016. The EDHS is a nationally representative survey using a two-stage cluster sampling method. In the first stage, 645 clusters (202 urban areas and 443 rural areas) were randomly selected from the sampling frame (ie, the 2007 Ethiopian population and housing census) and household listing. The second stage involved a systematic selection of 18 008 households from the selected clusters, of which 17 067 were occupied. Of the occupied cluster, 16 650 were successfully interviewed. The information we used was related to women of reproductive ages (15–49 years). A total of 15 683 eligible women were identified for the survey. Women who had never had sex, were not sexually active or were infecund were excluded from this study. A total of a weighted sample of 83 277 women of reproductive age were included for analysis.

Variables of study

Outcome variable

The main outcome variable was the unmet need for FP, where it composed of both unmet need for spacing and limiting form of unmet need. It refers to the proportion of women who desire to either delay the next pregnancy or limit future pregnancies but are not using any method of contraception.^{11 35} It was a binary variable, women with unmet need for spacing or limiting were recoded as 'unmet need', while those using FP methods for spacing or limiting or with no unmet need were recorded as 'no unmet need'.

Independent variables

Based on the literature, independent variables included in the analysis are broadly categorised as individual and community-level factors that are associated with unmet need for FP.

Individual-level variables considered in the analysis were age, women's level of education (no education, primary, secondary and higher), religion (recoded as Muslim, Orthodox, Protestant and others), education level of husband (categorised as no education, primary and secondary/higher), marital status (categorised as ever married and never married), working status (not working/working), exposure to the media (categorised as 'no' if there is no media exposure at all and 'yes' if there is media exposure to either radio, magazine/newspaper, internet or television), wealth index (poorest and poorer categorised as 'low', middle categorised as 'middle' and richer and richest categorised as 'high'), number of living children, desired number of children (categorised as <5 and ≥5), age at marriage (categorised as <18 and ≥18 years), pregnancy termination (yes/no), child death (yes/no), visited by field worker at home (yes/no), visited health facility last 12 months (yes/no), discussion on women's healthcare (categorised as women

alone, jointly, husband alone and others) and knowledge of ovulatory cycle recoded as 'knowledgeable' if they correctly identified middle of menstrual cycle as fertile window and otherwise recoded as 'not knowledgeable'.

Community-level factors included in the study were community wealth, community women's educational level, community husband's educational level, community media exposure and perceived distance to the health facility (big problem and not a big problem). Community wealth was defined as the proportion of women in the poorest and poorer quintile. Community women's educational level was defined as the proportion of women with a minimum of primary level of education. Community husband educational level was defined as the proportion of husbands with a minimum of primary level of education. Community media exposure was defined as the proportion of women exposed to at least one type of media, such as radio, newspaper, television or internet. Community-level factors, namely, community wealth, community women's educational level, community husband educational level and community media exposure were constructed by aggregating individual-level variables into community-level variables. Each aggregated community variable was divided into low and high based on the median value because they were not normally distributed.

Statistical analysis

All statistical analyses were performed using Stata V.14.0. Sample weighting was done before doing any statistical analysis, to adjust for the nonproportional allocation of the sample to different regions and their urban and rural areas as well as to adjust for the nonresponse rates. Sample-based nonresponse adjustments distributed the base weights of the nonrespondents to the respondents, so that the sum of the adjusted weights over the responding units equals the sum of the base weights for responding units and nonresponding units. Descriptive statistics using frequency and percentage were used to get an overview of the selected variables. Multilevel logistic regression models were used to estimate the effects of unmet need for FP factors at the two specified levels. It allows for the estimation of valid SEs by adjusting for the intracluster correlation of the outcome variable.⁴³

Four models were fitted. First, model I, the empty or unconditional model, without covariates was analysed. This model was used to estimate the random intercept at cluster level and the variation in the odds of unmet need for FP experience between communities. Second, model II was constructed by adding individual-level factors. Third, model III was constructed by adding community-level factors. Finally, model IV including both individual-level and community-level factors was constructed. Then, the appropriate model was selected using deviance and the model with the lowest deviance was fitted to estimate the association between independent factors and unmet need for FP. In addition, the measure of variance (random effects), which is the measure of residual errors at the

individual level and community variation, was reported in terms of the intraclass correlation coefficient (ICC)⁴³ and proportional change in variance (PCV).⁴⁴

First, bivariable multilevel logistic regression models were fitted and all variables with a *p* value <0.20 at bivariable analysis were entered into the multivariable analysis. Then multivariable multilevel logistic regression model was performed to control for possible confounders. In multivariable multilevel logistic regression models, ORs together with 95% CI were calculated, and statistical significance was declared at *p* value <0.05.

Ethical consideration

The data were accessed from the Demographic Health Survey Programme at <http://www.dhsprogram.com>. Ethical approval was not needed because the study used publicly available data. However, permission to use the data for the study was obtained from the Demographic Health Survey programme. Informed consent was obtained at the beginning of each interview by the EDHS data collectors.

Patient and public involvement statement

In this study, patients and the public were not involved in the study design or planning of the study. Furthermore, as we used secondary analysis, EDHS data patients were not consulted to interpret the results and were not invited to contribute to the writing or editing of this document for readability or accuracy.

RESULTS

In this study, a total weighted sample of 8327 women in reproductive age was included. The mean age of the study participants was 29.08±7.71 years. Most of them were Orthodox (*n*=3262, 39.2%), had ever been married (*n*=8158, 98.0%), married before 18 years of age (*n*=6193, 75.9%), desired to have five or more children (*n*=4511, 54.2) and were not exposed to media (*n*=6729, 80.2%). Regarding educational status, nearly two-third (*n*=5449, 65.4%) of women and nearly half of their parents (*n*=3801, 50.3%) had no formal education (table 1).

Magnitude of unmet for FP

In this study, overall unmet need for FP among rural women was 24.08% (95% CI 23.17 to 25.01) of which 14.79% (95% CI 14.04 to 15.57) was for spacing and 9.29% (95% CI 8.68 to 9.93) for limiting (figure 1).

Factors associated with unmet need for FP.

Random effect model

As presented in table 2, in the null model, about 9.6% of the total variance in the unmet need for FP was at the community level and may be attributable to other unobserved community factors (ICC=0.096). In the final model (model IV), as indicated by the PCV, 17.2% of the variation in unmet need for FP across communities was explained by both individual and community-level factors. Additionally, the final model indicates that

Table 1 Background characteristics of respondents in Ethiopia, EDHS 2016

Variables	Frequency	Per cent
Marital status		
Ever married	8158	98.0
Never married	169	2.0
Education of respondent		
No education	5449	65.4
Primary	2497	30.0
Secondary	301	3.6
Higher	80	1.0
Educational status of husband		
No education	3801	50.3
Primary	3016	39.9
Secondary/above	736	9.8
Wealth index		
Low	3863	46.4
Middle	2005	24.1
High	2459	29.5
Religion		
Orthodox	3262	39.2
Protestant	1824	21.9
Muslim	3011	36.1
Others	230	2.8
Working status		
No	6067	72.9
Yes	2260	27.1
Media exposure		
No	6729	80.2
Yes	1598	19.8
Knowledge of ovulatory cycle		
Knowledgeable	1681	20.2
Not knowledgeable	6646	79.8
Desired number of children		
<5	3816	45.8
≥5	4511	54.2
Age at marriage		
<18 years	6193	75.9
≥18 years	1964	24.1
Prior pregnancy termination		
No	7560	90.8
Yes	767	9.2
Child death		
No	7175	95.7
Yes	372	4.3
Distance from health facility		
Big problem	5106	61.3

Continued

Table 1 Continued

Variables	Frequency	Per cent
Not big problem	3221	38.7
Visited by field worker		
No	5859	70.4
Yes	2468	29.6
Visited health facility last 12 months		
No	6068	72.9
Yes	2259	27.1

EDHS, Ethiopian Demographic and Health Survey.

the lowest Median Odds Ratio (MOR) value (1.67) that showed the effects of community heterogeneity. This means if we randomly select women from different clusters, women at the cluster with higher risk of unmet need for FP had 1.67 times higher odds of unmet need for FP as compared with those women at cluster with the lowest risk of unmet for FP. Besides, model fitness was checked using deviance and model IV with the lowest deviance (deviance=6125.343) was used to identify significantly associated factors with unmet need for FP. Therefore, all interpretations and conclusions of results were thus based on model IV.

Fixed effect model

After adjusting for possible confounders, age, women's education level, wealth of household, number of children, age at first marriage, working status, distance from the health facility, community husband education level and community media exposure were significantly associated with unmet need for FP in Ethiopia.

As age of women increases the odds of unmet need for FP increases, adjusted OR ((AOR)=1.05; 95% CI 1.04 to 1.06). The odds of unmet need for FP among women who attend primary education was 13% (AOR=0.87; 95% CI 0.74 to 0.94) lower as compared with women with no formal education. As the number of children increases, the odds of unmet need for FP increases (AOR=1.15;

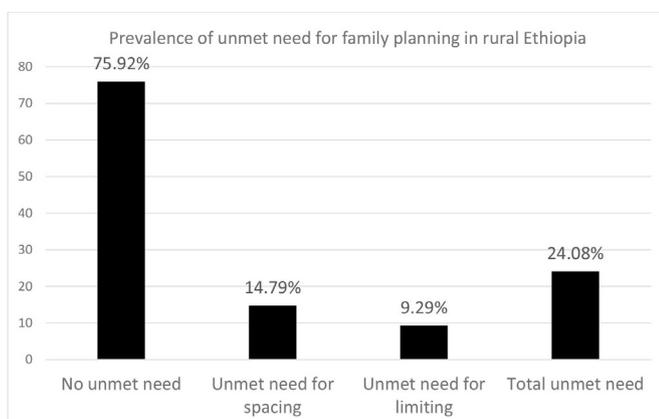


Figure 1 Magnitude of unmet need for family planning among rural women in Ethiopia.

95% CI 1.07 to 1.24). Women who had been working within the 12 months preceding the survey had higher odds of having unmet need for FP (AOR=1.18; 95% CI 1.02 to 1.37) compared with women who do not work. Women married at age 18 or later had 18% (AOR=0.82; 95% CI 0.70 to 0.96) lower odds of unmet need for FP as compared with marital age less than 18. Additionally, considering the wealth index, the odds of unmet need for FP among women from high wealth class was 23% (AOR=0.77; 95% CI 0.64 to 0.94) lower as compared with women from the poorer/poorest class.

Among community factors, the odds of unmet for FP among women reporting distance to a health facility as not the big problem were decreased by 15% (AOR=0.85; 95% CI 0.73 to 0.99) compared with their defined counterparts. Moreover, women from communities with a high percentage of educated women (AOR=0.73; 95% CI 0.59 to 0.89) were less likely to have unmet need for FP compared with women from communities with a low percentage of educated women. Similarly, this study further reveals that women who live in communities with high media exposure were associated with decreased odds of unmet need for FP compared with women in low-media exposure communities (AOR=0.81, 95% CI 0.68 to 0.98) (table 2).

DISCUSSION

This study was conducted to investigate the magnitude and factors for unmet need in FP among rural women in the reproductive age group. This study contributes to the literature on unmet need for FP by focusing on rural women, who have high unmet need for FP. Few studies of unmet need in rural areas have looked at this population. Identifying specific factors associated with unmet need for FP in a rural area has, therefore, been brought further to the fore of national FP awareness and improving access to reproductive health services, as this is critical for achieving the fifth SDG goal.⁴⁵ Additionally, this study extended factors associated with unmet need for FP by considering community-level factors that may shape the level of unmet need for FP in Ethiopia. This provides information on a wider range of factors to be targeted by FP policymakers in the country.

The current study revealed that 24.08% (95% CI 23.17 to 25.01) of rural women in reproductive age in Ethiopia had total unmet need for FP. The result is lower than a study conducted in Ethiopia,^{13 15–17 46} Ghana⁴⁷ and Cameroon.¹¹ This discrepancy could be explained by the fact that the previous studies conducted in Ethiopia^{13 15–17} were small-scale surveys compared with the EDHS, which is a nationally representative survey and covered more women in the region. It could be due to the differences in studied populations and background characteristics differences among participants. For example, assessing unmet need of long-acting and permanent FP methods¹³ and among young married women¹⁷ in Ethiopia and unmet need among HIV-positive women in Ghana⁴⁷

**Table 2** Multilevel logistic regression analysis for factors associated with unmet need for FP among reproductive-aged women in Ethiopia, EDHS 2016

Variables	Model 1	Model 2 (AOR with 95 % CI)	Model 3 (AOR with 95 % CI)	Model 4 (AOR with 95 % CI)
Age		1.05 (1.04 to 1.06)		1.05 (1.04 to 1.06)*
Level of women's education				
No education		1		1
Primary		0.91 (0.80 to 0.98)		0.87 (0.74 to 0.94)*
Secondary		1.08 (0.71 to 1.61)		1.09 (0.73 to 1.64)
Higher		0.90 (0.39 to 2.09)		0.91 (0.39 to 2.11)
Working status of respondents				
Not working		1		1
working		1.21 (1.04 to 1.40)		1.18 (1.02 to 1.37)*
Type of media exposed				
No		1		1
Yes		0.87 (0.72 to 1.05)		0.84 (0.69 to 1.02)
Husbands' education				
No education		1		1
Primary		1.28 (1.08 to 1.52)		1.23 (0.97 to 1.33)
Secondary/above		1.13 (0.88 to 1.44)		1.07 (0.84 to 1.38)
Wealth Index				
Low		1		1
Middle		0.94 (0.78 to 1.12)		0.93 (0.77 to 1.11)
High		0.77 (0.64 to 0.94)		0.77 (0.64 to 0.94)*
Age at marriage				
<18		1		1
≥18		0.82 (0.70 to 0.96)		0.82 (0.70 to 0.96)*
Religion				
Orthodox		1		1
Protestant		1.08 (0.86 to 1.36)		1.01 (0.79 to 1.2)
Muslim		1.14 (0.94 to 1.38)		1.13 (0.93 to 1.38)
Others		1.64 (1.05 to 2.56)		1.60 (1.03 to 2.50)
Child death				
No		1		1
Yes		1.19 (0.84 to 1.69)		1.18 (0.84 to 1.68)
Pregnancy termination				
No		1		1
Yes		0.94 (0.75 to 1.17)		0.94 (0.75 to 1.17)
Number of alive children				
		1.16 (1.07 to 1.25)		1.15 (1.07 to 1.24)*
Desired number of children				
<5		1		1
≥5		0.97 (0.84 to 1.13)		0.99 (0.86 to 1.15)
Distance from health facility				
Big problem			1	1
Not big problem			0.86 (0.76 to 0.98)	0.85 (0.73 to 0.99)
Community women's education				
Low			1	1

Continued

Table 2 Continued

Variables	Model 1	Model 2 (AOR with 95 % CI)	Model 3 (AOR with 95 % CI)	Model 4 (AOR with 95 % CI)
High			0.78 (0.64 to 0.93)	0.73 (0.59 to 0.89)*
Community husbands' education				
Low			1	1
High			1.17 (0.97 to 1.14)	1.15 (0.94 to 1.41)
Community wealth				
Low			1	1
High			0.83 (0.61 to 1.12)	0.90 (0.66 to 1.24)
Community media exposure				
Low			1	1
High			0.89 (0.75 to 1.06)	0.81 (0.68 to 0.98)*
Random effects and model comparison				
Community level variance (SE)	0.35 (0.056)	0.32 (0.059)	0.30 (0.053)	0.29 (0.057)
ICC (%)	9.6	8.7	8.4	8.1
Deviance (-2LL)	7121.163	6140.094	7078.809	6125.343
PCV (%)	Ref	8.6	14.3	17.2
MOR	1.75	1.71	1.68	1.67

*P value <0.05.

AOR, adjusted OR; EDHS, Ethiopian Demographic and Health Survey; FP, family planning; ICC, intraclass correlation coefficient; LL, log likelihood; MOR, Median Odds Ratio; PCV, proportional change in variance.

versus assessing unmet need for FP among reproductive age group women in our study. In terms of background characteristic differences among participants, the proportion of women who were married in this study was 98.0%, and in the Cameroon study, it was 61.1%.¹¹ In this regard, the previous study implies that married women had 59% lower odds of unmet need for FP compared with never married women.¹⁰ Therefore, having large proportions of women who are married in our study may reduce the odds of unmet need for FP.

However, the magnitude of unmet need for FP in this study was higher than studies conducted in Ethiopia,^{14 18} Burkina Faso,⁹ Malawi,¹⁰ Cameroon³⁶ and Nigeria.³⁵ This variation might be attributed to the differences in study population and study setting. The current study exclusively includes rural women. In most parts of Ethiopia, rural residents have usually low health services coverage and decreased awareness of FP due to low education, low socioeconomic status, and have limited access to FP services, this may lead to a higher prevalence of unmet need in rural areas. Therefore, this provides information on rural residents to be targeted by FP policymakers in the country because the high unmet need for FP further exposes women to unintended pregnancies and unsafe abortion, which raises the risk of maternal and child death.^{9 48} Another possible explanation for the difference in the prevalence of unmet need could be the difference in the educational level of study participants. For instance, a previous study done in Ethiopia reported that 41.6% of women have no formal education, which was lower than

that of this study (65.4%). Moreover, a study conducted in Sudan reveals that 51.1% of women had secondary education, which was higher than that of the current study (3.6%). Previous literature documented that educational level has a negative relationship with unmet need for FP.^{10 13 30 32 34 35 37} Therefore, expansion of women's education, which is currently poor as found in the current study, is recommended to increase awareness and to reduce unmet need for FP among women in rural areas. Besides, empowering illiterate women to know about and use FP and its promotion of men and couples through increasing outreach in the form of household visits by a community health worker may reduce unmet need for FP in rural areas.^{49 50} A higher proportion was observed for unmet need for spacing in comparison with that for limiting (14.79% vs 9.28%). This finding is in line with other studies conducted in different parts of Ethiopia^{14 18} and Cameroon,^{11 36} where unmet need for spacing contributed to a higher proportion of the total unmet need.

In this study, age of women was statistically significant that as age of women increased, the magnitude of unmet need also increased. Similarly, a study conducted in Ethiopia^{14 17} and Malawi¹⁰ reveals that unmet need for FP was higher among older women than younger women. This could be because older women near to menopause may be perceived as low risk for pregnancy and younger women may have better awareness of FP due to recently attending school. Moreover, this association may be explained by the fact that older women tend to have higher numbers of children than younger women.



In this study, women's education is another important variable that significantly associated with unmet need for FP, that is, women with primary education were less likely to report having an unmet need for FP as compared with women without education. This is congruent with the study conducted in Ethiopia,^{13 30 37} Nigeria,³⁵ Malawi,¹⁰ Burundi³² and other LMICs.³⁴ This might be due to women who attained education being more exposed to FP through media and other modes of exposure, which improves access to FP alternatives and helps them to understand the health benefits of the FP to reduce fertility, maternal and child morbidity and mortality. It suggests that educated women are more likely to gain FP services because they are more empowered in decision-making regarding contraceptive use.⁵¹ Furthermore, the educational status of women is directly related to economic and social empowerment, which increased exposure to resources such as access to media and utilisation of desired healthcare delivery services. Our study contradicts the finding of studies conducted in Ethiopia,^{18 37} Burundi,³² Nigeria³³ and Nepal,³¹ which have reported that educated women have higher odds of unmet need for FP. These findings indicate that the need to take the context into account when assessing factors associated with unmet need for FP.

A lower proportion of unmet need for FP was observed among women in the high wealth quantile. Results of this study show that women who were in the high wealth quintile were 23% less likely to have unmet need for FP than women who belong to the low quintile; this is in line with the results of other studies conducted in Ethiopia,^{18 24} Burundi,³² Nigeria³³ and Pakistan.²⁵ This may be due to our result reveals women in the high wealth category were most of them attend higher education but those in the low wealth category were most of them are not educated. Additionally, most of the women in the high wealth category are exposed to media (54.0%) as compared with women in the low wealth category (23.7%). Education and mass media exposure could probably give women a better chance to understand the uses of FP and the negative effects of FP methods thereby increased their consistent use.

The current study found that women who had been working within the 12 months preceding the survey had higher odds of having unmet need for FP. This finding is supported by the study conducted in Malawi.¹⁰ The possible explanation for this association might be because women who were working can have a good income so they may be able to afford private health facilities compared with their counterparts.⁵² Moreover, women who were working would have a great deal of trust and decision-making ability on health services including FP.^{52 53}

Consistent with previous studies,^{9 14 15 31–35} our study indicates that unmet need for FP is positively associated with having more children. Even though women with many children may actually want to either delay the birth of their next child or limit births, they are not empowered to use FP by the sociocultural setting

in rural areas.^{54 55} Therefore, it is important to address sociocultural barriers to reproductive health services in rural areas by strengthening the traditional governance structure, forming volunteer groups and committees, promoting male involvement in reproductive health services and engaging religious and clan leaders in reproductive health services.⁵⁶

We also identified that as the first marital age increased, the level of unmet need decreased. Women married at age 18 or later had lower odds of unmet need for FP compared with women who married before age 18. This finding is similar to study conducted in Gonji Kolela District, Ethiopia,⁵⁷ but it disagrees with another study done in Southern Nations, Nationalities and Peoples Region, Ethiopia.⁵⁴ Women who marry at age 18 or later were able to plan and decide their family size because they had more exposure to FP methods. In addition to increased unmet need for FP, child marriage (marriage before their 18th birthday) is associated with early child-bearing, low economic status of women, termination of education, negative psychological impact, higher rates of divorce, a number of poor social and physical outcomes for young women and their offspring, complications of pregnancy and an increased risk of both maternal and child mortalities.^{58 59} This implies policymakers should strive to create awareness and enforce the legal age for marriage so as to increase the marital age above 18 years to reduce unmet need for FP. However, studies on marital age have resulted in conflicting findings in Ethiopia. Some studies reported that marital age is negatively associated with unmet need for FP,^{46 57} while one study reported that marital age is positively associated with unmet need for FP.⁵⁴ In this regard, a systematic meta-analysis conducted in Ethiopia revealed that the odds of unmet need for FP were 2.3 times higher among women with age at first marriage <18 years than women marriage at 18 years and above.⁶⁰

Similar to a study conducted in Malawi,¹⁰ this study found that unmet need for FP was greater among women who cited the distance to a health facility as a problem. This finding suggests improving geographical access to health facilities decreases unmet need for FP. This could be explained by women who live closest to health facility being more likely to receive appropriate maternal healthcare services.^{61–63} Previous studies revealed that women who received maternal healthcare services (antenatal and postnatal care) were more likely to use contraception than women who did not receive any maternal healthcare services.^{64 65}

Furthermore, the current study reveals that community-level factors were also associated with the unmet need for FP. Unmet need for FP was found to be lower among women from communities with a high percentage of educated women. This is consistent with a study conducted in Malawi.¹⁰ The result of our study further reveals that women who live in communities with high media exposure had decreased odds of unmet need for FP compared with women in low-media exposure communities. This

might be due to educated women having higher odds of understanding health messages and experiencing demand for FP services. Additionally, educated women and women from wealthier households are more likely to be empowered to make decisions on their own, which may subsequently increase accessing information and affording private health facilities to access FP services.^{66 67} Mass media is an important tool for mobilising communities to use FP services.³⁰ Therefore, women from communities with a high percentage of exposure to media and educated women may learn from others about the benefit of using FP services and where these may be accessed.

This study builds literature on both individual and community-level factors associated with unmet need for FP among rural women using EDHS. This has implications for both interventions at the individual and community level. Therefore, we hope that this study will help policymakers to make wise decisions to reduce unmet need for FP, and it could be used as a baseline measure for future FP intervention studies.

Strengths and limitations

The main strength of this study was it used large population-based data with a large sample size, which is representative of the entire population of rural Ethiopia. Also, using large sample size allows us to more precisely estimate unmet need for FP and the effect size for associated risk factors. Furthermore, multilevel logistic regression was applied for this study to identify the contextual factors in the occurrence of unmet need for FP among rural women of reproductive age. Despite the study's strengths, it has limitations. Due to the cross-sectional nature of the EDHS data, it does not show a temporal relationship between independent variables and outcome variable. Additionally, due to the use of secondary data, essential factors such as knowledge and attitude of FP methods, fear of side effects, health worker training on FP and men's perspectives on contraceptive use were not available in the EDHS; therefore, it was not possible to incorporate these variables in the analysis.

Conclusion

This study has shown that unmet need for FP among reproductive-aged women in rural Ethiopia was high. Number of children and working status of women were significantly associated with higher odds of unmet needs for FP. However, women with primary education, women married at age 18 or later, being higher wealth, distance to a health facility not the big problem, women from communities with a high percentage of educated women and women who live in communities with high media exposure were significantly associated with a lower odds of unmet needs for FP. Therefore, there is the need to implement consistently effective FP policies among rural women in Ethiopia. Moreover, public health policies and interventions that will strengthen women's education improve the existing strategies to increase the marital age of women, improve media exposure of women on

FP issues and increase the wealth status of households should be designed and implemented to reduce unmet need for FP in rural parts of country.

Acknowledgements We would like to acknowledge Major Demographic Health and Survey (DHS) program, which granted us the permission to use DHS data.

Contributors AZA: developed the concept, reviewed literature, carried out the statistical analysis, interpreted the results and prepared the manuscript. CDA: reviewed literature, involved in analysis, interpretation and prepared the manuscript. Both the authors read and approved the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement The datasets used and/or analysed during the current study is available in a public, open access repository which is accessible online <http://www.dhsprogram.com>.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Adugnaw Zeleke Alem <http://orcid.org/0000-0002-1928-8548>

Chilot Desta Agegnehu <http://orcid.org/0000-0001-9407-4630>

REFERENCES

- 1 Starbird E, Maureen Norton RM. Investing in family planning: key to achieving the sustainable development goals. *Glob Heal Sci Pract* 2016;4:1–20.
- 2 Gebremeskel F, Estifanos W, Gizachew Y, *et al*. Utilization of family planning methods and associated factors among reproductive-age women with disability in Arba Minch town. *J Contracept* 2020;11:25–32.
- 3 Moreira LR, Ewerling F, Barros AJD, *et al*. Reasons for nonuse of contraceptive methods by women with demand for contraception not satisfied : an assessment of low and middle-income countries using demographic and health surveys. *Reprod Health* 2019;16:1–15.
- 4 Central Statistics Agency (CSA) [Ethiopia] and ICF International. *Ethiopia demographic and health survey 2016*. 2016. Addis Ababa, Ethiopia and Rockville, Maryland, USA: Central Statistical Agency (CSA) and ICF International, 2016.
- 5 Mulatu T, Sintayehu Y, Dessie Y, *et al*. Modern family planning utilization and its associated factors among currently married women in rural eastern Ethiopia: a community-based study. *Biomed Res Int* 2020;2020:6096280.
- 6 United Nations Department of Economic and Social Affairs. Estimates and projections of family planning indicators. Available: https://www.un.org/en/development/desa/population/theme/family-planning/cp_model.asp [Accessed 17 Apr 2020].
- 7 Sedgh G, Ashford LS HR. Unmet need for contraception in developing countries: examining Women's reasons for not using a method. *New York Guttmacher Institute*;216AD:2015–6.
- 8 Gahungu J, Vahdaninia M, Regmi PR. The unmet needs for modern family planning methods among postpartum women in sub-Saharan Africa: a systematic review of the literature. *Reprod Health* 2021;18:1–15.
- 9 Wulifan JK, Jahn A, Hien H, *et al*. Determinants of unmet need for family planning in rural Burkina Faso: a multilevel logistic regression analysis. *BMC Pregnancy Childbirth* 2017;17:1–11.
- 10 Nkoka O, Mphande WM, Ntenda PAM, *et al*. Multilevel analysis of factors associated with unmet need for family planning among Malawian women. *BMC Public Health* 2020;20:1–12.
- 11 Edietah EE, Njotang PN, Ajong AB, *et al*. Contraceptive use and determinants of unmet need for family planning: a cross sectional survey in the North West Region, Cameroon. *BMC Womens Health* 2018;18:1–8.

- 12 Wemakor A, Garti H, Saeed N, *et al.* Prevalence and determinants of unmet need for contraception in North Gonja district, Ghana. *BMC Womens Health* 2020;20:1–9.
- 13 Mota K, Reddy S, Getachew B. Unmet need of long-acting and permanent family planning methods among women in the reproductive age group in shashemene town, Oromia region, Ethiopia: a cross sectional study. *BMC Womens Health* 2015;15:1–8.
- 14 Gebre G, Birhan N, Gebreslasie K. Prevalence and factors associated with unmet need for family planning among the currently married reproductive age women in Shire-Enda- Slassie, Northern West of Tigray, Ethiopia 2015: a community based cross-sectional study. *Pan Afr Med J* 2016;23:1–9.
- 15 Solomon T, Nigatu M, Gebrehiwot TT, *et al.* Unmet need for family planning and associated factors among currently married reproductive age women in Tiro Afeta district, South West Ethiopia, 2017: cross-sectional study. *BMC Womens Health* 2019;19:1–9.
- 16 Worku SA, Ahmed SM, Mulushewa TF. Unmet need for family planning and its associated factor among women of reproductive age in Debre Berhan town. *BMC Res Notes* 2019:9–14.
- 17 Dingeta T, Oljira L, Worku A, *et al.* Unmet need for contraception among young married women in eastern Ethiopia. *Open Access J Contracept* 2019;10:89–101.
- 18 Tadele A, Abebaw D, Ali R. Predictors of unmet need for family planning among all women of reproductive age in Ethiopia. *Contracept Reprod Med* 2019;6:1–9.
- 19 Central Statistics Agency (CSA) [Ethiopia] and ICF International. *Ethiopia demographic and health survey 2000*. Addis Ababa, Ethiopia and ORC Macro Calverton, Maryland, USA: Central Statistical Agency (CSA) and ICF International, 2000.
- 20 Genet E, Abeje G, Ejigu T. Determinants of unmet need for family planning among currently married women in Dangila town administration, Awi Zone, Amhara regional state ; a cross sectional study. *Reprod Health* 2015:1–5.
- 21 Bishwajit G, Tang S, Yaya S, *et al.* Unmet need for contraception and its association with unintended pregnancy in Bangladesh. *BMC Pregnancy Childbirth* 2017;17:1–9.
- 22 Yaya S, Ghose B. Prevalence of unmet need for contraception and its association with unwanted pregnancy among married women in Angola. *PLoS One* 2018;13:e0209801–13.
- 23 WHO. *A guide to family planning for community health workers and their clients*, 2012.
- 24 Yalew M, Adane B, Kefale B, *et al.* Individual and community-level factors associated with unmet need for contraception among reproductive-age women in Ethiopia ; a multi-level analysis of 2016 Ethiopia Demographic and Health Survey. *BMC Pub Heal* 2020;20:1–9.
- 25 Asif MF. Socio-demographic determinants of unmet need for family planning among married women in Pakistan. *BMC Public Health* 2019;19:1–8.
- 26 Kabagenyi A, Jennings L, Reid A, *et al.* Barriers to male involvement in contraceptive uptake and reproductive health services. a qualitative study of men and women's perceptions in two rural Districts in Uganda. *Reprod Heal* 2014;11.
- 27 Moshia I, Ruben R, Kakoko D. Family planning decisions, perceptions and gender dynamics among couples in Mwanza, Tanzania: a qualitative study. *BMC Public Health* 2013;13:523.
- 28 National Planning Commission, The Federal Democratic Republic of Ethiopia. *The second growth and transformation plan (GTP II), 2015/16-2019/20*: NPC Addis Ababa, Ethiopia, 2016. Available: http://dagethiopia.org/new/docstation/com_content.article/100/gtpii_english
- 29 FMOH. Health sector development programme IV-2010/11–2014/15. Available: <https://www.healthynewbornnetwork.org/hnn-content/uploads/HSDP-IV-Final-Draft-October-2010>
- 30 Duressa LT, Getahun A, Regassa T, *et al.* Unmet need for family planning and related factors among currently married women in Sibru Sire district. *J Women's Heal Care* 2016;7:1–14.
- 31 Lamichhane K. Unmet need for family planning among currently married young women in Nepal. *J Dev Adm Stud* 2017;25:83–94.
- 32 Nzokirishaka A, Itua I. Determinants of unmet need for family planning among married women of reproductive age in Burundi: a cross-sectional study. *Contracept Reprod Med* 2018;3:1–13.
- 33 Alaba OO, Olaomi JO, Olubusoye OE. Spatial pattern and determinants of unmet need of family planning in Nigeria spatial pattern and determinants of unmet need of family planning in Nigeria. *South African Fam Pract* 2015;57:306–12.
- 34 Wulifan JK, Brenner S, Jahn A, *et al.* A scoping review on determinants of unmet need for family planning among women of reproductive age in low and middle income countries. *BMC Womens Health* 2016;16:2.
- 35 Solanke BL, Oyinlola FF, Oyeleye OJ, *et al.* Maternal and community factors associated with unmet contraceptive need among childbearing women in Northern Nigeria. *Contracept Reprod Med* 2019;4:1–12.
- 36 Ajong AB, Njotang PN, Yakum MN, *et al.* Determinants of unmet need for family planning among women in urban Cameroon: a cross sectional survey in the Biyem-Assi health district, Yaoundé. *BMC Womens Health* 2016;16:1–8.
- 37 Workie DL, Zike DT, Fenta HM, *et al.* A binary logistic regression model with complex sampling design of unmet need for family planning among all women aged (15–49) in Ethiopia. *Afr Health Sci* 2017;17:637–46.
- 38 Nyarko SH, Sparks CS, Bitew F. Spatio-temporal variations in unmet need for family planning in Ghana: 2003–2014. *Genus* 2019;75.
- 39 Mercer LD, Lu F, Proctor JL. Sub-national levels and trends in contraceptive prevalence, unmet need, and demand for family planning in Nigeria with survey uncertainty. *BMC Public Health* 2019;19:1–9.
- 40 Pal A, Yadav J, Jitenkumar S, *et al.* Factors associated with unmet need of family planning in Bihar, India: a spatial and multilevel analysis. *Int J Reprod Contracept Obstet Gynecol* 2018;7:3638–45.
- 41 Wilopo SA, Setyawan A, Pinandari AW, *et al.* Levels, trends and correlates of unmet need for family planning among postpartum women in Indonesia: 2007–2015. *BMC Womens Health* 2017;17:1–14.
- 42 Central Statistics Agency (CSA) [Ethiopia] and ICF International. *Ethiopia demographic and health survey 2016*. Addis Ababa, Ethiopia and Rockville, Maryland, USA: Central Statistical Agency (CSA) and ICF International, 2016.
- 43 Peugh JL. A practical guide to multilevel modeling. *J Sch Psychol* 2010;48:85–112.
- 44 Merlo J, Chaix B, Ohlsson H, *et al.* A brief conceptual tutorial of multilevel analysis in social epidemiology: using measures of clustering in multilevel logistic regression to investigate contextual phenomena. *J Epidemiol Community Health* 2006;60:290–7.
- 45 Starbird E, Norton M, Marcus R. Investing in family planning: key to achieving the sustainable development goals. *Glob Health Sci Pract* 2016;4:191–210.
- 46 Dejen G, Ayichiluhm M, Abajobir AA. Prevalence and associated factors of unmet need for family planning among married women in Enemay district, Northwest Ethiopia: a comparative cross-sectional study. *Glob J Med Res Interdiscip* 2013;13.
- 47 Laryea DO, Amoako YA, Spangenberg K, *et al.* Contraceptive use and unmet need for family planning among HIV positive women on antiretroviral therapy in Kumasi, Ghana. *BMC Womens Health* 2014;14:1–8.
- 48 Bishwajit G, Tang S, Yaya S, *et al.* Unmet need for contraception and its association with unintended pregnancy in Bangladesh. *BMC Pregnancy Childbirth* 2017;17:186.
- 49 León FR, Lundgren R, Sinai I, *et al.* Increasing literate and illiterate women's met need for contraception via empowerment: a quasi-experiment in rural India. *Reprod Health* 2014;11:1–10.
- 50 White JS, Speizer IS. Can family planning outreach bridge the urban-rural divide in Zambia? *BMC Health Serv Res* 2007;7:1–9.
- 51 Riaz S, Pervaiz Z. The impact of women's education and employment on their empowerment: an empirical evidence from household level survey. *Qual Quant* 2018;52:2855–70.
- 52 Tiruneh FN, Chuang K-Y. Women 's autonomy and maternal healthcare service utilization in Ethiopia. *BMC Heal Serv Res* 2017;217:718.
- 53 Viswan SP, Ravindran TKS, Kandala N-B, *et al.* Sexual autonomy and contraceptive use among women in Nigeria: findings from the demographic and health survey data. *Int J Womens Health* 2017;9:581–90.
- 54 Hailemariam A, Haddis F. Factors affecting unmet need for family planning in southern nations, Nationalities and people. *Ethiop J Heal Sci* 2011;21:77–89.
- 55 Cleland J, Harbison S, Shah IH. Unmet need for contraception: issues and challenges. *Stud Fam Plann* 2014;45:105–22.
- 56 Wester KC, Medhanyie AA, Spigt M, *et al.* Best practices for addressing socio-cultural barriers to reproductive, maternal and neonatal health service utilization among women from pastoralist communities of Afar, Ethiopia : a qualitative study. *Ethiop J Heal Dev* 2018;32:1–9.
- 57 Alebel Biadgie AN, Handebo S, Berhe R. Prevalence and associated factors of unmet need for family planning among married women in rural communities of Gonji Kolela district. *J Community Med Health Educ* 2019;9:1–7.
- 58 Herliana BR, Wayan N, Utami A, *et al.* Early marriage practices and the health impacts on female adolescent health in Central Lombok : a qualitative study 2018;6:61–7.

- 59 de Groot R, Kuunyem MY, Palermo T, *et al.* Child marriage and associated outcomes in northern Ghana: a cross-sectional study. *BMC Public Health* 2018;18:1–12.
- 60 Getaneh T, Negesse A, Dessie G, *et al.* Predictors of unmet need for family planning in Ethiopia 2019: a systematic review and meta analysis. *Arch Public Health* 2020;78:1–11.
- 61 Tanou M, Kamiya Y. Assessing the impact of geographical access to health facilities on maternal healthcare utilization: evidence from the Burkina Faso demographic and health survey 2010. *BMC Public Health* 2019;19:838.
- 62 De Allegri M, Tiendrebéogo J, Müller O, *et al.* Understanding home delivery in a context of user fee reduction: a cross-sectional mixed methods study in rural Burkina Faso. *BMC Pregnancy Childbirth* 2015;15:1–13.
- 63 Soubeiga D, Sia D, Gauvin L. Increasing institutional deliveries among antenatal clients: effect of birth preparedness counselling. *Health Policy Plan* 2014;29:1061–70.
- 64 Zimmerman LA, Yi Y, Yihdego M, *et al.* Effect of integrating maternal health services and family planning services on postpartum family planning behavior in Ethiopia: results from a longitudinal survey. *BMC Public Health* 2019;19:1448.
- 65 Emiru AA, Alene GD, Debelew GT. The role of maternal health care services as predictors of time to modern contraceptive use after childbirth in Northwest Ethiopia: Application of the shared frailty survival analysis. *PLoS One* 2020;15:e0228678.
- 66 Hameed W, Azmat SK, Ali M, *et al.* Women's empowerment and contraceptive use: the role of independent versus couples' decision-making, from a lower middle income country perspective. *PLoS One* 2014;9:e104633.
- 67 Samarakoon S, Parinduri RA. Does education empower women? Evidence from Indonesia. *World Dev* 2015;66:428–42.