BMJ Open

Individual-level and community-level factors associated with the family planning use among pastoralist community of Ethiopia: a community-based cross-sectional study

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ABSTRACT

Objective The study aimed to identify the effects of the individual-level and community-level factors on the use of family planning (FP) among married women in the pastoralist community of Ethiopia.

Design A community-based cross-sectional study was conducted in September 2018. Data were analysed using R software. To determine the fixed effect of individual-level and community-level factors of FP use, a two-level mixed-effects logistic regression was used. The result was described using the Adjusted OR (AOR), and the variance partition coefficient.

Setting and participants Afar, Ethiopia (2018; n=891) married women of reproductive age (15–49) years.

Primary outcome measures FP use or non-use.

Results The current use of FP was 18.7% (16.31%–21.43%). Women who need to walk 1 hour and more to the nearest health facility (AOR 0.14, 95% CI 0.05 to 0.3), have ANC visit of 4 and above (AOR 6.02, 95% CI 1.74 to 20.8), had their last birth at a health facility (AOR 2.71 95% CI 1.27 to 5.81), have five and more children (AOR 4.71, 95% CI 1.86 to 11.9), have high knowledge on FP (AOR 2.74, 95% CI 1.11 to 6.74) and had high intentions to use FP (AOR 10.3, 95% CI 3.85 to 27.6) were more likely to report FP use. The magnitude of the effect of for FP use was smaller than that of 9 of the 13 individual factors. Apart from this 19.4% of the total variance in the odds of using FP attributed to between community difference (intraclass correlation coefficient=0.194). Regarding the community-level characteristics, clusters of having higher electronic media possession (AOR 2.84, 95% CI 1.2 to 6.72) and higher women decision making on FP (AOR 8.35, 95% CI 2.7 to 27.1) were significantly associated with increased FP use compared with clusters with lower reports of these aspects.

Conclusion FP use among the pastoralist community is influenced by both individual cluster/community-level characteristics or factors. Even though the effect of clustering in FP use was large in comparison with the unexplained between-cluster variation, it was lower than the individual-level factors.

Trail registrtion number NCT03450564

Strengths and limitations of this study

► Our study employs a robust methodology to analyse the data with consideration of the effect of both individual and community-level factors concerning family planning use.
► The result was described not only by the OR, proportional change of the variance, variance partition coefficient but also, a summary measures of the effect of cluster variables (interval OR and proportion of opposed OR) and measures of components heterogeneity (median OR) to make our result more informative and explanatory.
► Due to the limited number of clusters, the desired effect is not explicitly described.
► The findings are limited to married women aged between 15 and 49.
► The use of a cross-sectional study makes the examination of causal–effect relationships difficult.

INTRODUCTION

Despite low coverage or utilisation of contraceptive use in sub-Saharan Africa (SSA), the global modern contraceptive use increased, from 54% in 1990 to 57.4% in 2015. In Africa, it increased from 23.6% to 28.5%.[1] In addition to this, globally in 2018, nearly 214 million women of reproductive age in low/middle-income countries who want to avoid pregnancy are not using a modern contraceptive method. Such a number is high in Africa 24.2%.[1] The main reasons are limited choice of methods, limited access to contraception, particularly among young people, poorer segments of populations or unmarried people; fear or experience of side effects; cultural or religious opposition; poor quality of available services; users and providers bias and gender-based barriers. Moreover, the proportion of women who use contraceptives

and their barriers is very low and affected by multifaceted factors in the pastoral area. In SSA, pastoral and agropastoral communities account for 20 million and 240 million individuals, respectively.[2] It is over a quarter of the total population and they cover an area of 43% of the continent's total landmass.[3] Thus, a high proportion of women could benefit from having access to effective family planning (FP).

FP allows people to attain their desired number of children and determine the spacing of pregnancies. It is achieved through the use of contraceptive methods.[1] Ethiopia, increased contraceptive prevalence rate (CPR) from 6.3 in 2000 to 41 in 2019. And such a number is not uniformly distributed between the agrarian and pastoralist region.[4 5] The magnitude of FP among the pastoralist community was very low at 4.6%.[6 7] Increasing the current low CPR among the pastoralist community will contribute to a reduction in maternal and infant morbidity and mortality. Additionally, there could be socioeconomic benefits to women and the entire country. For instance, an economic benefit analysis study on FP in Ethiopia revealed that investing US$1 to reduce TFR to 2.5 from 5.7 can save about US$53.42 costs of health and education.[8] Even though, a small pocket study in the pastoralist community of Ethiopia identifies the individual factors (monthly income, attitude, educational status, owning a radio, household asset availability, type of marriage in union (polygamous or monogamous), and the number of children wanted[6–8]—they did not explore contextual/cluster-level factors associated with FP use in the pastoral area.

Furthermore, inability to identify cluster-level factors associated with FP do not give a complete picture on the dimension of FP use, it does not provide meaningful information to policymaker for intervention and does not show the clear gap for the future researchers. Hence, we hypothesised that FP use can be affected by both factors (individual and community). In light of this, this study aimed to examine the effects of individual and community-level characteristics and between-community differences on FP use. Additionally, most of the multilevel analysis results with a binary outcome including (FP use/ non-use) described by OR, the proportion of change in cluster variation (PCV), and variance partition coefficient (VPC) or intraclass correlation coefficient (ICC). Moreover, this study attempts to describe the finding in terms of measures of the effect of cluster-level variables (interval OR (IOR), proportion of opposed OR (POOR))) and measures of components of heterogeneity (median OR (MOR)) to make the interpretation of the findings more informative and explanatory.

METHODS
Study setting and study design
As an end line for the cluster randomised controlled trial (CRT), to ascertain the effect of a community-based intervention for increasing FP use among pastoralist community a cross-sectional study was conducted.[9] Its purpose was for identifying the individual and community-level factors in FP use. It was done in the Afar region of Northeastern Ethiopia in September 2018. Married women of reproductive age (15–49 years) were the source population, whereas women who were critically ill during data collection were excluded from the study.

Sample size and sampling procedures
The targets of inference for the findings were the entire pastoralist married women of reproductive-aged group (15–49) years. The sample size was selected using a cluster sampling technique. Initially, three districts namely Kori, Afambo and Mille were selected. On the second stage cluster/kebele which contains married women were selected. The sampling unit in this study included a total of 33 clusters and 891 married women. One cluster contains 27 married women. Hence, to approach eligible married women, a systematic sampling technique was employed. Based on the number of married women in the cluster, a sampling fraction was calculated and a random start number was identified to select the first household.

Data collection procedure
This data were collected as part of the end line CRT with trial registrationnumber of NCT03450564 [9]—and the questions for the questionnaire were developed based on previous literature in the region.[6 7 10 11] Accordingly, a reliable and valid tool with a pastoralist context was developed Alemayehu, M., Medhanyie, A.A., Reed, E. *et al*. Validation of family planning tool in the pastoralist community. *Reprod Health* 17, 123 (2020). https://doi. org/10.1186/s12978-020-00976-x. The tool was pretested in 45 (5%) of married women. A total of six clinical nurse's data collectors and two supervisors participated during the data collection. Before the actual data collection, intensive training was given for the data collectors and supervisors on the purpose of the study, items, how to approach study participants, and how to use mobile-based applications. The data collectors and supervisors were assigned to the clusters of a given district. The data were collected using an electronically smartphone-based application open data kit (ODK). The collected data were sent to the Mekelle University (MU) server after checking for its completeness.

Measurement
The FP use (use or non-use) of the pastoralist married women was considered as the outcome variable.

Individual-level variables
Women's education was measured as a women's ability to read and write a simple sentence.

Intention to use FP was the motivational factors that influence FP use where the stronger the intention to perform the FP use, the more likely the FP use will be performed.[12] A total of eight items that range from the lowest level (at this moment, I can list some benefits of FP use and I would gain if I use it) to the highest

level of intention to use FP (It is expected that women in our community should use FP and so do I) was used. The response ranges from 1(uncertain/disagree) to 3 (certain/agree). For the analysis purpose, intention to use FP was categorised into high and low intention to use FP based on the mean value.

Attitude and perceived behavioural control over FP use were collected as the constructs of the integrated behavioural model. Attitude towards FP use was composed of an expressional and instrumental attitude. Expressional attitude is the married woman's emotional response to the idea of performing FP use. A total of eight items with three response categories of 1 (unlikely/unworthy) and 3 (likely/worthy) were used. Instrumental attitude is the married women's evaluation for the FP use. It is determined by belief about the outcomes of behaviour. Fourteen items with responses ranging from 1 (uncertain /unlikely) to 3 (certain/likely) were used. And perceived behavioural control over FP was composed of perceived control and self-efficacy. Perceived control is a married woman's perceived control over FP use. Ten items that scored from 3 (highly/agree) to 1 (does not matter/disagree) were used. Self-efficacy is the personal belief that married women can successfully perform an FP use under specified conditions. It was measured with seven items. Responses were coded as 1 (disagree) and 3 (agree). The items of expressional and instrumental attitude had a belief and evaluation components. Multiplying the belief response with its corresponding evaluation was made to create a continuous variable. And, the multiplied items of the response were summed up to form a continuous variable(attitude towards FP use). Moreover, the response of self-efficacy and perceived control was added to form a continuous variable).[12]

Time taken to reach the nearest health facility by walking was measured by asking the married women 'how long does it take you to walk to the nearest health facility'. And the response was categorised in minutes as 'less than 60 min (1 hour)', and 'greater than 60 min (1 hour)'.

Antenatal care (ANC) visit was measured by asking the married women of visit to a health facility for her recent pregnancy. The response was categorised as 'no ANC visit', '1–3 ANC visits' and 'our and above ANC visits'. Place of delivery for last child was gathered by asking the married women of the place where she gave her last birth and the response was categorised as home or institutional delivery.

Knowledge of FP: The response to 13 items was labelled as 'alse', 'Not sure' and 'True'. And the response of these items was summed up to form one continuous variable. Accordingly, using the mean value, the response was categorised in to 'low knowledge on FP' and 'High knowledge on FP'. Examples of items include: 'FP use could cause menstruation disturbance', 'FP use could prevent daily activity', 'pill should be taken daily to prevent pregnancy', 'Depo-provera can prevent unwanted pregnancy for 3 months' and 'following FP use, pregnancy can return immediately'.

Community-level variables

Decision making on FP use was measured by asking the married women on the decision on FP. It was composed of four items namely who decides: to use/take, not to use/take, to stop the use of contraceptive and on the number of children a couple would have in the future. Its response was scored as 'women's only decision', 'joint decision' and 'husband only decision'. Items negatively worded were reversed scored. The response was summed up to form one continuous variable. Discussion among couples on FP use was measured by asking the married women whether they discussed or didn't discuss FP with their partner. The response was scored as 'no' or 'yes'. Women's norm on the number of children for couples to have includes a total of five items (eg, the total number of children a couple should have 2, 3, 4, 5 and 10). Its response was scored on a three-point Likert scale 1 (agree) to 3 (disagree). Then, the response was summed up to generate a continuous variable. Electronic media possession: the respondents were asked whether they have a radio, television or mobile phone. Its response was summed up to form one continuous. Health facility availability: it was measured by asking the respondents whether they have a health facility (health post or health centre) in their cluster/kebele. With this in mind, the above-listed community-level variables were created by aggregating the individual-level variables. Hence, based on the mean value of the response the variable was labelled as 'lower' and 'higher' categories for cluster who scored mean and below and above mean value, respectively.

Data quality control

In the beginning, intensive training was given for data collectors and supervisors. A strong follow-up and continuous support were given for the data collectors while they were in the field. The data were collected using an electronic-based application called an ODK. It was sent to MU server after its completeness was checked.

Verbal consent was secured from married women to collect the data. A one-page consent letter was attached to the cover page of each questionnaire as an information sheet which includes a detailed description about the benefit and risk of participating in the study, participation is voluntary, the right to withdraw from the study, identification of informant was possible only through specific identification numbers and the privacy of collected information. The data collected from the participants was kept confidential.

Patient and public involvement

'No patient involved'.

Data analysis

The data collected through ODK was exported and analysed by R software V.3.6.1. At the initial step, exploratory data analyses include data coding and recoding, categorisation of continuous variables and construction of aggregate community-level variable (decision making on

FP use, discussion with husband, health facility coverage, electronic media possession and women's norm on the number of children for couples to have) was made. Appropriate descriptive analyses of the data were computed over the different individual and community-level characteristics of the married women. The result was described and explained using text, frequency and percentage. Hence, the married women are nested within-cluster/kebele, a two-level mixed-effects regression model was employed to describe the individual and community level within and between cluster effect on FP use.

A two-level model was developed in which the individual women (level 1) are nested within the community (level 2) to estimate the effect of individual and community characteristics on FP use. Bivariate multilevel logistic regression analysis was performed between the individual and community characteristics with FP use to estimate the crude ORs. To reveal the adjusted effect size, multivariate two-level logistic regression analysis was performed to estimate the adjusted OR (AOR) for both the individual and community characteristics and to estimate the extent of random variations between communities.

Model I (empty model)
This was the first step in the multilevel model analysis to run the model without any factors. This aimed to test the random effect of the between-cluster variability. Derived from the between-cluster and within-cluster variability, the ICC was estimated to explain if the data justified to use a multilevel approach for analyses by depicting the level of variability between-clusters.

Model II
This model examined the effects of individual characteristics on FP use. Those individual-level variables which were statistically significant in the bivariate multilevel logistic regression analysis were included in this model.

Model III
It examined the effect of community variables on FP use. Those community-level variables which were statistically significant in the bivariate multilevel logistic regression analysis were included in this model. They were formed by aggregating the variable from the individual variables.

Model IV
It included both the individual and community-level characteristics which were statistically significant at model II and model III. This model allowed us to measure the effectiveness of both individual and community characteristics simultaneously. On the model with the consideration of the conditional or cluster-specific interpretation of the regression coefficient, a shrinkage factor was calculated for calculating marginal or population average regression coefficient and OR. It eases the interpretation of an association between the cluster-level variable and the outcome variable. As the shrinkage factors are very close to one, the population-average regression coefficients (and corresponding population-average ORs) will

be very close to the conditional or cluster-specific regression coefficients and corresponding ORs.[13 14]

Moreover, a summary measure of the effects of cluster-level variables: IOR and POOR were calculated. The IOR an interval covering the middle 80% of the distribution of such ORs. As every exposure category of the cluster-level variable contains many clusters, when the residual cluster variance is large, then the distributions of the clusters around the average outcome in the different exposure categories overlap each other. Therefore, when performing pairwise comparisons between FP use and FP not use (exposed and unexposed) the ORs will vary widely around the average OR (ie, a large 80% IOR). However, when the residual cluster variance is small, then the variability of the ORs will also be small (ie, a small 80% IOR). The value of IOR may or may not include 1. It should be noted that the cluster variability is large and small in comparison with the effect of the cluster-level variable, respectively, if the IOR contains one or not include one.[15] POOR is an alternative to the IOR as a measure of the magnitude of the effect of cluster-level variables. Importantly, IOR describes the middle 80% of the distribution of OR comparing a random cluster from use and not use of FP (exposed to the covariate and a random cluster not exposed to the covariate). It is the proportion of such ORs with the opposite direction to the overall OR. The POOR can take values ranging from 0% to 50%. If its value is 0, it indicates that all pairwise OR are in the same direction as the overall cluster-specific OR. And half of the pairwise comparisons between clusters use of FP or not are in the direction opposite to the overall OR for the POOR value of 50%. A larger value for the POOR implies that the association is very heterogeneous.[13]

Inline to the above (IOR and POOR) description of measurement, we have a measure of components of variance (the VPC or ICC)) and of heterogeneity (median OR (MOR)). VPC/ICC represents the proportion of the total observed individual variation in the outcome that is attributable to between-cluster variation. It measures the proportion of total variance that is due to the difference between groups. It is interpreted as the correlation in the outcome between two individuals randomly selected from the same cluster. MOR quantifies the magnitude of the effect of clustering.[16] Hence, MOR is a measure of heterogeneity mainly depend on between-cluster variance while the VPC (ICC) is a measure of components of variance (clustering) that considers both between-cluster and within-cluster variance. The VPC value ranges from 0 to 1; if all subjects in the same cluster exhibited the same response, it has a value of 1 and it would be 0 if there was no within-cluster homogeneity of responses. MOR has a value from 1 to infinity and helps for quantifying the contextual effect is that is on the same scale. In line with this, a PCV was calculated for all models by taking the empty model as a reference point.[13] Furthermore, the effect of multicolinearity between the predictor variables was checked using tolerance and variance inflation factor. Akaike information criterion (AIC) was used to compare

and check the goodness of fit of the consecutive models. The model with the lowest value of AIC was considered a better explanatory model that fits the data.

RESULTS

Individual-level variables

This study focused on a sample of 33 clusters in the pastoralist community of the Afar region. We included 891 married women in the 33 clusters. A large majority of the respondents (77.2%) were unable to read and write a simple sentence. About one-quarter (24.8%) of the respondents were living in a polygamous marriage (not a single wife to their husband). Above one-in-two (51%) respondents were living within a walking distance of 1 hour and more to the nearest health facility. Most respondents (75.1%) had a short birth interval (within 2 years interval) in their two consecutive births. One-third (32.2%) of the respondents had five and more children. The proportion of respondents who had an abortion in their lifetime was 21.7%. A considerable number of respondents 41.0% and 67.6% had no ANC visit and gave their last birth at home, respectively. Almost half (45.7%) of the respondents had a high intention to use FP (table 1). The mean value of attitude towards FP use was 40.7 (39.2, 42.1), while it was 40.7 (39.4, 42.2) for the perceived behavioural control over FP use.

Community-level variables

A total of 33 clusters were considered as a unit of analysis. The community-level variables were formed by aggregating the individual-level variables. Accordingly, 30.3, 60.6% and 54.5% of the clusters had lower health facility coverage, lower women decision making on FP, and lower discussion among couples on FP, respectively. Above half (54.5%) of the clusters had higher women norms on the number of children for the couples. Besides, 60.6% of the cluster belongs to lower electronic media possession (table 2).

Multivariable multilevel analyses

FP use

In our study, the current use of FP among the respondents was 18.74% (16.34%–21.43%).

Estimated variance components, IOR, median OR, proportional change invariance and POOR of the model

To analyse the effects of pastoralist married women's individual characteristics and community-level factors in FP use, a two-level mixed-effects logistic regression model was used. As illustrated in table 3 for the empty model, 19.4% of the total variance in the odds of using FP attributed to the between-cluster variation (ICC=0.194). The ICC or the between-cluster variability declined across the individual factors, community factors and combined level factors model with a value of 12.1, 7.04 and 4.0%, respectively. Hence, to describe the factors related to FP use among the pastoralist married women,

Table 1 Selected individual-level variables of respondents, Ethiopia, 2018

Individual characteristics	N	%	95% CI
Educational status of women			
Not Able to read and write	688	77.2	74 to 79
Able to read and write	203	22.7	20 to 25
Single wife to her husband			
No	221	24.8	12.1 to 47.6
Yes	670	75.1	72 to 77
Time taken to reach the nearest health facility through walking			
Less than 1 hour	430	48.2	44 to 51
1 hour and above	461	51.8	48 to 55
The current no of children			
1–4	540	67.7	63 to 70
5 and above	264	32.3	29 to 36
Birth interval			
Short	495	70.4	66 to 73
Optimal	208	29.5	26 to 33
History of having an abortion			
No	632	78.2	75 to 80
Yes	176	21.7	19 to 24
ANC visit			
No ANC visit	369	41.4	38 to 44
1–3 ANC visit	277	31.1	28 to 34
4 and above ANC visit	245	27.5	24 to 30
Place of delivery for the last child			
Home	533	67.6	64 to 70
Health facility	255	323	29 to 35
Knowledge on FP			
Low knowledge on FP	422	47.3	44 to 50
High knowledge of FP	469	52.6	49 to 55
Intention to use of FP			
Low intention	483	54.2	50 to 57
High intention	408	45.7	42 to 49

ANC, antenatal care; FP, family planning.

a combined model of individual and community factors were used. The PCV of the combined factors was 98% (τ=0. 01385). To mean that, 98% of the predicting use of FP in the pastoralist community can be explained using the reported individual and community-level factors. Similarly, a shrinkage factor was calculated for having a better interpretation of the intra-cluster association in the cluster/community level factor because the value of the cluster level variable is constant for all individuals in the cluster. The shrinkage factor helps to suit the conditional interpretation of the regression coefficients with population average ORs (the average OR comparing two individuals from two different clusters who are identical in

Table 2 Selected community-level variables of respondents

Community characteristics	No of women (%)	95% CI	No of clusters
Health facility availability in the cluster			
Lower	270 (30.3)	27.3 to 33.3	10
Higher	621 (69.7)	66.6 to 72.6	23
Community decision making on FP use made by women			
Lower	540 (60.7)	57.3 to 63.7	20
Higher	351 (39.3)	36.2 to 42.6	13
Community discussion on FP			
Lower	486 (54.5)	51.2 to 57.7	18
Higher	405 (45.5)	42.2 to 48.7	15
Women norms on the no of children for the couples			
Lower	405 (45.5)	42.2 to 48.7	15
Higher	486 (54.5)	51.2 to 57.7	18
Community electronic media possession			
Lower	540 (60.7)	57.3 to 63.7	20
Higher	351 (39.3)	36.2 to 42.6	13

FP, family planning.

other respects or apart from the covariate of interest). In the community factor or model 3, the shrinkage value was 1.042 which is nearly 1. This indicates that the population average ORs for the five clusters/community factors are essentially equal to the conditional or cluster-specific ORs (to two decimal places). Moreover, the 80% IOR for the five community-level factors in model 3 were (2.28, 3.5) for lower vs higher electronic media possession, (1.62, 2.49) for lower versus higher health facility coverage, (6.7,1 0.3) for lower versus higher women decision making on FP, (2.00, 3.06) for lower vs higher discussion among couples and (0.27, 0.41) for lower versus higher women norms on the number of children for couples to have. Overall, the effect of the cluster/community level variable is large in comparison with the unexplained between-cluster variation.

Furthermore, the POOR of the community factors value was 0.00002 for community electronic media possession, 0.000023 for community discussion on FP, 0.00001 for community health facility coverage, 0.0003 for women norms on the number of children and 0.00002 for women decision making on FP. Thus, in 0.002% of comparison between the community with lower and higher electronic media possession, the OR for this comparison would be different in direction to that of the overall OR for community level, electronic media possession (2.84) denotes an increased FP use (table 4). Moreover, in 0.002% pairwise comparison, the odds of FP use would be higher at the community with higher electronic media possession than at lower electronic media possession. Additionally, in our model the median OR (MOR) was equal to 2.338 (empty model), 1.902 (individual factors), 1.610 (community

factors) and 1.118 (combined model). Hence, for the individual factors, the MOR was 1.901 whereas its reciprocal was 0.52. Therefore, examining the OR for individual factors in table 4, nine of the individual factors had an OR that lay outside of the interval (0.52, 1.901). Thus, the magnitude of the effect of clustering (cluster effect) was smaller than that of 9 of the 13 individual factors. Hence, the MOR of 1.901 interpreted as fair because only 12.1% of the total variation in pastoralist married women FP use is due to cluster difference.

Effect of individual women characteristics on the FP use

The individual and community factors effect size on FP use as described in table 4. After adjusting for the individual and community factors, married women who gave birth at a health facility for their last birth were more likely to report FP use (AOR 2.71, 95% CI 1.27 to 5.81) as compared with women who gave their last birth at home. Similarly, women who had 1–3 or 4 or more ANC visits were also more likely to report FP use (AOR 3.6, 95% CI 1.08 to 11.9) and (AOR 6.02, 95% CI 1.74 to 20.8), respectively, as compared with married who do not have ANC visit for their recent pregnancy. Women who reported having five or more children and those reporting to walk more than 1 hour to the nearest health facility were 4.71 times and 0.141 more likely to use FP, respectively, as compared with women who had 1–4 children (AOR 4.71, 95% CI 1.86 to 11.9) and walking distance of less 1 hour to the nearest health facility (AOR 0.141, 95% CI 0.05 to 03). Moreover, married women with high knowledge on FP and high intention to use FP were more likely to report FP use (AOR 2.74, 95% CI 1.11 to 6.74) and (AOR 10.3, 95% CI 3.85 to 27.6), respectively, as compared with married women who had low knowledge and low intention to use of FP, respectively. The net odds of FP use among married women who had an optimal birth interval for their last consecutive birth was 2.65 times (AOR 2.65, 95% CI 1.24 to 5.64) as compared with married women who had a short birth interval. In line with this, as attitudes supportive of FP use and perceived behavioural control over the negative pressures of influential groups increased by one unit, the odds of FP use increased by 1.24 (AOR 1.24, 95% CI 1.13 to 1.37) and 1.11 (AOR 1.11, 95% CI 1.03 to 1.2), respectively (table 4).

Effect of community-level factors/characteristics on the FP use

Accordingly, after controlling the effect of individual and community factors, cluster with higher discussion among couples on FP, higher women's norm on the number of children for couples to have and higher women's decision making on FP associated with higher odds of FP use (AOR 2.48, 95% CI 1.02 to 6.72), (AOR 0.34, 95% CI 0.13 to 0.84) and (AOR 8.35, 95% CI 2.57 to 27.1), respectively as compared with cluster who have a lower discussion among couples on FP, lower women's norm on the number of children for a couple to have and lower women decision making on FP, respectively (table 4).

Table 3 Estimated variance components, IOR, MOR, POOR in the opposite direction of respondents, Ethiopia, 2018

Variable	Empty model	Individual factors		Community factors			Combined factors
		IOR lower	IOR upper	IOR lower	IOR upper	POOR	
Individual-level factors							
Being a single wife to her husband		0.88	1.32				
Institutional delivery		2.17	3.33				
Having five and more children		3.8	5.83				
1–3 ANC visit		2.9	4.45				
Four and above ANC visit		4.83	7.41				
Walking distance within 1 hour to the nearest health facility		0.11	0.17				
High knowledge of FP		2.19	3.36				
Perceived behavioural control over FP use		0.90	1.38				
Attitude towards FP use		1.006	1.54				
High intention to FP use		8.30	12.72				
Able to read and write simple sentences		1.62	2.49				
Having an abortion in a lifetime		0.58	0.89				
Having a short birth interval		2.13	3.26				
Community-level factors							
Higher electronic media possession				2.28	3.5	0.00002	
Higher discussion on FP				2.00	3.06	0.00002	
Higher women decision making on FP				6.7	10.3	0.00001	
Higher women norms on the number of children				0.27	0.41	0.0003	
Higher health facility coverage				1.62	2.49	0.00001	
PCV	Ref	0.37		0.63			0.98
VPC or ICC	0.194	0.121		0.0704			0.004
MOR	2.338	1.902		1.610			1.118
Shrinkage factor	1.128	1.075		1.042			1.0023
AIC	822.4	260.1		806			252.5

AIC, Akaike information criterion; ANC, antenatal care; FP, family planning; ICC, intraclass correlation coefficient; IOR, interval OR; MOR, median OR; PCV, proportional change of the variance; POOR, the proportion of OR in the opposite direction; VPC, variance partition coefficient.

DISCUSSION

Our study revealed that only less than 2-in-10 pastoralist married women currently use FP. Such a proportion of FP users attributed to individual and community-level factors. To mention the individual factors, time taken to the nearest health facility, have five or more children, had an optimal birth interval, the number of ANC visit, have birth at health institution, have high knowledge on FP, positive attitude towards FP, high perceived behavioural control over FP use and had high intentions to use FP. At the community level, three variables namely clusters having higher electronic media possession, higher women's norm on the number of children for a couple to have, and higher support of women's decision making on FP significantly associated with increased FP use compared with clusters with lower reports of these aspects. Besides,

to the description of the result of multivariable analysis with OR, a summary measures of the effect of cluster variables (interval IOR, POOR), the PCV and measures of components of variance and heterogeneity (the VPC or ICC and median OR) was calculated to make our result more informative and explanatory.

Nearly 2-in-10 of married women in our study currently use FP. This is in line with a study done in pastoralist women in the Bale eco-region, Southeast Ethiopia.[17] However, a little bit higher with previous studies done in the pastoralist area.[6 7 11 18] Differing from this, 4-in-10 women in Ethiopia currently uses FP.[4 19] Additionally, other small pocket studies in Ethiopia revealed that a higher proportion of women uses FP.[19 20] This implies further effort is needed to enhance FP use in the pastoralist community. Importantly, it will contribute to the

Table 4 Estimated ORs for multilevel logistic regression model of FP use of respondents, Ethiopia, 2018

Variable	Empty model	Individual factors	Community factors	Combined factors
		OR (95% CI)		
Individual-level factors				
Being a single wife to her husband		0.99 (0.42 to 2.32)		1.06 (0.44 to 2.54)
Institutional delivery		2.85 (1.32 to 6.18)**		2.71 (1.27 to 5.81)*
Having five and more children		3.82 (1.56 to 9.33)**		4.71 (1.86 to 11.9)**
1–3 ANC visit		4.89 (1.42 to 16.8)*		3.6 (1.08 to 11.9)*
Four and above ANC visit		6.91 (1.91 to 24.96)**		6.02 (1.74 to 20.8)**
Walking distance within 1 hour and above to the nearest health facility		0.22 (0.08 to 0.58)**		0.141 (0.05 to 0.3)***
High knowledge of FP		2.48 (1.03 to 5.95)*		2.74 (1.11 to 6.74)*
Perceived behavioural control over FP use		1.10 (1.03 to 1.18)**		1.11 (1.03 to 1.2)**
Attitude towards FP use		1.25 (1.14 to 1.38)***		1.24 (1.13 to 1.37)***
High intention to use FP		12.8 (4.56 to 36.2)***		10.3 (3.85 to 27.6)***
Able to read and write simple sentences		2.13 (0.93 to 4.90)^		2.01 (0.86 to 4.688)
History of having an abortion		0.87 (0.377 to 4.89)		7.23 (0.3 to 1.69)
Having a short birth interval		2.33 (1.11 to 4.89)*		2.65 (1.24 to 5.64)*
Community-level factors				
Higher electronic media possession			1.07 (0.58 to 1.99)	2.84 (1.2 to 6.72)*
Higher discussion among couples on FP			0.59 (0.33 to 1.05)	2.48 (1.02 to 6.05)*
Higher health facility coverage in the cluster			3.33 (1.49 to 7.43) **	2.01 (0.48 to 8.39)
Higher women's norm on the number of children for a couple to have			1.48 (0.8 to 2.74)	0.34 (0.13 to 0.84)*
Higher women decision making on FP			1.00 (0.50 to 1.98)	8.35 (2.57 to 27.1)***

Significant at 0 '****' 0.001 '***' 0.01 '*' 0.05,
ANC, antenatal care; FP, family planning.

achievement of the national and international goals on FP by narrowing the huge gap between the agrarian and the pastoralist community.

Our study revealed that the time taken to reach the nearest health facility through walking was positively associated with FP use. In line with this, another research output indicates that long distance to the health facility limits FP use.[20] This would help to convey a tailored and appropriate message of using access to FP by women through increasing contact with health professionals to enhance husbands' and communities' acceptance of the benefits of FP.

Women from the cluster who had higher electronic media possession were associated with FP use. Our finding is in line with another study in the pastoralist community of the Afar region.[11] It should be noted that the media programme in the region and the broadcast at the national level with the focus of promoting FP use may encourage women to use FP. Despite the media promotion in the broadcast on FP, the overall infrastructure in the pastoralist community is not well established and does not contribute to its threshold in creating awareness for the women who reside in a remote area.

This study points out that pastoralist women who had a high number of children were positively associated with

FP use. These findings are in line with another study done in Bale eco-region, Southeast Ethiopia.[20] Clearly, as it was indicated from the community-level variables women who reside in a cluster with lower women's norm on the number of children had higher odds of FP use. Similarly, a study in the pastoralist region revealed that a positive association existed between women who were undecided on when to have their next child and FP.[7] In this case, as the women have a higher number of children, they may feel the burden and risks associated with frequent childbirth and child-rearing. As a result, the mother's contributions to the economic development of the household, community and the country would be limited.

Our finding revealed a positive association between FP use and women who had an optimal birth interval in their last consecutive birth. Importantly, having a short birth interval would endanger the lives of the mother as well as her newborn.[21] However, a study in the Bale eco-region, South East Ethiopia indicates that having a short birth interval in the last consecutive children was positively associated with FP use.[20] This implies the pastoralist women in our study embedded in strong cultural and religious perspectives which promotes to have a high number of children and this leads them to follow short birth intervals. And a considerable

proportion of women are currently experiencing polygamous marriage and this results to enforce married women to have a high number of children. This is one of the cultural manifestations of respecting the needs of the husband and the pride of winning the competition with the other wives. Moreover, a considerable number of women could not read and write a simple sentence. Hence, such collective influence (being polygamous and illiterate) makes the women normalise and positive reinforcement for giving birth with closed/short birth intervals. However, for a woman who is aware of the benefit of the optimal birth interval, they try to practice it by using FP as they learn from real-life experience was evident in our study.

In our study, FP use was positively associated with an ANC and health facility delivery. That is, pastoralist married women who have ANC visits of 1–3 and have ANC visits of 4 and above associated with FP use. This was in line with studies done elsewhere.[22 23] WHO recommends that a woman should have ANC visits of 4 and above in the course of pregnancy. Moreover, currently WHO recommends a woman to have at least eight ANC visits.[24] Regarding institutional delivery, our finding was in line with a study done in urban Uttar Pradesh, India.[23] Therefore, as the women's contact with health providers increases, the probability of obtaining information and informed consent on FP would be improved. Thus, the women who get a golden opportunity to the awareness of FP[10]—would be vital to fill the missed opportunity. Hence, such collective effort would contribute to increase the women's intention and actual use of FP.

Our finding revealed a positive association of FP use with women's knowledge. Such, finding is also supported by a study done in Mekelle, Tigrai region.[25] This implies that knowledge is a prerequisite for FP use. To use FP, a woman should first be equipped with comprehensive knowledge on FP which encourages a positive attitude and enhance intention on FP.

A study in the pastoralist community of Afar revealed that having a positive attitude towards FP positively associated with FP use.[11 26] This was similar to our finding. Importantly, attitude is a proximate indicator of having/showing a behaviour which is FP use in our scenario by mitigating the myths and misconceptions on FP, creating a conducive environment on the information and relationship between the healthcare providers and women. As a consequence, a continuous effort is needed in the pastoralist community through the community-based structure like faema (a traditional community structure which serves as a social support group and justice) [27] and government structure for sustaining the current users of FP and to create a new adopter for FP.

Previous studies in the pastoralist community mentioned that husband objection and religious norms promote a high number of children, and this unquestionably negatively influence FP use.[28 29] It should be noted that enhancing the perceived behavioural control over FP use (the ease of the women for any challenges related to FP comes from influential groups; husband, clan and religious leader) would have a contribution to increasing the proportion of women who use FP. As a consequence, the women's ability to tolerate the pressure that comes from the influential groups would be increased and the women would get an opportunity to use FP. Proof of this, a study in pastoralist women of the Bale eco-region indicates that a positive relationship exists between the perceived cultural acceptability and FP use[17] However, a study in Niger shows that perceived behaviour control positively predicts over woman resides in an urban area than rural.[26] Such variation in residence can be explained as that fact of huge difference for the women access to school, and exposure to media which both promote FP use. Also, having concentrated health facilities in urban areas favours women to get information and service at a convenient time.

As part of the cluster effect, married women who had decision making on FP use was associated with FP use. Our study was in line with a finding from pastoralist women of the Bale eco-region[17]—and Mozambique.[30] The overall activity of women education, providing informed consent and FP use leads to empowering women. As a result, they would have children by choice not by chance, participating in the income-generating activity, in turn, have a direct effect on increasing the economic status of the household, the community and the country as large. It should be noted that supporting women's economic empowerment in the pastoralist community would narrow the health indicators gap including FP with the agrarian society to meet the national and international goals set by the country. For instance, Ethiopia sets an ambitious plan to have a CPR of 55% and a total fertility rate of 3 by the year 2020.[31]

A positive relation appears across the intention to use FP with actual use. A similar finding revealed that contraceptive use is high per the stated intention to use contraceptives.[26 32] It should be noted the overall effort in disseminating information and counselling women on FP to create a positive attitude towards FP and high intention. Hence, these cumulative effects bring or predict the actual use of FP. This implies a meticulous effort is needed in changing the proportion of women who intend to the actual use of FP. For this reason, the overall activity in health facility including FP counselling should be given based on informed consent. And it should be given with good quality to have the mother optimal birth interval, a desired number of children, and enhance the number/proportion of FP users.

Furthermore, out of the normal interpretation of multilevel analysis using OR and reporting PCV and VPC/ICC, it includes a summary measures of the effect of cluster variables and measures of components of heterogeneity. In this case, the magnitude of the effect of clustering (cluster effect) for FP use was smaller than that of individual factors. However, a considerable number of the variation to the FP use ascribed to cluster difference. Hence,

it is important to consider the local/ground situation of a community for promoting better use of FP. FP use can be affected by individual and community level factors. It should be noted that the pastoralist women lived in multi-faced factors and addressing such factors would enhance FP use. To conclude, a considerable number of women still use FP in an area where there were strong religious and cultural perspectives. Hence, such a result along with the individual factors, the effect of community/cluster-level factors is not minimal. At the end, the result of our study will be generalised to pastoralist married women aged 15–49 years. However, our finding should be interpreted while considering the following limitation (1) due to the limited number of clusters, the desired effect is not explicitly described as having high number of clusters (2) our result is limited to the married women aged between 15 and 49 and do not include women who are single, divorced and widowed which may have an effect on quantifying the actual number of FP users (3) Since we employed a cross-sectional study to answer the objectives, it makes the examination of causal effect relationship difficult.

CONCLUSION

FP use among the pastoralist community is influenced by both individual and cluster/community level characteristics or factors. Even though the effect of clustering (cluster effect) on FP use was large in comparison with the unexplained between-cluster variation, it was lower than the individual-level factors.

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