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Postpartum emotional fertility intentions in Ethiopia: an insight and correlates from a national women and newborns cohort study

Solomon Abrha Damtew^{1,5*} , Solomon Shiferaw² , Tariku Dejene Demissie³ , Adamu Addissie², Tesfamichael Awoke Sisay⁵, Ayanaw Amogne⁵, Fitsum Tariku Fantaye⁴ , Hailay Gebremichael Gebrekidan⁶ , Tariku Tesfaye Bekuma⁷, Bezawork Ayele Kassa⁸, Kelemua Mengesha Sene⁹, Niguse Tadele Atnafu¹⁰ , Mahari Yihdego Gidey⁵ , Addisalem Zebene Armide⁵, Zelalem Nigussie Azene^{11,12}, Metages Yohannes¹³ and Assefa Seme² 

Abstract

Background Women's emotional fertility intentions to conceive are an integral part of Reproductive Health (RH) right which can also be considered as decision-making over their fertility. In this study, postpartum emotional fertility intention was measured by asking a cohort of women how they would feel if they became pregnant by their one year postpartum following the index birth. Emotional health and couples communication are key during pregnancy, childbirth and in the postpartum period coupled with the simultaneous reproductive coercion (RC) minimization. The postpartum period is a key for the newborns milestones development and in maintaining maternal emotional, psychosocial, and mental health. Therefore, this study aimed at determining the level of one-year postpartum emotional fertility intention and identifying its correlates among a cohort of one-year postpartum women. The Ethiopian Federal Ministry of Health and relevant developmental partners can use this evidence as an action point to empower women to exercise their reproductive health rights and rights related to reproduction.

Methods Nationally representative Ethiopia Performance Monitoring for Action (EPMA) women and newborns cohort survey data collected from eligible women in four rounds were further analyzed in this study. This study collected real-time data on various sexual, reproductive, maternal and newborns nationwide priority indicators using customized Open Data Kit Mobile application. These data were collected using a standard pretested questionnaire prepared in English and translated in three local languages (Amharic, Afan Oromo and Tigrigna) by well-experienced resident enumerators. This study was limited to the further analysis of 1,703 non-pregnant women by their one-year postpartum. Frequencies were computed to describe the study participant's characteristics. The partial proportional odds statistical modeling was fitted to identify correlates for the hierarchical variation in one-year postpartum emotional fertility intention. Results were presented in the form of percentages and odds ratios alongside with 95% Confidence Interval. Statistical significance was declared at a *p*-value of 0.05.

*Correspondence:
Solomon Abrha Damtew
abrsle2006@gmail.com

Full list of author information is available at the end of the article



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Results The proportion of one-year postpartum emotional fertility intention of being unhappier was found to be nearly two thirds, 64.87% (62.20%, 67.45%). Nearly one in 6, (17.12% (15.15%, 19.29%)) and one in 20, (4.63% (3.60%, 5.94%)) women reported that they have experienced a mixed and very happy feelings in the same period. The proportional cumulative odds of one-year postpartum emotional fertility intention were 0.66 (0.44, 0.97) and 0.43 (0.29, 0.63) respectively among women who reported that they had ever used contraceptive and those who reported that they have resumed their contraceptive use by one-year postpartum compared with their counterparts. The proportional cumulative odds of one-year postpartum emotional fertility intention were found to be lower and asymmetrical among women with higher birth order and those who do not want to have additional children.

Conclusion One-year postpartum emotional fertility intention of being unhappier is more pronounced in Ethiopia which calls for enhancing intended and spaced pregnancies by ensuring women reproductive health decision making autonomy. Activities and efforts that promote spaced pregnancies, and diversifying access to postpartum contraceptives are likely to improve the level of one-year postpartum emotional fertility intention. Activities and interventions that enable women to decide over their contraceptive use alongside patient-centered contraceptive use counseling could also contributed to the improvement of one-year postpartum emotional fertility intention as well. The study findings implied that awareness creation on and availing the specific inter-pregnancy contraceptive services and mental health preconception care packages could also contribute in addressing the varying level of one-year postpartum emotional fertility intention. The other implication of the findings calls for strengthening postpartum contraceptive counseling and intensifying actual service provision. Besides, enabling high parity women to use contraceptive through access and diversification of the methods could help in this regard. Moreover, installing the inter-pregnancy preconception care packages in the health care system, enhancing informed contraceptive use decision making and improving one-year postpartum contraceptive uptake are imperative. Provision of one-year post-partum contraceptive could reduce maternal and newborns morbidity and mortality through spacing, improving women's emotional and mental health in the postpartum period. These activities and interventions are very critical to improve postpartum emotional fertility intention.

Keywords Women health, Emotional health, Women's postpartum psychosocial health, Women postpartum mental health, Postpartum emotional fertility intention, Ethiopian PMA, Women and newborns cohort, One year postpartum period, Perinatal period

Background

Emotional fertility intention [1–3] and couples communication [4] are key during pregnancy, child birth and in the postpartum period. Besides, the simultaneous minimization of reproductive coercion (RC) coupled with reduction of perinatal intimate partner violence [5, 6] is very critical. Intimate partner violence reduction and provision of postpartum contraception are proofed to improve women emotional well-being in the postpartum period and are imperative for better maternal and newborns health outcomes [6–9]. Women emotional health should be maintained in the postpartum period for a healthy inter-pregnancy period and to make the subsequent pregnancies successful [10, 11]. Besides, the postpartum period is a key milestone in the newborns developmental process; and maintaining this milestone is crucial for maintaining maternal emotional health at its optimum level. It can also serve as an entry point to provide the inter-pregnancy maternal and newborns care continuum [12] and preconception care packages during the inter-pregnancy period [13]. Therefore, this study aimed at measuring one-year postpartum emotional fertility intention during this critical period. In this study, one-year postpartum emotional fertility intention was

measured by asking a cohort of women how they would feel if they became pregnant by their one-year postpartum following the index birth [1, 2, 14].

Moreover, the World Health Organization defined health as a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity. Accordingly, since pregnancy and childbirth are communal events in the Ethiopian context, this study aimed at addressing the mental, emotional and psychosocial aspects of women health [15]. Emotional fertility intention may be related with religious blessing and the cultural acceptability of large families [16]. Besides, evidence has shown that there is a link between happiness and fertility behavior. Spéder & Kapitány stated that happier men and women prefer to become parents sooner arguing the link between intention and behavior towards fertility [17, 18]. Moreover, couples' happiness and emotion determines having a child, particularly, women's happiness matters more in the decision-making process towards having a subsequent child [19]. Another evidence showed that fertility intention and behavior have a closer link [20], indicating emotional fertility intentions and behavior influences the demographic dividend

of countries. However, the emotional aspect of fertility intention among women has been understudied.

Additionally, in a patriarchal society such as Ethiopia, husband fertility desire is one of the core determinants of couple's fertility desire [11, 21]. Males' dominance in the decision making as far as sexual and reproductive health is concerned was reported to negatively affecting women intentions to conceive and their reproductive health rights [22–25]. Further evidence has also showed the existence of discordance in fertility desire among couples [26]. Besides, women's emotional fertility intentions to conceive are an integral part of reproductive health (RH) rights which can be considered as a decision-making ability over their fertility. However, in low and middle-income countries including Ethiopia, males' dominance is culturally accepted and socially constructed. Hence, males' take the lead in the household-level decision making, determining the family size; and lead women RH health service use decision making. In such a scenario women may not have their voices heard and respected.

As a result, women are likely to hold negative emotion and unpleasant feeling whenever they think of becoming pregnant [1, 24]. In addition, the disproportionate huge burden of raising children which is experienced by most women precipitated their negative emotional intention for every additional pregnancy they are going to bear. Amidst in the rapid population growth, such unpleasant feeling is likely to exacerbate the fertility rate and population dynamics a [18, 22, 27].

Therefore, the Federal Democratic Republic of Ethiopia Health Minister and the government of Ethiopia have been showing commitments to make the population growth in line with the country's economic growth and development. Provision of contraceptive commodities free of charge, improving the quality of contraceptive counseling; policy-level advocacy and the routine health care providers counseling on spaced pregnancies are among the top strategies being employed [10, 28–31]. Unfortunately, achievement of the desired level of change in the fertility rate has become challenging over the last few decades [10, 31–33]. Lack of women emotional fertility intentions in the postpartum period is likely to contribute its share for the sustained higher fertility rate, subsequent health and economic effects and for the demographic dividend as well [34, 35].

Furthermore, evidence revealed that a multifaceted societal and individual-level factors were found to influence fertility desire. At the societal level, the desire for fertility is often influenced by the community and cultural factors [36, 37]. These includes a strong cultural preferences for large families [36, 38] and sex preference for boys. These cultural and social elements, and sex preference also precipitated the emotional aspect of fertility intention [39–42]. This is coupled with the current

situation of social unrest, political turmoil, internally displaced people, and the economic crisis across the globe. These are the macro level factors which are further precipitating women emotional well-being [43–46]. Besides, at the individual level, characteristics such as age [47, 48], number of living children [49, 50]; marital status, wealth, educational level [51–55], place of residence [56–58], husband emotional fertility intention [2] and socio-demographic characteristics of the women [51, 52] were found to be associated with fertility desire. Although numerous factors have been shown to influence fertility desire, there is a relative dearth of literature on emotional fertility intention in Ethiopia [1–3] where the desire for additional children is pronounced [51, 59].

To this end, one-year postpartum emotional fertility intention: how would women feel if they became pregnant with a short inter-pregnancy interval, notably by one-year postpartum is understudied and there is a dearth of evidence in Ethiopia. Hence, determining the degree of one-year postpartum emotional fertility intention and identifying its correlates could provide actionable evidence to mitigate the fertility surge by promoting the continuum of care and preconception care packages in the one-year postpartum period and as a life course approach.

Methods and data sources

Study design, population, sample size and field work

The Ethiopian Performance monitoring for action (EPMA) have been collecting both cross-sectional and longitudinal data on selected maternal, newborn health, contraceptive use; and women and girls' empowerment indicators over the past decade. Pertinent to this study, women were also asked how they would feel if they became pregnant by their one-year postpartum during the one-year follow-up study interview. This variable was regarded as one-year postpartum emotional fertility intentions. It was regard as the outcome variable of this study.

This study utilized community based baseline cross sectional, six weeks postpartum follow up and one-year postpartum follow up cross-sectional data sets from the prospective Ethiopian PMA women and newborns cohort one study. The data were collected in Ethiopia from the six panel survey regions: namely: Addis Ababa, Afar, Amhara, Oromia, SNNPR and Tigray by well experienced resident enumerators. This study collected real time data on various sexual, reproductive, maternal and new born nationwide priority indicators using customized Open Data Kit Mobile application. These data were collected using standard pretested questionnaire prepared in English and the three local languages (Amharic, Afan Oromo and Tigrigna).

The Ethiopian Performance Monitoring for Action (EPMA) cohort one study employed a two stage stratified cluster sampling. The main sampling units or enumeration areas (EAs) were chosen using the recent Ethiopia Population and Housing Census (PHC) as a sampling frame. The Ethiopian Central Statistical Services head office was involved in the sampling of the primary sampling units (enumeration areas) and processed enumeration area maps for selected EAs. Accordingly, a total 265 EAs were chosen in the first stage with independent selection in each sampling stratum and a probability proportional to EA size. In the second stage, a complete census of all households was conducted in 217 EAs to screen and enroll eligible women to obtain adequate sample size of a cohort of eligible women and to improve the study's power. The overall sample size and cell sample size adequacy was checked and found adequate to generate unbiased estimates for the one-year postpartum women emotional fertility intention. One thousand seven hundred three, (1703) non-pregnant women who completed the follow up interviews were included in this further analysis.

The study was started by recruiting and enrolling pregnant women and puerperal women less than six weeks postpartum through the screening questionnaire. These panel of women were then interviewed at their respective 6 weeks, 6 months and one-year postpartum period as a follow up interviews. Concerning enrollment, in order not to miss all eligible women in the 217 panel survey enumerations areas (EAs), complete census was conducted. This panel survey was executed by Addis Ababa University's School of Public Health in collaboration with the Ethiopian Public Health Association with assistance from the Federal Democratic Republic of Ethiopia Health Ministry, Ethiopia Statistical Services, Bill & Melinda Gates Institute for Population and Reproductive Health (Johns Hopkins Bloomberg School of Public Health). More details on the sampling design, selection procedures, selection probabilities, design effects, sampling methods and field work implementation were described well in the protocol [60].

Variables

Outcome variable

One-year postpartum emotional fertility intention was the outcome variable for this further analysis. It was measured by a likert scale question with 5 response options with ordinal scale of measurement. By one-year postpartum women were asked how they would feel if they become pregnant? For the seek of getting a meaning out this specific scale of measurement, the scale was reverse coded so that the very happy category gets the larger value on the scale and the very unhappy labeled as the smallest value in the scale.

Independent variables

Independent variables were classified into individual-level variables and enumeration area-level variables. Individual-level independent variables were further categorized into socio-demographic/economic characteristics, parity and other reproductive health characteristics such as contraceptive use history, resuming contraceptive use by one-year postpartum; and husband related characteristics.

The enumeration area (EA) level variables included were the two integral variables namely: region and place of residence and "Region" was grouped into six categories: Tigray, Afar, Amhara, Oromia, SNNPRs and Addis Ababa city administration. The place of residence is classified according to the default urban/rural designation.

Analysis and measurement

Data preparation and merging

To facilitate the merging process, repeatedly asked questions in one or more of the follow up interviews were renamed by giving a prefix 6W, 6M and OY to indicate these sets questions were asked in all the six weeks, six months and the one-year postpartum interviews during the data preparation stage. The data sets were merged using a unique participant ID assigned for every participant women at enrollment and/or baseline survey, and updated during each of the follow up interview visits as a linking variable. The unique participant ID was used as a link variable to link the baseline data set with the three follow up data sets.

A merged women and newborns cohort one data sets consisting of baseline, six weeks, six months and one-year postpartum data sets from the Ethiopian PMA cohort one survey were used for this further analysis. Frequencies and percentages were computed to characterize the study population. Chi-square test statistics were computed to check the cell sample size adequacy, and the sample size was found to be adequate to provide unbiased estimates on one-year postpartum emotional fertility intention. Exploratory data analysis were run for data cleaning thereby checking for item nonresponse rate for every variable and don't know response which were later excluded from the analysis. Following this, variables were recoded to create biological plausible categories alongside with checking the distribution of the recoded variables using proportion. Composite variables were created; namely, baseline and six weeks intimate partner violence.

Generalized ordinal Logistics Regression (GOLR), also is known as the partial proportional odds model was used to identify important correlates of one-year postpartum emotional fertility intention: how would women feel if they became pregnant within one-year postpartum following the index child birth. A p value cutoff

0.25 was used to select candidate variables for the partial proportional odds statistical model building process. Results were presented in the form of percentages, and odds ratios with 95% CI. Significance was declared at a significance level of 0.05. Results were reported based on weighted count and one-year follow-up weight was applied.

Unlike the conservative ordered logistics regression, the GOLR relaxes the assumption of proportional odds for some variables [61]. Since, practically the parallel line assumption is most of the time violated, using the generalized ordered model entertains this practical phenomenon. Unlike the ordered ordinal regression, the generalized ordered model can be less restrictive and more parsimonious than methods that ignore the ordering of categories altogether [61]. Hence, generalized ordinal logistic regression statistical modeling was fitted to identify the correlates of the one-year postpartum emotional fertility intention [61, 62].

Besides, given an ordinal outcome variable, the potential model to be fitted for this type of data is the ordered logit model. For the use of the ordered logit model to be valid, the assumptions that the effect of the independent variables on the odds ratio is constant across all the cut-off points between the categories should be met. These assumptions of the model is referred to as the parallel lines or parallel regressions assumptions. The Brant test is the commonly used approach to assess whether the proportional odds assumption has been violated. During the analysis, the Brant test yielded that the assumption of the proportional odds was violated for the two independent variables, namely: 'fertility desire at baseline' and 'birth order'. Consequently, generalized ordered logit model, an alternative to the ordered logit model, was fitted to the data. Generalized ordered logit statistical modeling is an alternative approach that relaxes the proportional odds assumptions. While using this approach, the effect of the explanatory variables on the odds of being in a higher category versus a lower category or vice versa can vary across the different cut-points of the ordinal outcome. This flexibility of the model comes with the increased number of parameters estimated than the conventional ordered logit model. Since these two independent variables were found to violate the proportional odds assumption, a generalized ordered logistics regression statistical model building process was employed. The generalized logit model is also called cumulative logit model, as it determines the cumulative probability of being in different combination of the higher-level categories of the outcome variable [61].

Data quality management and control

The four data sets were prepared for analysis by introducing the 6 W, 6 M and OY prefixes for questions that were

repeatedly asked. Then a link variable called a unique participant ID was used to merge the data sets. The necessary data cleaning and completeness check were performed. Data completeness for variables and items for creating composite variables was verified through exploratory data analysis, after which any item nonresponse was excluded from the analysis. Frequencies were run to exclude responses with do not know (DNK) and no response (NR).

The Ethiopian PMA (EPMA) has employed a standard and pretested tool, providing ToT for regional coordinators and supervisors; intensive training with mock interviews for resident enumerators; pilot testing the survey instruments, close supervision during the field work, timely progress report and correction, 10% random check were some of the modalities used to maintain the quality of the collected data, the detail is reported somewhere else [60]. Furthermore, frequent field supervision were made during the follow-up interview visits. Besides, supervisors regularly follow up resident enumerators to plan and schedule follow up interviews together and reminding them the scheduled dates for follow up interviews. To minimize the lost to follow up and for logistics reasons, the follow-up six weeks interviews and one year follow up interviews were conducted within a plus or minus two weeks window period as of the delivery date. The six months follow up interviews, however, were conducted within a three weeks interview window period after the newborns have celebrated their 6 months birthday.

Results

Magnitude of one-year postpartum emotional fertility intention among one-year postpartum women

This study reported the magnitude of one-year postpartum emotional fertility intention. Two thousand eight hundred sixty eight (2,868) pregnant and 6 weeks postpartum women were enrolled, $\frac{3}{4}$ (78%) of them were pregnant women at enrolment. Among those, 2094, 87% of the enrolled women completed the one year follow-up interview, of which 54 became pregnant at one-year postpartum. Among them, 1,703 of them provided response for the one-year postpartum emotional fertility intention question item, the outcome variable for this study. The number of enrolled women who missed the six weeks, 6 months and one-year postpartum follow up interviews was 255, 250 and 320 respectively. The number of women who completed the respective three follow up interviews was 2664, 2414 and 2094 with an equivalent response rate of 93%, 91% and 87% respectively.

The proportion of one-year postpartum emotional fertility intention of being felt very unhappy and a sort of unhappy was found to be 31.00% (28.40%, 33.66%) and 34.00% (31.36%, 36.52%) respectively. Similarly,

17.12% (15.15%, 19.29%) had mixed feelings while 13.38% (11.63%, 15.34%) felt a sort of happy and 4.63% (3.60%, 5.94%) reported that they have felt very happy.

The proportion of one-year postpartum emotional fertility intention of being happier about the prospect of becoming pregnant by one-year postpartum was 18.01% (16.00%, 20.20%. Nearly two – third; 64.87% (62.20%, 67.45%) of them have reported that they have felt unhappy (Fig. 1).

Proportion of one-year postpartum emotional fertility intention among one-year postpartum women by socio-demographic characteristics

The proportion of one-year postpartum emotional fertility intention of being felt very unhappy, a sort of unhappy, mixed feelings, a sort of happy and very happy was found to be 39.75%, 34.79%, 15.80%, 6.98% and 2.68% respectively among women in the age group 40 to 49 years. Similarly, of women with secondary or above educational status, the proportion of those who reported that they have felt very unhappy, a sort of unhappy, a mixed feelings, a sort of happy and very happy was found to be 27.84%, 29.86%, 21.47%, 14.73% and 6.33% respectively (Table 1).

The proportion of one-year postpartum emotional fertility intention for women belonging to the households with the lowest wealth quintile was found to be 25.62%,

37.39%, 14.43%, 17.14% and 5.42% for the respective feeling categories. Likewise, for the residents of Tigray region, 62.87%, 12.25%, 8.18%, 13.74% and 2.95% of one year postpartum women have reported that they were very unhappy, a sort of unhappy, in a mixed feelings, a sort of happy and very happy respectively. Similarly, for urban residents, this similar proportion for the respective feeling categories was 27.92%, 29.61%, 24.26%, 14.34% and 3.88%. Besides, for Muslim religion followers, this respective proportion was reported to be 31.60%, 29.11%, 17.63%, 15.25% and 6.42% respectively. Among those women who reported a larger family size of 6 to 14, the proportion of very unhappy and a sort of un happy was 38.79% and 30.75% while mixed feelings, a sort of happy and very happy accounted for 15.15%, 12.74% and 2.56% respectively (Table 1).

Proportion of one-year postpartum emotional fertility intention among one-year postpartum women by reproductive, contraceptive use and related characteristics

The proportion of one-year postpartum emotional fertility intention among those with higher birth order was found to be 37.22%,33.94%,13.44%, 12.26% and 3.14% for the feeling categories of very unhappy, a sort of unhappy, mixed feelings, a sort of happy and very happy respectively. Similarly, this same proportion for women who did not decided whether to have a child was 24.07%, 34.17%,

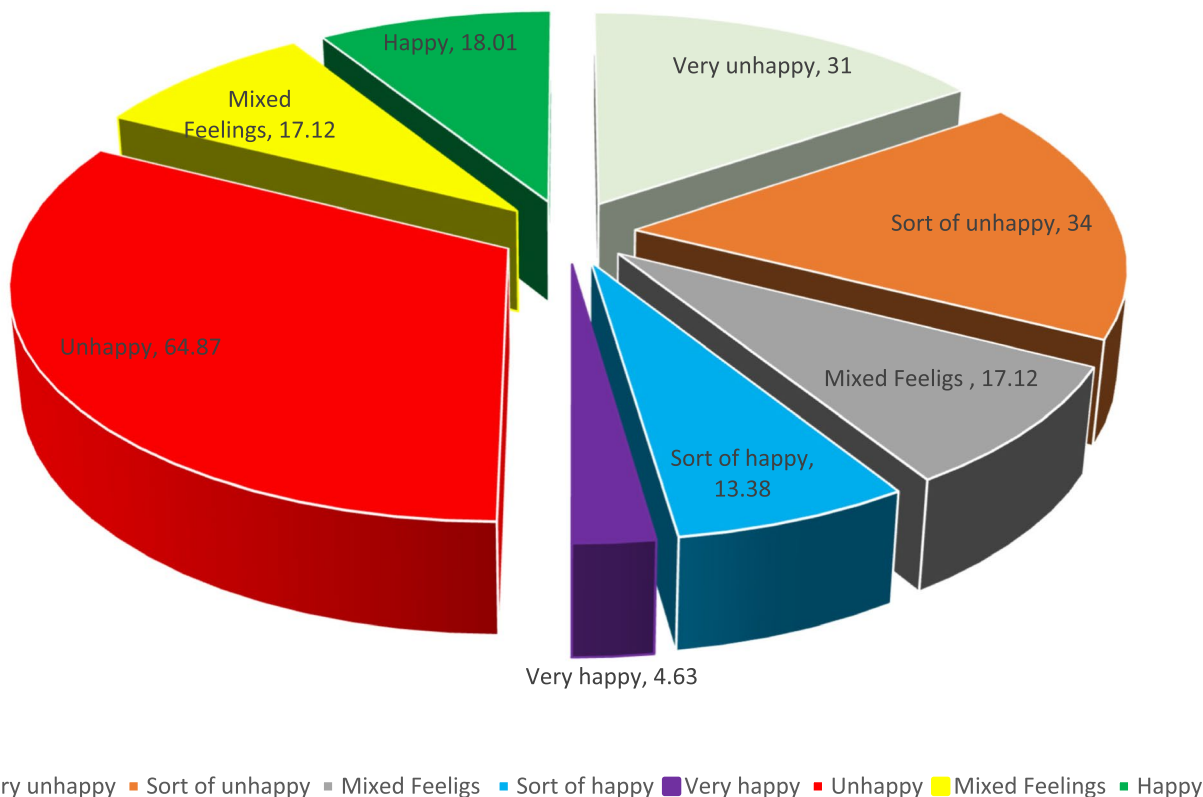


Fig. 1 Magnitude of one-year postpartum emotional fertility intention among one-year postpartum women

Table 1 Proportion of one-year postpartum emotional fertility intention among one-year postpartum women by socio-demographic characteristics

Variables	Very unhappy	%	Sort of unhappy	%	Mixed feeling	%	Sort of happy	%	Very happy	%	Total
Age Category	15 to 19 years	42	24.51	59	34.34	31	18.06	31	18.34	8	171
	20 to 24 years	100	25.52	145	37.03	69	17.49	62	15.83	16	392
	25 to 29 years	148	29.17	172	33.82	94	18.47	58	11.45	36	509
	30 to 34 years	126	37.15	101	29.60	59	17.36	44	12.87	10	340
	35 to 39 years	83	37.57	76	34.46	28	12.67	27	12.45	6	220
40 to 49 years	28	39.75	25	34.79	11	15.80	5	6.98	2	71	
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Religion	Other religion*	10	27.94	9	22.98	6	15.30	11	29.26	2	37
	Orthodox	181	28.80	203	32.43	126	20.10	91	14.46	26	627
	Protestant	152	33.44	195	42.98	57	12.50	37	8.17	13	454
	Muslim	185	31.60	170	29.11	103	17.63	89	15.25	38	585
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Wealth Quintile	Lowest quintile	89	25.62	130	37.39	50	14.43	60	17.14	19	348
	Lower quintile	128	37.90	107	31.82	54	16.01	34	10.19	14	337
	Middle quintile	126	35.13	114	31.81	57	15.96	46	12.88	15	358
	Higher quintile	107	31.31	129	37.92	50	14.73	39	11.44	16	341
	Highest quintile	78	24.49	97	30.29	80	25.11	49	15.28	15	319
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Family Size	1 to 3 members	140	25.44	197	35.71	108	19.56	70	12.76	36	551
	4 to 5 members	166	28.57	205	35.25	98	16.75	85	14.58	28	582
	6 to 14 members	221	38.79	175	30.75	86	15.15	73	12.74	15	570
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Educational Status	No Formal	243	32.99	245	33.21	115	15.68	99	13.41	35	736
	Primary	202	30.16	244	36.52	112	16.79	85	12.74	25	668
	Secondary Plus	83	27.84	89	29.68	64	21.42	44	14.73	19	298
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Place of Residence	Urban	101	27.92	107	29.61	88	24.26	52	14.34	14	361
	Rural	427	31.80	470	35.04	204	15.20	176	13.12	65	1342
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703
Region	Tigray	48	62.87	9	12.25	6	8.18	11	13.74	2	77
	Afar	—	—	4	10.95	5	16.20	16	48.37	8	33
	Amhara	102	28.26	111	30.84	79	21.99	51	14.05	18	361
Oromiya	231	30.51	235	30.96	141	18.59	109	14.45	42	758	
SNNP**	131	31.72	203	48.97	41	9.93	32	7.71	7	414	
Addis	14	23.97	15	25.62	19	30.85	9	15.28	3	60	
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	463	1703

**former Southern Nations Nationalities and Peoples Region which consists of the current South Ethiopia, Central Ethiopia, South West Ethiopia, and Sidama Regions

*Wakfeta and traditional religion

25.75%, 11.02% and 4.99% respectively. Likewise, among women whose husband have other wives, 26.28%, 35.51%, 20.16%, 12.85% and 5.20% of them have felt very unhappy, a sort of unhappy, a mixed feelings, a sort of happy and very happy. The proportion of one-year postpartum emotional fertility intention of being very unhappy, a sort of unhappy, a mixed feelings, a sort of happy and very happy was 32.14%, 33.05%, 17.32%, 12.31% and 4.91% among women who have married more than once respectively. Similarly, this same proportion was 28.87%, 32.07%, 17.37%, 15.63% and 6.05% among those who perceived that their husband were very happy when learned the index pregnancy (Table 2).

Concerning contraceptive use, among ever contraceptive users, the proportion of one-year postpartum emotional fertility intention of feeling unhappy, a sort of unhappy, mixed feelings, a sort of happy and very happy was found to be 33.16%, 35.45%, 16.40%, 11.40%, and 3.59% respectively. Similarly, the respective proportion was found to be 30.53%, 39.97%, 17.80%, 8.83% and 2.87% among those who reported that they have resumed their contraceptives use by one-year postpartum (Table 2).

The proportion of one-year postpartum women's emotional fertility intention of being very unhappy, a sort of unhappy, in a mixed feelings, a sort of happy and very happy was 4 in 10 (39.72%), 35.41%, 11.63%, 11.06% and 2.18% respectively among those who have reported that they have experienced at least one form of perinatal physical and/or sexual violence during the baseline survey. Similarly, this respective proportion was 38.67%, 32.23%, 13.96%, 11.16% and 3.97% among those who reported that they have experienced at least one form of perinatal physical and/or sexual violence as reported at their six weeks postpartum. Last but not least, the proportion of one-year postpartum emotional fertility intention of being very unhappy, a sort of unhappy, in a mixed feelings, a sort of happy and very happy was 28.91%, 37.11%, 14.66%, 13.74% and 5.58% among those whose desired place of delivery was home. Besides, the respective proportion was found to be 29.28%, 31.81%, 15.81%, 17.96% and 5.14% among those whose preferred birth attendant was traditional birth attendant (Table 2).

Correlates of one year postpartum emotional fertility intention among one-year postpartum women

This study has investigated and reported the hierarchical variation of one-year postpartum emotional fertility intention and factors contributing among a cohort of women who were followed for a maximum of 2 years. The proportional cumulative odds from the cumulative logit regression modeling was reported.

The two variables namely: women's 'baseline fertility desire' and 'birth order' were found to have disproportional association across the cumulative logit resulting in

an asymmetrical odds on one-year postpartum women emotional fertility intention. For these two independent variables the association was presented separately for the 'two' ordinal outcome categories. This implies that the effect of these two independent variables on the odds ratio across all the cutoff points between the categories can vary while fitting the generalized ordered logistics regression, resulting the reported different odds ratio for these two variables unlike for the other independent variables where there effect is on the odds ratio is constant across all the cutoff points (Table 3).

The proportional cumulative odds of one-year postpartum emotional fertility intention was found to be 34% (AOR: 0.66 (95%CI: 0.44, 0.97)) lower among women who reported that they ever used contraceptives compared with non-ever users. Similarly, the proportional cumulative odds of one-year postpartum emotional fertility intention was found to be only (AOR: 0.43 (95%CI: 0.29, 0.63)) among women who reported that they had resumed their contraceptive use by one-year postpartum compared with those women who had not commenced contraceptive use by then (Table 3).

The cumulative odds of one-year postpartum emotional fertility intention were found to be disproportional for fertility desire and birth order variables, yielding an asymmetrical cumulative logit result. Hence, fertility desire at baseline and higher birth order had a disproportionate cumulative effect on one-year postpartum emotional fertility intention. The disproportionate cumulative odds of postpartum emotional fertility intention was found to be (AOR: 0.63, 95%CI:(0.41, 0.97)) and (AOR 0.42, 95%CI: (0.22, 0.83)) for the birth order categories of having one to two child and for women who had 3 to 14 children respectively as compared with those with no child. Similarly, women who reported that they do not wanted more child at one-year postpartum had a disproportionate cumulative odds of (AOR: 95CI: 0.51 (0.29, 0.89)) (Table 3).

Discussion

The postpartum period is a key timing in shaping women's postpartum emotional, psychosocial and/or mental health and newborns health outcomes. Determining the level of one-year postpartum emotional fertility intention among one-year postpartum women and identifying the factors contributing for this variation has paramount importance for building and sustaining a healthy family with a better maternal and newborns health outcomes. The study's relevance is very important in the settings such as Ethiopia where male's dominance in household decision making and reproductive health services use decision making is culturally accepted and social constructed. Generating such an evidence is hoped to provide an actionable evidence for the Federal

Table 2 Proportion of one-year postpartum emotional fertility intention among one-year postpartum women by reproductive, contraceptive use and related characteristics

Variables	Very unhappy	%	Sort of unhappy	Mixed feeling	%	Sort of happy	%	Very happy	%	Total
Birth Order										
No Child	71	22.70	97	31.07	71	22.90	56	17.96	17	5.37
1_2 Children	170	27.45	219	35.29	117	18.80	77	12.47	37	5.99
3_14 Children	286	37.22	261	33.94	103	13.44	94	12.26	24	3.14
Total	527	30.99	576	33.91	291	17.13	228	13.38	78	4.59
Fertility Intention										
Undecided	31	24.07	44	34.17	33	25.75	14	11.02	6	4.99
Have a/another child	260	25.93	360	35.89	167	16.67	156	15.57	60	5.94
No more no children	130	42.44	98	31.86	52	17.04	25	8.02	2	0.64
Total	421	29.28	501	34.88	252	17.56	195	13.55	68	4.72
Hus-Other Wives										
No	485	31.47	519	33.72	259	16.80	207	13.43	70	4.57
Yes	43	26.28	58	35.51	33	20.16	21	12.85	8	5.20
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	4.63
Marriage History										
Only once	455	30.76	503	34.02	253	17.09	200	13.54	68	4.59
More than once	73	32.41	74	33.05	39	17.32	28	12.31	11	4.91
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	4.63
Contraceptive Ever Use History										
No	177	27.43	203	31.36	118	18.31	107	16.57	41	6.33
Yes	350	33.16	374	35.45	173	16.40	120	11.40	38	3.59
Total	527	30.98	577	33.90	291	17.12	227	13.36	79	4.63
Desired place of delivery at enrollment										
Home	168	28.91	215	37.11	85	14.66	80	13.74	32	5.58
Government HF	250	29.84	282	33.63	160	19.03	113	13.45	34	4.05
Private HF	3	14.83	4	20.68	8	43.68	2	12.25	1	8.56
Total	421	29.28	501	34.88	252	17.56	195	13.55	68	4.72
Desired Birth Attendant at enrollment										
No One	32	36.59	30	34.43	13	14.35	7	8.24	6	6.39
Health Professional	245	28.14	291	33.43	176	20.15	121	13.87	38	4.42
HEW	7	48.65	4	30.78	0	0.00	1	5.12	2	15.44
TBA	55	29.28	60	31.81	30	15.81	34	17.96	10	5.14
Family Member	81	29.67	115	42.03	34	12.25	32	11.71	12	4.34
Total	421	29.30	501	34.90	252	17.52	195	13.56	68	4.73
Perinatal IPV at enrollment										
No	413	29.35	477	33.92	248	17.61	197	14.00	72	5.13
Yes	107	39.72	95	35.41	31	11.63	30	11.06	6	2.18
Total	520	31.01	573	34.16	279	16.65	227	13.53	78	4.66
Perinatal IPV at Six Week postpartum										
No	445	29.78	510	34.12	264	17.65	204	13.68	71	4.77
Yes	75	38.67	62	32.24	27	13.96	22	11.16	8	3.97
Total	520	30.80	572	33.91	291	17.22	226	13.39	79	4.68
most recent pregnancy husband feeling										
Very unhappy	24	65.47	7	19.53	4	10.00	2	5.00	.	37
A Sort unhappy	30	39.81	26	34.56	7	10.07	8	11.17	3	4.39
Mixed Feeling	52	39.31	39	29.36	25	18.59	15	11.43	2	1.31
A sort Happy	164	27.42	226	37.68	108	17.96	77	12.80	25	4.15
Very Happy	226	28.87	251	32.07	136	17.37	122	15.63	47	6.05
Total	497	30.52	549	33.74	280	17.19	224	13.80	77	4.75

Table 2 (continued)

Variables	Very unhappy	%	Sort of unhappy	%	Mixed feeling	%	Sort of happy	%	Very happy	%	Total
One Year Postpartum Contraceptive											
No	300	31.33	280	29.17	159	16.60	162	16.90	58	6.00	959
Yes	227	30.53	297	39.97	132	17.80	66	8.83	21	2.87	744
Total	528	30.98	577	33.89	292	17.12	228	13.38	79	4.63	1703

Democratic Republic of Ethiopia Health Minister and relevant developmental partners to improve women’s decision making over their emotional fertility intention in particular and reproductive health rights in general. The findings could contributed for tracking SDG 5.6.1.

The finding that two third (64.0%) of one-year postpartum women emotionally felt unhappier is worth to consider while revising the current national reproductive health policy to improve women postpartum emotional fertility intention and psychosocial health. This has an implication on women postpartum emotional and mental health. This finding was found higher than the proportion of women emotional fertility intention of being unhappier for the index pregnancy for this same cohort of women, 48.73% (95% CI: 46.21%, 51.23%) and 16.4% [1, 3] while lower than 74.9% (95% CI; 72.5%–77.1%) [63]. This higher proportion of one -year postpartum emotional fertility intention of being unhappier might be related to women experience of low-quality antenatal care (ANC) received during their index pregnancy and had not able to receive the recommended ANC visits during their most recent pregnancy and childbirth. A recent study conducted in Ethiopia [64] reported that the overall effective ANC coverage was low. On the other hand, the success of health extension program (HEP), Health Sector Transformational Plans and the new reproductive health policy in the country [30, 31] might have contributed for the observed 18.01% proportion of one-year postpartum emotional fertility intention of being happier.

To this end, the implication of the finding that only one in five post-partum women reported that they have felt happier underscored that we have a long way to go to make women decided over their emotional fertility intention. Besides, installing the inter-pregnancy pre-conception care packages which are relatively new for our country was implied [10, 13, 65]. Furthermore, the expansion of the urban health extension professional and addition of level IV health extension workers in rural areas should be used as a stepping stone to improve the quality of care [66] at the community level. This could enable women to get informed counseling about their reproductive health needs and rights, including planning and spacing their pregnancies and consequently feeling happier. Moreover, the effort to improve quality of maternal and newborns health care; and provision respectful maternity care [67] along with the quality maternal and newborns continuum of care are likely to encourage women to plan their pregnancies and subsequently to be happier. Besides, the variation in community support for pregnant women to utilize the three domains of the maternal and new born continuum of care packages could also contributes to the observed variation in the postpartum emotional fertility intention [68].

Table 3 Generalized ordered logistics regression modeling result of one-year postpartum emotional fertility intention among one-year postpartum women

Variables		Very unhappy feeling AOR	Mixed feeling AOR ⁺
AOR			
	15 to 19 years	1	
	20 to 24 years	1.10 (0.63,1.93)	
	25 to 29 years	1.26 (0.74,2.16)	
	30 to 34 years	1.17 (0.64,2.16)	
	35 to 39 years	1.01 (0.51, 2.01)	
	40 to 49 years	0.62 (0.21, 1.77)	
Religion	Other Religion	1	
	Orthodox	0.94 (0.25, 3.51)	
	Protestant	0.38 (0.12,1.25)	
	Moslem/Muslim	0.80 (0.20,3.16)	
Wealth Quintile	Lowest quintile	1	
	Lower quintile	0.74 (0.43,1.28)	
	Middle quintile	0.88 (0.45,1.72)	
	Higher quintile	0.66 (0.32,1.40)	
	Highest quintile	1.17 (0.62,2.19)	
Family Size	1 to 3 members	1	
	4 to 5 members	1.34 (0.95,1.89)	
	6 to 14 members	1.26 (0.73,2.19)	
Educational Status	No Formal Education	1	
	Primary Education	0.92 (0.59,1.44)	
	Secondary Plus Education	1.14 (0.65, 2.00)	
Birth Order ⁺	No Child	1	1
	1_2 Children	0.63 (0.41,0.97)*	0.67 (0.40,1.12)
	3_14 Children	0.42 (0.22,0.83)*	0.65 (0.35,1.20)
Fertility Desire at baseline ⁺	Undecided/Don't know	1	1
	Have a/another child	0.62 (0.381,0.1)	0.37 (0.61,2.16)
	No more/prefer no children	0.51 (0.29,0.89)*	0.26 (0.22, 1.40)
Most recent pregnancy husband feeling	Very Unhappy	1	
	Mixed Feeling	1.03 (0.42,2.54)	
	A Sort Happy	1.15 (0.52,2.51)	
	Very Happy	1.51 (0.66,3.43)	
Contraceptive Ever Use History	No	1	
	Yes	0.66 (0.44,0.97)*	
Perinatal IPV experience at baseline	No	1	
	Yes	0.69 (0.45, 1.08)	
Variables		Very unhappy feeling AOR	Mixed feeling AOR ⁺
Perinatal IPV experience at 6 weeks	No	1	
	Yes	0.99 (0.61,1.60)	

Table 3 (continued)

Variables		Very unhappy feeling AOR	Mixed feeling AOR ⁺
AOR			
	One Year Postpartum Contraceptive use	No Yes	1 0.43 (0.29, 0.63)***

*P<0.005 *** P<0.000

***p<.001, **p<0.01, *p<0.05

⁺Only results for two independent variables presented in both outcome variable categories since these two variables violated the assumptions of parallel regressions assumptions

Furthermore, the variation in the degree of women emotional fertility intention might be related with the socially constructed and culturally accepted male dominance in matters that affect women, this dominance negatively interferes on women reproductive autonomy and the control they have over their fertility among others in low and middle-income countries including Ethiopia. A recent nationally representative study from Ethiopia revealed that partner-perpetrated pregnancy coercion inhibits women’s reproductive autonomy reported that approximately 20% of Ethiopian women reported past-year pregnancy coercion (11.4% less severe; 8.6% more severe), ranging from 16% in Benishangul-Gumuz to 35% in Dire Dawa [7]. This led women being emotionally unhappier whenever they thought of becoming pregnant. Addressing this gap in women’s emotional fertility intention would help to track the success of SDG goal 5.6.1 [65] and the reproductive health targets [10]. Besides, poor patient-provider communication and inadequate support of women’s autonomy during antenatal and postnatal care visits contributed most to poor person-centered maternity care might be possible explanation for this variation in the level of postpartum emotional fertility intention [4].

Those women with a contraceptive use history and those who have reported to have commenced contraceptive use by their one-year postpartum following the index birth were found to have lower symmetrical cumulative logit of one-year postpartum emotional fertility intention. This finding was found in line with findings from studies [25, 51, 69, 70]. The possible explanation for the link between contraceptive use and emotional fertility intention might be related to contraceptive access [71, 72]; pregnancy and child bearing [71]. Besides, it might be also be related with contraceptive use and fertility transition [73] and women fertility desire and contraceptive behavior might also be one of the possible explanations

[70]. Moreover, the poor quality contraceptive counseling [74, 75] could be another explanation for the observed variation. This implied that we need a long way to go to empower women on their contraceptive use decision making [76, 77]. The poor patient-provider communication and inadequate support of women's autonomy contributed most to poor person-centered maternity care [4] might be another possible explanation.

The finding that women intended to have another child had lower one-year postpartum emotional fertility intention but disproportionate across the cumulative logit might be related the families' aspiration to achieve the desired family size. This can be seen as exercising their reproductive right and reproductive autonomy [1, 3, 78]. Moreover, the lower and asymmetrical effect of higher birth order on one-year postpartum emotional fertility intention was also found in line with findings from studies [51, 79]. This observed finding might be related with women prior pregnancy experience [1, 63, 80] and is likely related with male decision making on the number of children [22, 81, 82]. In line with studies [1, 3] birth order was found associated with emotional fertility intentions. Lastly, unlike studies [1, 53, 63, 83] individual women related factors such as age, religion, family size, and educational status of women, intention to use contraception were not found to affect one-year postpartum women emotional fertility intentions. Besides, studies on emotional fertility intention [1, 3] reported that age, region, educational status and desired birth attendant were significantly associated with emotional fertility unlike this study. The use of data collected at different time points through the follow up period [3] and the difference in the statistical model fitted by the one study [3] might explain the observed discrepancy while cross-sectional data was used by the other study [1].

This study is not spared of limitations. To begin with, the reliance on personal history report response by asking women to learn about how they would feel if they became pregnant within one-year postpartum has its own limitations. This led to potential biases such as social desirability bias. Besides, owing to social prestige, women seldom discuss negatively about their emotional fertility intentions in our context. However, such findings offer a meaningful insights which are important and relevant for outlining care for pregnant women and their partners. Moreover, further research is needed to validate and build upon this initial result including studies that develop with alternative and direct measures for emotional fertility intentions. In addition, the PMA 2019/21 cohort one follow up survey didn't collect information on variables such as husband desired number of children, husband employment and women employment. The women's survey did not collect information on these variables either. Hence, future similar surveys need

to collect these missing variables along with important paternal indicators regarding contraception, emotional health, indicators related preconception care packages and maternal and newborns care continuum. Further researches with qualitative triangulation aimed at exploring one-year postpartum emotional fertility intention across different cultural or socio-economic groups are need.

Conclusion

One-year postpartum emotional fertility intention of being unhappier is more pronounced in Ethiopia which calls for intended and spaced pregnancies by ensuring women reproductive health services and contraceptive use empowerment. The findings underscored the pivotal role of contraceptive use history and resuming contraceptive use by one-year postpartum in shaping one-year postpartum emotional fertility intentions. Activities and efforts targeting on women with high parity and promoting intended and spaced pregnancies and access to contraceptives do likely improve one-year postpartum emotional fertility intention. Activities that enable women to decide their contraceptive use along with patient-centered counseling during ANC and PNC visits are very crucial to shape one-year postpartum emotional fertility intention. The study results implied that awareness creation on contraceptive use related components of the inter-pregnancy preconception care packages services and more specifically availing the actual inter-pregnancy contraceptive service provision could also be critical to address one-year postpartum emotional fertility intention.

Practical and clinical implications; and policy relevance of the findings

The implication of the findings calls for strengthening postpartum contraceptive use counseling and intensifying actual service provision alongside with enabling high parity women to use contraceptive through access and informed decision making.

The other implications of the study findings include enhancing client-centered informed contraceptive use decision making to sustain contraceptive use among those with a contraceptive use history and improving postpartum contraceptive uptake. Provision of postpartum contraceptive could reduce maternal and newborns morbidity and mortality through spacing, improving women emotional and mental health in the postpartum period. It also improves their emotional fertility readiness and/or intention as well.

At the policy level, the subsequent national reproductive health policy and strategic plans need to entertain the human right approach strategy in providing contraceptive methods and enforcement of women alone

decision making on contraceptive use as part of women and girls empowerment [76]. The Federal Democratic Republic of Ethiopia Health Minister need to work strategically with relevant partners and programs working on contraceptive commodity provision and access by streamlining resources and budget. This approach will enable a timely service delivery.

The clinical care implication of the findings is that health care professionals need to counsel on postpartum emotional fertility intention and mental health during antenatal and postnatal care service provision endeavors through patient-centered contraceptive use counseling. Besides, installing the inter-pregnancy contraceptive and mental health care related preconception care packages in the health system are very crucial. Furthermore, extending the continuum of maternal, newborns and child health cares to one-year postpartum and beyond could have paramount importance.

Abbreviations

ANC	Antenatal Care
ARRR	Adjusted Relative Risk
CS	Cross-sectional
EA	Enumeration Areas
HH	Households
HEW	Health extension Workers
HF	Health Facility
HP	Health Professionals
GOLR	Generalized Ordered Logistics Regression
PNC	Postnatal care Care
EPMA	The Ethiopian Performance for Monitoring for Action Ethiopia
SNNPR	The former Southern Nations, Nationalities and Peoples Region
TBA	Traditional Birth Attendants

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Authors' contributions

SA conceptualized the study, conducted the data curation and the formal analysis; and draft the manuscript and wrote the final version, interpreted the results and critically revised the manuscript. He also got involved in survey implementation, preparatory and operational activities and survey tool quality assurance as well. Besides, he also involved in the further analysis of the collected data and communicating the findings on selected survey indicators such as on intimate partner violence among pregnant women and six weeks postpartum women, women contraceptive use decision making, emotional fertility intention and perceived paternal emotional fertility intention, contraceptive use intention among non-users, perceived community acceptance and partner engagement on the use of the recommended components of maternal and newborns care continuum and perceived community acceptance on TBA assisted childbirth care. TD involved in the project data management, guide the analysis and critically review the final manuscript. TD also assisted in the model building process, in the data interpretation and critically reviewing the manuscript. FT contributed to the conception of the idea, involved in writing the draft manuscript and interpretation of the results along with critically reviewing the final manuscript. FT also participated in the field wok supervision, survey tool quality check and project facilitation. HG and TT Participated in the field work, survey operation, tool translation and critically and intellectually review the final manuscript. HG and TT also participated in writing, reviewing and editing the manuscript. KM: critically review the final manuscript including language

check. BA contributed for the conception and in intellectually reviewing the manuscript. She also participated in the field work supervision. AA (Author 6) and TA involved in the project data management, guide the analysis and critically review the final manuscript. TA also assisted in the data curation. MY (Author 13) and NT contributed for the conception, served as survey tool developer, coordinating and facilitating the project implementation and contributed intellectually in critically reviewing the manuscript. NT also participated in the data interpretation and the modeling process, led the translation team to insure survey tool quality. MY (Author 13) also participated in the survey operation and management as project coordinator. AA (Author 4) and ZN: intellectually and critically reviewed the final version of the manuscript. MY (author 16) and AZ: Contributed in intellectually and critically reviewing the final manuscript. MY (author 16) participated in the field work. AZ also participated in running the project preparatory and/or facilitation, logistics procurement and management activities and served as an assistant project coordinator. SS and AS contributed for the conception of the idea, provide guidance in the manuscript write up, contributed for the data interpretation and critically and intellectually reviewing the final manuscript. SS led the Ethiopian Performance Monitoring for Action Ethiopia (EPMA) project and the former Performance monitoring for action 2020 Ethiopia. AS co-led the Ethiopian Performance Monitoring for Action Ethiopia (EPMA) project and the former Performance monitoring for action 2020 Ethiopia. All authors reviewed and approved the final version of the manuscript.

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Data availability

The datasets generated during the study are publicly available from the PMA website and/or the Johns Hopkins Research Data Repository: <https://archive.data.jhu.edu/dataverse/root/?q=PMA+Ethiopia+Cohort+one>.

Declarations

Ethics approval and consent to participate

This study involved a secondary analysis of deidentified data from the PMA Ethiopia. The PMA Ethiopia survey was conducted strictly under the ethical rules and regulations of world health organization and IRB of Ethiopian Health and Nutrition Research Institute (EHNRI). Informed consent was obtained from respondents during the data collection process of PMA Ethiopia on the baseline data collection on Oct 2019 and subsequent follow up interviews till Aug 2021. Minors less than 15 years as per the law were not included in this study. Informed verbal consent was take from study participants during the screening, baseline and follow up interviews. PMA survey has been also conducted after obtaining ethical approval from Addis Ababa University College of Health Sciences and Medicine and Bloomberg School of Public Health at Johns Hopkins University in Baltimore, USA.

Consent for publication

N/A not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Epidemiology and Biostatistics, School of Public Health, Wolaita Sodo University, Wolaita Sodo, South Ethiopia, Ethiopia

²School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia

³Center for Population Studies, College of Developmental Studies, Addis Ababa University, Addis Ababa, Ethiopia

⁴FTF Research Consult, Addis Ababa, Ethiopia

⁵Ethiopian PMA (EPMA) Project at Addis Ababa University, Addis Ababa, Ethiopia

⁶College of Health Sciences, Mekelle University, Mekelle, Tigray, Ethiopia

⁷Department of Public Health, Institute of Health Sciences, Wollega University, Nekemte, Oromiya, Ethiopia

⁸University of the Western Cape, Cape Town, South Africa

⁹Department of English Language, Kotebe Metropolitan University, Addis Ababa, Ethiopia

¹⁰School of Nursing and Midwifery, Addis Ababa University, Addis Ababa, Ethiopia

¹¹School of Health and Society, University of Wollongong, Wollongong, NSW, Australia

¹²Department of Women's and Family Health, School of Midwifery, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

¹³Metages Yohannes Health Research Consultant, Addis Ababa, Ethiopia

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