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Effect of group-based training interventions on mothers' knowledge about menstruation in the selected districts of Jimma zone: A controlled quasi-experimental study

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Abstract

Menstrual health plays an important role in adolescent development; however, many girls in resource-constrained settings enter menarche with inadequate knowledge due to restricted access to information and the influence of prevailing social and cultural norms. Strengthening mothers' knowledge may provide an indirect but effective approach for improving menstrual awareness among adolescent girls. In Ethiopia, little evidence exists regarding interventions specifically designed to improve maternal knowledge of menstruation. This study therefore assessed the impact of group-based training on mothers' knowledge, aiming to enhance understanding and dispel misconceptions. A quasi-experimental controlled study was conducted in Omo Nada and Shabe Sombo districts of Jimma Zone, Ethiopia, among 390 mothers of adolescent girls aged 10 to 19 years. One district received the intervention, while the other served as a comparison area. The intervention group participated in six structured sessions on menstrual health and hygiene, whereas the comparison group received routine health education. Data were collected using pre-tested questionnaires at baseline and endline and analyzed using multilevel mixed-effects logistic regression models to account for clustering within villages and kebeles. Following the intervention, the proportion of mothers with adequate menstrual knowledge increased from 46.7% to 99.5% in the intervention group. After adjusting for potential confounders and clustering effects, mothers in the intervention area were more than seven times as likely to have adequate menstrual knowledge compared with those in the comparison area (AOR = 7.55, 95% CI: 4.69-12.16). The findings suggest that a group-based, mother-focused educational intervention was associated with substantial improvements in maternal knowledge of menstruation. Such interventions may contribute to improving menstrual health literacy among mothers and, ultimately, support better menstrual health outcomes for adolescent girls. *(Afr J Reprod Health 2026; 30 [21]: 88-99).*

Keywords: Menstrual health literacy, Maternal education, adolescent girls, quasi experimental study

Résumé

La santé menstruelle joue un rôle important dans le développement des adolescentes ; cependant, dans les milieux aux ressources limitées, de nombreuses filles abordent la puberté (et les premières règles) avec des connaissances insuffisantes, en raison d'un accès restreint à l'information et de l'influence des normes sociales et culturelles en vigueur. Renforcer les connaissances des mères pourrait constituer une approche indirecte mais efficace pour améliorer la sensibilisation aux questions menstruelles chez les adolescentes. En Éthiopie, il existe peu de données probantes concernant des interventions spécifiquement conçues pour améliorer les connaissances des mères sur les menstruations. Cette étude a donc évalué l'impact d'une formation en groupe destinée aux mères, visant à approfondir leur compréhension et à dissiper les idées fausses. Une étude quasi expérimentale contrôlée a été menée dans les districts d'Omo Nada et de Shabe Sombo, dans la zone de Jimma (Éthiopie), auprès de 390 mères d'adolescentes âgées de 10 à 19 ans. L'un des districts a bénéficié de l'intervention, tandis que l'autre a servi de zone de comparaison. Le groupe ayant bénéficié de l'intervention a participé à six séances structurées sur la santé et l'hygiène menstruelles, alors que le groupe de comparaison a reçu une éducation à la santé classique. Les données ont été recueillies à l'aide de questionnaires prétestés, au début et à la fin de l'étude, puis analysées au moyen de modèles de régression logistique à effets mixtes multiniveaux, afin de prendre en compte le regroupement des données au sein des villages et des *kebeles*. À l'issue de l'intervention, la proportion de mères possédant des connaissances adéquates sur les menstruations est passée de 46,7 % à 99,5 % dans le groupe ayant bénéficié de l'intervention. Après ajustement en fonction des facteurs de confusion potentiels et des effets de regroupement, les mères vivant dans la zone d'intervention étaient plus de sept fois plus susceptibles de posséder des connaissances adéquates sur les menstruations que celles vivant dans la zone de comparaison (AOR = 7,55 ; IC à 95 % : 4,69–12,16). Ces résultats suggèrent qu'une intervention éducative en groupe, ciblant les mères, est associée à une amélioration substantielle de leurs connaissances sur les menstruations. De telles

interventions pourraient contribuer à renforcer les connaissances des mères en matière de santé menstruelle et, à terme, favoriser une meilleure santé menstruelle chez les adolescentes..*(Afr J Reprod Health 2026; 30 [21]: 88-99).*

Mots-clés : Connaissances en matière de santé menstruelle, éducation des mères, adolescentes, étude quasi expérimentale

Introduction

The onset of menstruation marks an important transition during adolescence and can influence girls' physical health, school participation, emotional well-being, and social experiences.[1–4] Despite menstruation being experienced by nearly all adolescent girls, it remains surrounded by stigma, cultural taboos, and silence in many settings, particularly in low- and middle-income countries such as Ethiopia.[5–7] Myths and misconceptions based on tradition and religion only intensify more stigma and confusion. [8] Many girls enter menarche without adequate prior knowledge or preparation, resulting in limited preparedness and increased anxiety regarding the onset and management of menstruation. This lack of preparation makes it tough for girls to focus at school, feel comfortable in public, or interfere with their productive life.[9–14]

Within many households, mothers serve as the primary source of menstrual information and emotional support during puberty, placing them in a strategic position to influence menstrual health literacy among adolescent girls.[5,7,15–16] In Kenya, for example, most girls reported preferring to discuss sexual development with their mothers rather than with other sources of information.[17] Similar findings have been reported in Ethiopia, where girls identified mothers and female teachers as their most trusted sources of menstrual information and advice.[9] In Pakistan, a study found that 77% of girls first learned about periods from their mothers.[18]

Despite their important role, many mothers possess limited or inaccurate knowledge regarding menstruation due to sociocultural beliefs and inadequate access to reproductive health information. In Pakistan, half the mothers told their daughters not to bathe during their periods.[18] In Ethiopia, many girls reach menarche with little or no prior information, and the information provided afterward may be incomplete or inaccurate.[9] Only about 8% of Ethiopian mothers educate their daughters before their first menstrual period, leaving many girls unprepared and contributing to the persistence of menstrual-related taboos and misconceptions.[19]

These findings underscore the importance of mothers as key contributors to adolescent menstrual health. As primary caregivers and trusted sources of information, mothers are well positioned to shape their daughters' understanding of menstruation and provide emotional and practical support during puberty. Improving maternal knowledge may help address persistent menstrual stigma and misconceptions while fostering open communication within families. Evidence suggests that when mothers possess accurate menstrual health knowledge, girls are more likely to develop positive attitudes toward menstruation, greater confidence in managing menstrual hygiene, and healthier menstrual practices.[8, 20] Therefore, strengthening mothers' knowledge represents a potentially effective strategy for improving menstrual health literacy among adolescent girls and promoting positive menstrual experiences.

Despite the recognized role of mothers, few menstrual health interventions in Ethiopia specifically target mothers as recipients of education. Most menstrual health programs are implemented in school settings and primarily focus on adolescent girls, while mothers are often overlooked despite their critical role in pre-menarche education. However, evidence from Ethiopia and other settings suggests that mother-inclusive educational interventions can improve girls' menstrual knowledge, attitudes, and hygiene practices.[21–23] Group-based educational approaches are particularly promising because they facilitate peer learning, shared experiences, and culturally appropriate discussions. Furthermore, broader evidence from adolescent sexual and reproductive health programs indicates that caregiver involvement strengthens program effectiveness by enhancing knowledge transfer and reinforcing positive health behaviours within households.[24]

Despite growing recognition of the importance of menstrual health, evidence on the effectiveness of structured, mother-focused educational interventions remains limited in Ethiopia. Existing research has largely concentrated on school-based education for adolescent girls, leaving the potential contribution of maternal

education insufficiently explored. Consequently, there is limited empirical evidence regarding whether improving mothers' menstrual health knowledge through structured group training can enhance their capacity to support adolescent girls. Addressing this gap is important because mothers often serve as the first source of menstrual information, yet many lack access to accurate reproductive health education. Therefore, this study aimed to assess the effect of a structured group-based menstrual health education intervention on mothers' knowledge of menstruation among mothers of adolescent girls in Ethiopia. The findings may inform community-based strategies and policy interventions that seek to reduce menstrual stigma, improve menstrual health literacy, and strengthen support systems for adolescent girls.

Methods

Study design

A community-based quasi-experimental study with intervention and comparison groups was conducted to evaluate the effect of group based structured menstrual health education intervention on mothers' knowledge of menstruation and menstrual hygiene. Baseline and endline assessments were conducted among mothers of adolescent girls residing in selected districts of Jimma Zone, Oromia Region, Ethiopia. Omo Nada district served as the intervention area, while Shabe Sombo district served as the comparison area Baseline data were collected from July 5 to 25, 2022. The intervention was implemented between late September and October 2022, and follow-up data were collected six months post-intervention.

Participants

The study population consisted of mothers of adolescent girls aged 10–19 years residing in the selected districts. Eligible mothers were those meeting inclusion criteria and randomly selected from designated kebeles. Both biological mothers and female caregivers were included.

Sample size

Sample size estimation was based on a previous intervention study conducted in Unguja, Zanzibar.[25] Using G*Power version 3.9.1, calculations assumed two independent groups of equal size, a significance level of 5%, statistical power of 80%, and an expected effect size of 0.4. This yielded 79 mothers per group. We added 15% in case some didn't respond, increasing it up to 91 in each group. The sample size calculation incorporated a design effect to account for clustering of participants within community units; an intraclass correlation by using 0.173[26] and an average cluster size of 13 were used to adjust for within-cluster correlation [27], resulting in a final sample size of 390 participants equally distributed between the intervention and comparison groups.

Sampling procedure

Two districts were included in the study. The districts were randomly allocated, with Omo Nada assigned to the intervention arm and Shabe Sombo assigned to the comparison arm. Within each district, six kebeles were selected using simple random sampling. Gares (sub-units) within the selected kebeles were subsequently identified, and household listings were conducted to identify mothers or female caregivers of adolescent girls aged 10-19 years. Eligible participants were selected using a lottery method from the sampling frame. An equal number of participants were recruited from each gare.

Eligibility criteria

Mothers had to live with their adolescent daughters for the length of the study and not plan to move. We got informed consent from every participant. We excluded mothers whose daughters were married and those with serious medical or mental health conditions that could interfere with participation in the intervention sessions or completion of study assessments.

Group allocation

The study employed a controlled quasi-experimental design. Prior to implementation, the two study districts were assigned to the intervention and comparison arms through a coin toss conducted by the principal investigator. Omo Nada district was

assigned to the intervention arm, while Shabe Sombo district served as the comparison district. Participant recruitment and baseline data collection were conducted within the respective study districts before implementation of the intervention. Mothers in the intervention district received structured menstrual health and hygiene education delivered by Health Extension Workers (HEWs) with support from members of the Women's Development Army (WDA). Participants in the comparison district continued to receive routine health education services available through the existing health system.

Intervention

Mothers in the intervention group went through a six-week group based behavioral communication program on menstrual health and hygeine. The session aimed to give them knowledge and real confidence to talk openly with their daughters about menstruation. Each week built on the last, encouraging mothers to actually use what they learned for conversations at home.

Implementation

The intervention consisted of six weekly group sessions delivered over a six-week period. Sessions were held in accessible community venues, including schools, kebele offices, and health posts, based on local availability and participant convenience. Each session lasted approximately two hours, except for the final session, which was conducted as a four-hour edutainment event. The intervention was delivered by trained Health Extension Workers (HEWs) with support from members of the Women's Development Army (WDA). Prior to implementation, facilitators received training on the intervention package, session content, and participatory facilitation techniques to ensure standardized delivery. Sessions were conducted using interactive and participatory learning approaches, including brief presentations, group discussions, scenario-based role plays, and experience-sharing activities. In addition, educational reading materials were provided for mothers to review independently or discuss with their adolescent daughters, reinforcing key messages beyond the group sessions. The final edutainment session used poetry, drama, and community engagement activities to reinforce core messages and promote open dialogue

Weekly Session Content

Week 1: Puberty and Menstruation: Introduction to puberty, menstrual cycle, physical and emotional changes, and management of premenstrual symptoms.

Week 2: Menstrual Hygiene Management (MHM): Hygiene practices, absorbent use, washing, drying, storing, disposal, and risks of poor hygiene.

Week 3: Myths, Norms, and Practices: Exploration of cultural beliefs and myths surrounding menstruation and their impact on behaviour.

Week 4: Breaking the Silence: Strategies for initiating conversations and normalizing menstruation through open communication.

Week 5: Parental Roles: Guidance for mothers on supporting adolescent girls with hygiene and emotional care.

Week 6: Edutainment Event: Creative reinforcement of key messages through poetry, drama, and community participation.

Attendance, Adherence, and Fidelity Monitoring

Attendance was recorded at each session using participant registration sheets. Mothers were encouraged to attend all six sessions. Participants who missed a session were followed up by members of the Women's Development Army (WDA) and encouraged to attend subsequent sessions. At the beginning of each session, a brief recap of the previous session was conducted, and key messages were summarized for participants who had been absent. To promote adherence, session schedules were developed in consultation with community leaders and participants to ensure convenience and maximize attendance. Regular reminders were provided through Health Extension Workers (HEWs) and Women's Development Army representatives.

Data collection

Data were collected using a semi-structured questionnaire developed based on previously published studies assessing knowledge related to puberty and menstruation. The instrument included

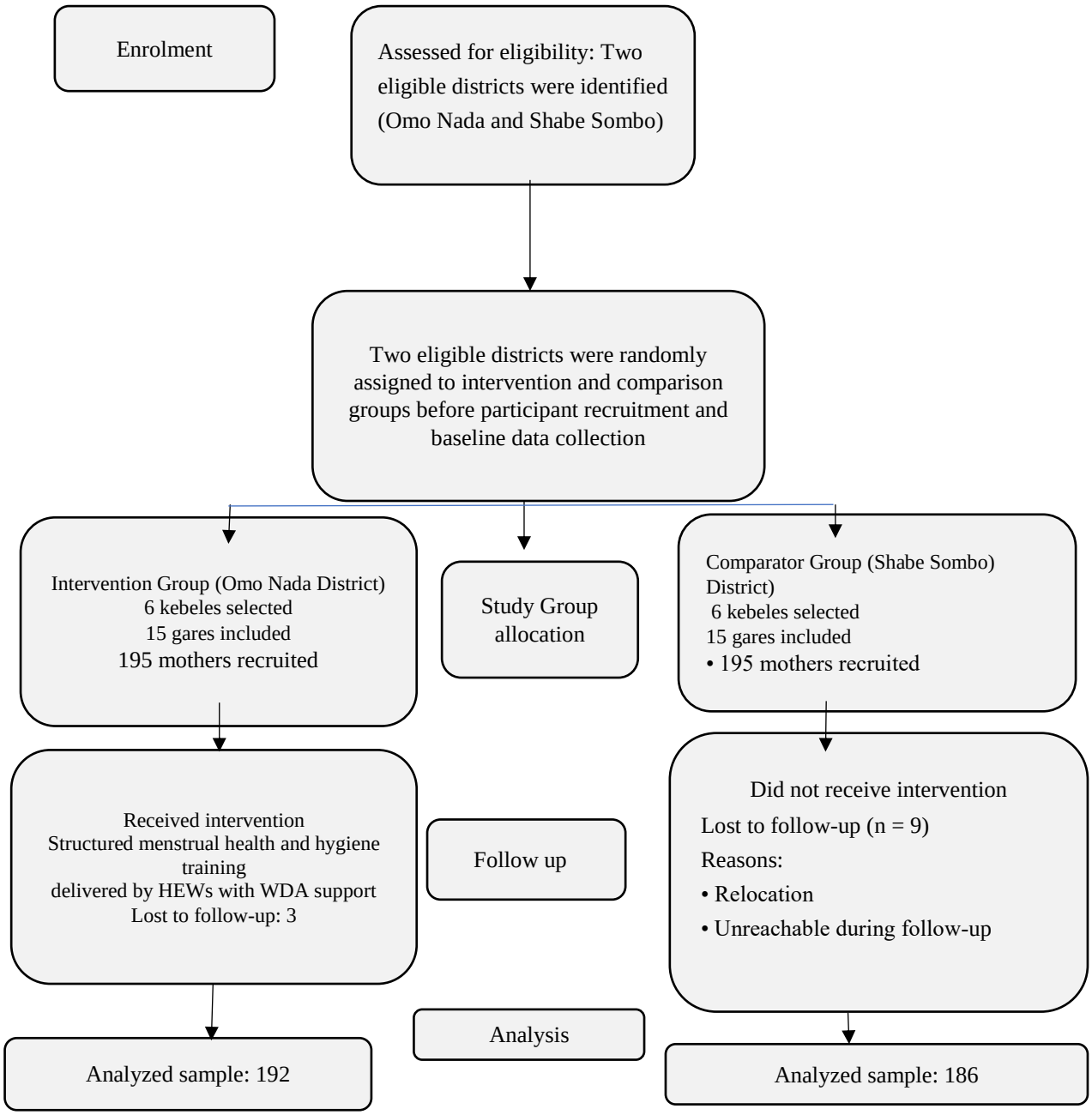


Figure 1*:* Participant flow diagram for the controlled quasi-experimental study evaluating the effect of group-based menstrual health education on mothers' knowledge in Omo Nada and Shabe Sombo districts, Jimma Zone, Ethiopia

items on participants' socio-demographic characteristics and knowledge of menstrual health and hygiene. The questionnaire was adapted to the local context, translated into Afaan Oromo, and back-translated into English to ensure consistency. Prior to the main study, a pretest was conducted among 20 mothers residing outside the study area to assess clarity, comprehensibility, and cultural appropriateness. Based on the pretest findings, minor modifications were made to improve the

instrument. Internal consistency reliability was assessed using Cronbach's alpha, yielding a coefficient of 0.70. The final questionnaire consisted of 16 knowledge-related items and was entered into KoboToolbox for electronic data collection. Face-to-face interviews were conducted with the same cohort of mothers at baseline and six months after completion of the intervention.

Data quality control

Supervisors and data collectors went through focused training to make sure they really understood the survey and the KoboToolbox app. While midwives and nurses performed interviews and the primary investigator supervised the system on a daily basis, public health professionals monitored the process at the actual data collection site. KoboToolbox was configured to enforce mandatory responses and range checks, minimizing missing or inconsistent data.

Variables

Mothers' knowledge of menstruation was assessed using 16 knowledge-related items. Each correct response was assigned a score of one and each incorrect response a score of zero, resulting in a total score ranging from 0 to 16. The mean knowledge score was 10. For regression analysis, the knowledge score was dichotomized into adequate and inadequate knowledge categories. Participants scoring at or above the mean (= >10) were classified as having adequate knowledge, while those scoring below the mean were classified as having inadequate knowledge. This categorization was adopted to facilitate logistic regression analysis and interpretation of the intervention effect.

Statistical analysis

Data were analyzed using Stata version 17.1, and statistical significance was declared at $p < 0.05$. Descriptive statistics were used to summarize study variables, with continuous variables presented as means ± standard deviations (SDs) and categorical variables as frequencies and percentages. Due to loss to follow-up, analyses were restricted to participants with complete baseline and endline data. Accordingly, the final analysis included 378 participants who completed the follow-up assessment. Given the hierarchical structure of the data, with participants nested within community units, multilevel mixed-effects logistic regression models were fitted to account for intra-cluster correlation and to identify factors associated with maternal knowledge of menstruation. Four models were constructed: a null model with no explanatory variables, a model including individual-level factors, a model including community-level factors, and a full model incorporating both individual- and community-level variables. Variables with a p-value < 0.25 in the bivariable analysis were entered into the multivariable models. The final results are presented as adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

Ethical considerations

Ethical approval was obtained from the Institutional Review Board of Jimma University on October 13, 2021 (Ref. No. IHRPG1/541/21). Written informed consent was obtained from all participants before enrollment. The study adhered to the principles of the Declaration of Helsinki and other relevant ethical guidelines governing research involving human participants. The study was conducted according to a pre-developed intervention protocol. The intervention was retrospectively registered in the Pan African Clinical Trials Registry (PACTR202501545388779) on January 16, 2025.

Results

Sociodemographic characteristics of the study participants

A total of 390 mothers or caregivers were enrolled in the study, with 195 participants recruited from the intervention district and 195 participants recruited from the comparison district. During the six-month follow-up period, 12 participants were lost to follow-up due to relocation (n = 5) or because they became unreachable (n = 7). Consequently, 378 participants completed the endline assessment, comprising 192 (50.8%) participants in the intervention group and 186 (49.2%) participants in the control group (Figure 1). Attrition was higher in the control group (n = 9; 4.6%) than in the intervention group (n = 3; 1.5%).

Table 2: Baseline sociodemographic characteristics of participants in the intervention and comparison groups, 2022

Variable	Baseline (N: 390)		P value
	Control	Intervention	
Age in years	(n: 195)	(n=195)	
Mean (SD)	39± 7.409	36±5.667	
25-34	38(19.49)	59(30.26)	0.001
35-44	101 (51.79)	115(58.97)	
>= 45	56(28.72)	21(10.77)	
Educational status			
Unable to read and write	155(79.49)	173(88.72)	0.105
Read and write	19(9.74)	15(7.69)	
Formal education [a]	21(10.77)	7(3.59)	
Place of residence			
Rural	166(85.13)	163(83.59)	0.676
Urban	29(14.87)	32(16.41)	
Ethnicity			
Oromo	144(73.85)	190(97.44)	0.001
Amhara	36(18.46)	4(2.05)	
Others [b]	15(7.69)	1(0.51)	
Religion			
Muslim	184(94.36)	144(73.85)	0.001
Orthodox Christian	7(3.59)	43(22.05)	
Protestant Christian	4(2.05)	8(4.10)	
Occupation			
Housewife	132(67.69)	147(80.51)	0.140
Farmer	47(24.10)	30(15.38)	
Others [c]	16(8.21)	8(4.10)	
Marital status			
Married	172(88.21)	186(95.38)	0.107
Others [d]	23(11.79)	9(4.62)	

a. Formal education is Primary and above
b. Others: Kafa and Yem
c. Others: Petty trades, government employee, and daily laborer
Others: Divorced, widowed, single

Table 3: Knowledge outcomes of participants in the intervention and comparison groups, 2022

Variable	Category	Baseline (N (%))		P	End line (N (%))		P value
		Intervention	Control	value	Intervention	Control	
Knowledge	Adequate	91	80 (41.03)		191	31	
	knowledge	(46.67)		0.262	(99.48)	(16.67)	<0.001
	Inadequate	104	115 (58.97)		1	155	
	knowledge	(53.33)			(0.52)	(83.33)	

Baseline sociodemographic characteristics of participants are presented in Table 1. At baseline, the mean age of participants was 39.0 ± 7.4 years in the control group and 36.0 ± 5.7 years in the intervention group. Most participants were aged 35-44 years, resided in rural areas, were unable to read and write, and identified as Oromo and Muslim. The majority were housewives and married. Although the intervention and comparison groups were similar with respect to several characteristics, statistically significant differences were observed in age, ethnicity, and religion at baseline (Table 1).

Table 4: Results of mixed-effects logistic regression analysis examining factors associated with mothers' knowledge

Variable	Category	Model 2 AOR (95%CI)	P value	Model 3 AOR (95%CI)	P value	Model 4 AOR (95%CI)	P value
Mother age	25-34	Ref.					
	35-44	0.973(0.662-1.428)	0.888			0.952(0.651-1.393)	0.801
	>= 45	0.796(0.4654- 1.361)	0.405			0.789(0.463-1.346)	0.385
Mother occupation	Housewife	Ref.					
	Farmer	2.033(1.127-3.667)	0.018			1.961(1.095-3.513)	0.024
	Others	1.992(0.893- 4.442)	0.092			1.913(0.862- 4.241)	0.111
Mother education	Unable to read and write	Ref.					
	Informal education	1.024(0.523 - 2.008)	0.945			0.993(0.511- 1.929)	0.983
	Formal education	2.356(1.180- 4.705)	0.015			2.279(1.153-4.507)	0.018
Marital status	Other	Ref.					
	Married	2.229(1.183-4.199)	0.013			2.043(1.084-3.851)	0.027
Place of residence	Rural			Ref.			
	Urban			1.189(0.732-1.931)	0.484	1.040(0.625-1.732)	0.880
Received intervention	No						
	Yes			6.991(4.486-10.894)	0.000	7.549(4.686-12.162)	0.000
Constant		0.459(0.203-1.039)	0.062	0.390(0.283-0.536)	0.000	0.182(0.084-0.392)	0.000

Knowledge outcomes in the intervention group versus the control group

At baseline, the proportion of mothers classified as having adequate knowledge was comparable between the intervention and control groups (46.7% versus 41.0%, respectively; p = 0.262). However, substantial differences were observed at endline. Nearly all mothers in the intervention group demonstrated adequate knowledge (99.5%), compared with only 16.7% of mothers in the control group (p < 0.001) (Table 2). These findings indicate a strong positive association between participation in the educational intervention and improved maternal knowledge of menstruation and menstrual hygiene management.

Association between the intervention and mothers' knowledge of menstruation

In the mixed-effects multilevel logistic regression analysis, participation in the educational intervention was strongly associated with adequate knowledge of menstruation. Mothers in the intervention group had significantly higher odds of demonstrating adequate knowledge compared with mothers in the comparison group (AOR = 7.549, 95% CI: 4.686–12.162, p < 0.001). In addition, several socio-demographic characteristics were independently associated with maternal knowledge. Mothers engaged in farming were more likely to have adequate knowledge than housewives (AOR = 1.961, 95% CI: 1.095–3.513, p = 0.024). Similarly, mothers with formal education were more likely to demonstrate adequate knowledge than those who were unable to read and write (AOR = 2.279; 95% CI: 1.153-4.507; p = 0.018). Informal education was not significantly associated with knowledge levels (AOR = 0.993; 95% CI: 0.511-1.929; p = 0.983) (Table 3).

Discussion

The findings of this study indicate substantially higher levels of menstrual health knowledge among mothers in the intervention group compared with those in the comparison group. Although knowledge levels were similar at baseline, a marked difference was observed at the six-month follow-up, with a substantially greater proportion of mothers in the intervention group demonstrating adequate knowledge. These findings suggest that the participation in the mother-focused group education intervention was associated with improved

knowledge of menstruation and menstrual hygiene. Given that the study assessed knowledge outcomes rather than behavioral outcomes, the findings should be interpreted as improvements in knowledge and awareness rather than direct evidence of changes in menstrual health practices or behaviors. Consistent with the mixed-effects multilevel regression analysis, mothers in the intervention group had significantly higher odds of demonstrating adequate knowledge than mothers in the comparison group.

These finding is consistent with earlier studies conducted in Ethiopia and other low-resource settings. For example, a study in rural Ethiopia reported higher menstrual health literacy among adolescent girls and caregivers who participated in life-skills programming by fostering open dialogue and providing culturally sensitive education.[23] Similarly, UNICEF's national baseline report on menstrual hygiene management in Ethiopia emphasized the critical role of community engagement and maternal education in improving menstrual knowledge and practices. [9]

The present findings are consistent with studies from Ethiopia, Iran, and other settings suggesting that interventions involving caregivers may contribute to improved menstrual health knowledge and communication within households. Mehrabi et al. reported higher knowledge levels among participants exposed to puberty education interventions,[28] while Mousavi observed improvements in maternal and adolescent knowledge following mother-focused group discussions.[29] Similarly, Ramdinmawii and Yadav found that educational interventions were associated with enhanced awareness of pubertal changes among adolescent girls, with mothers involvement showing larger benefits.[30] According to extensive data from UNICEF and UNFPA, focusing on mothers and caregivers promotes open communication and lessens stigma, making mothers key players in the promotion of menstruation health.[9, 20] Collectively, these studies support the potential contribution of caregiver engagement in improving knowledge-related outcomes.

An important finding of this study was the decline in the proportion of mothers with adequate knowledge in the control group during the follow-up period. While the exact reasons for this observation cannot be established from the available data, it may be related to the absence of ongoing educational exposure and reinforcement. The knowledge retention may decrease over time when educational messages are not periodically reinforced. The finding may therefore indicate the importance of continued community-based education and follow-up support to sustain menstrual health knowledge among mothers. However, additional research is needed to explore the mechanisms underlying knowledge retention and loss in this context.

In addition to participation in the intervention, the study identified several socio-demographic factors associated with maternal knowledge. Mothers with formal education were more than twice as likely to have adequate knowledge compared to those unable to read and write. Education likely enhances mothers' ability to access, understand, and apply health information, thereby improving their capacity to support their daughters. Occupation and marital status also emerged as significant factors. Due to increased social interaction and exposure to health information through health extension programs, mothers who worked as farmers were more likely than housewives to possess adequate knowledge. Married mothers had higher levels of knowledge, which could be attributed to more stable households and easier access to family health services that improve their awareness of menstruation.

Study implications

The findings suggest that structured group-based educational interventions may improve mothers' knowledge of menstruation and menstrual hygiene. Given the influential role mothers often play as primary sources of information for adolescent girls, strengthening maternal knowledge may create opportunities for better communication and support regarding menstruation within households. However, since the present study assessed knowledge rather than behavioural outcomes, caution is required when interpreting the potential downstream effects of the intervention. Future research should examine whether higher levels of maternal knowledge are associated with changes in parent-child communication, menstrual hygiene practices, and adolescent reproductive health outcomes. The findings nevertheless indicate that

community-based educational approaches involving mothers may be a promising component of broader menstrual health promotion strategies.

Strengths and limitations

This study has several strengths. It employed a controlled intervention design with prospective baseline and endline assessments, allowing evaluation of changes in maternal menstrual health knowledge over time. The intervention was structured, theory-informed, and specifically targeted mothers, a population that has received limited attention in menstrual health interventions. In addition, the study accounted for the hierarchical nature of the data through multilevel mixed-effects logistic regression analysis, thereby addressing clustering at the community level. Nevertheless, several limitations should be considered when interpreting the findings. First, although the study included intervention and comparison districts, only one district was included in each study arm. As a result, district-level contextual factors and unmeasured cluster-level confounding may have influenced the observed differences between groups, limiting the strength of causal inference. Second, knowledge was assessed using self-reported questionnaire responses and may therefore be subject to recall bias and social desirability bias. Third, although participant attrition was relatively low, some loss to follow-up occurred, and the analysis was restricted to participants who completed both baseline and endline assessments. Fourth, the study focused exclusively on maternal knowledge outcomes and did not evaluate whether improved knowledge translated into changes in mother-daughter communication, menstrual hygiene practices, or adolescent health outcomes. Finally, knowledge was assessed six months after the intervention, and therefore the long-term sustainability of the observed knowledge gains remains uncertain. These limitations should be considered when interpreting the findings and assessing their generalizability to other settings.

Conclusion

This study found that mothers in the intervention group demonstrated substantially higher levels of menstrual health knowledge at follow-up compared with mothers in the comparison group. The findings suggest that structured, mother-focused educational interventions may be a promising approach for improving maternal knowledge related to menstruation and menstrual hygiene management. Given the important role mothers often play as sources of menstrual health information for adolescent girls, strengthening maternal knowledge may contribute to better communication and support within households. However, this study assessed knowledge outcomes only and did not evaluate whether improvements in maternal knowledge translated into changes in menstrual health practices, communication patterns, or adolescent health outcomes. The findings support the inclusion of mothers in community-based menstrual health education initiatives and highlight the need for further research to examine the sustainability of knowledge gains and their association with menstrual health behaviors and adolescent well-being.

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Conflict of interest

All authors declare that there are no conflicts of interest in this work.

Data availability

The manuscript contains the information that is needed. On request, the corresponding author will provide more information.
Trial registry: The trial was retrospectively registered in the Pan African Clinical Trials Registry (PACTR202501545388779).
https://pactr.samrc.ac.za/,

Contribution of authors

AK conceived the study concept and led the manuscript preparation. GT, ZB, and MA contributed to the study concept, development of data collection tools, and manuscript drafting, review, and editing. All authors read and approved the final manuscript. The views expressed are those of the authors and do not necessarily reflect those of the funder, Jimma University.

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