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Antenatal pelvic floor muscle exercises knowledge and practice in Ethiopia: a cross-sectional study in Jimma Zone public hospitals

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Abstract

Background Pelvic floor disorders, often resulting from muscle damage during pregnancy and childbirth, are a global health concern. Even though pelvic floor muscle exercises are recommended to alleviate discomfort, there is a significant lack of knowledge and practice among pregnant women in Ethiopia.

Objective To assess knowledge and practice of antenatal pelvic floor muscle exercise and its associated factors among pregnant women attending antenatal care at Jimma zone public hospitals, southwest Ethiopia, 2024.

Method An institution-based, cross-sectional study was conducted at public hospitals in the Jimma Zone from January 1 to March 1, 2024. Trained data collectors employed systematic random sampling for the selection of 422 participants involved in the study. The study used bivariate and multivariable logistic regression to assess associations between dependent and independent variables, considering P-values less than 0.05 as statistically significant.

Result Out of the total study participants, 32.0% (95%CI: 27.5–36.5) had good knowledge of pelvic floor muscle exercises, and 9.5% (95%CI: 6.6–12.6) had good practice of these exercises. Knowledge of pelvic floor muscle exercises was statistically associated several factors: age (AOR = 2.61; 95% CI: 1.05, 6.48), educational status (AOR = 4.83; 95% CI: 1.72, 13.53), residence (AOR = 2.56; 95% CI: 4.76, 26.52), gravidity (AOR = 4.78; 95% CI: 2.25, 10.16), and previous cesarean section (AOR = 6.15; 95% CI: 2.46, 15.36).
Similarly, the practice of pelvic floor muscle exercises was found to be statistically associated with educational status (AOR = 4.37; 95%CI: 1.53, 12.49), residence (AOR 3.76; 95%CI: 1.69, 8.36)), gravidity (AOR 2.6; 95% CI: 1.1, 6.39), and previous cesarean section (AOR 2.86; 95%CI: 1.34, 6.1).

Conclusion and recommendations A small proportion of pregnant women had good knowledge and practice of pelvic floor muscle exercises. Knowledge of these exercises was significantly associated with age, educational level, residence, gravidity, and previous history of cesarean section. Similarly, the practice of these exercises was significantly associated with educational level, residence, gravidity, and previous history of cesarean section. Therefore, future

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studies should consider using qualitative or mixed methods research designs to explore antenatal exercise from various perspectives.

Keywords Pelvic floor muscle training, Pelvic floor disorders, Pregnant women, Pregnancy, Urinary incontinence, Pelvic organ prolapse, Knowledge, Practice, Ethiopia

Introduction

Pelvic floor muscles (PFM) form a supportive sling extending from the pubic bone anteriorly to the coccyx posteriorly, encircling the urethra, vagina, and anus [1]. These muscles play a vital role in maintaining continence, supporting pelvic organs (bladder, uterus, and rectum), and enhancing sexual function [2, 3]. Pelvic floor muscle exercises, also known as Kegel exercises, are a conservative, non-invasive, low-risk, and cost-effective intervention that strengthens the striated muscles of the urogenital sphincter, improves tone, prevents prolapse, and enhances bladder control [4–6].

Pelvic floor disorders (PFD) represent a major global public health concern, affecting approximately 37% of women worldwide [7]. The burden is substantial in Sub-Saharan Africa, with prevalence rates varying widely, and particularly high in Ethiopia, where 41.1% of women experience PFD, primarily urinary incontinence (32.8%), followed by pelvic organ prolapse (25.5%) and faecal incontinence (4.2%) [8]. These disorders largely result from muscle damage and weakness during pregnancy and childbirth, profoundly impairing women's physical, psychological, social, and economic well-being [9, 10].

Despite strong evidence supporting the effectiveness of pelvic floor muscle exercises in preventing and reducing pelvic floor disorders during pregnancy and the postpartum period, the global practice rate of PFME among pregnant women remains low [9]. Studies from high-income and upper-middle-income settings report relatively higher practice rates, such as 54.5% in Australia and East Coast Malaysia [8, 11]. In contrast, practice rates in Middle Eastern countries are moderate, with reports of 38.5% in Al Madinah Al Munawarah and 38.8% in Jazan, Saudi Arabia [7, 12]. Lower practice rates have been documented in several Asian and African countries, including Thailand (10.7%), Pakistan (6.5%), and Ethiopia (7.2%) [13–15]. Similarly, in Sub-Saharan Africa, practice rates vary, with 38.8% reported in Nigeria but substantially lower levels observed in Ethiopia [16, 17].

These wide variations in regional disparities suggest differences in antenatal education, healthcare provider counselling, and access to maternal health services, with higher rates observed in high-resource settings compared to lower rates in low- and middle-income countries such as Ethiopia.

Globally, key strategies include supervised pelvic floor muscle training in routine prenatal care, educational workshops, awareness campaigns (e.g., by the International Continence Society), and mobile apps to improve knowledge and adherence among pregnant women [18]. In Ethiopia, the government and stakeholders primarily recommend health education and counselling on Kegel exercises during antenatal and postnatal care, while also focusing on family planning to reduce the risks of pelvic floor disorders, with no dedicated national programs yet in place [19].

In Ethiopia, the high burden of PFD contrasts sharply with the limited context-specific evidence on pregnant women's knowledge and uptake of PFME [20]. Existing studies are few, geographically restricted, and rarely assess both knowledge and practice simultaneously in public hospital settings. Notably, no data are available from the Jimma Zone, Oromia Region, despite high antenatal care utilization in the area. This evidence gap hinders the integration of targeted PFME counselling into routine maternal health services. Therefore, this study aimed to assess the knowledge and practice of pelvic floor muscle exercises among pregnant women attending antenatal care services in public hospitals of Jimma Zone, Oromia Region, Ethiopia.

Methods and materials

Study setting, period, and design

An institution-based cross-sectional study was conducted among pregnant women receiving antenatal care at public hospitals in the Jimma Zone, specifically at Jimma University Medical Center, Shenen Gibe General Hospital, Seka Chekorsa Hospital, and Agaro General Hospital, from January 1 to March 1, 2024. The study period was strategically chosen to optimize data collection by avoiding major religious holidays that could potentially decrease patient attendance, as well as seasonal challenges, such as heavy summer rains that hinder travel to hospitals. Additionally, this timeframe ensured operational feasibility by aligning with periods of stable staffing and resource availability across the participating facilities.

Jimma Zone comprises nine public hospitals, three private hospitals, and 120 health centres, including one referral hospital, three general hospitals, and five primary hospitals. Notably, the zone is home to Ethiopia's oldest hospital, the Jimma University Medical Center (JUMC), which serves a population of over 15 million people. Additionally, the newly established Sheen Gibe General Hospital features 80 inpatient beds and six delivery couches. Agaro General Hospital provides a range of

services, including dentistry, ophthalmology, medicine, surgery, gynaecology, obstetrics, and paediatrics. Seka Chekorsa Hospital, a district hospital, is in Seka Chekorsa town, 18 km south of Jimma Town [20, 21].

Study population

The study encompassed all pregnant women attending antenatal care in public hospitals within the Jimma Zone who consented to participate. Participants were women from the selected hospitals who fulfilled the inclusion criteria, which mandated that they be mentally and physically capable of participation and currently receiving antenatal care at Jimma Zone Public Hospital. Women exceeding 32 weeks of gestation or those with high-risk conditions, including incompetent cervix, preeclampsia, premature membrane rupture, twin pregnancy, preterm labor, antepartum haemorrhage, or a history of preterm labor or haemorrhage were excluded from the study.

Simple size determination

The sample size for this study was calculated using a single population proportion formula. This calculation incorporated a 5% margin of error, a 95% confidence interval, a significance level (α) of 0.05, and an assumed proportion (P) of 47% of pregnant women who are knowledgeable about pelvic floor muscle exercises, as indicated by a study conducted in northwest Ethiopia [14], the formula $n = (Z\alpha/2)^2 P (1 - P) / d^2$ produced an initial sample size of 383, which was subsequently adjusted to 422 to account for a 10% non-response rate.

For the second objective, which assessed the practice of pelvic floor muscle exercise, the sample size was recalculated using the reported PFME practice proportion of 7.2% among pregnant women in Ethiopia, with the same assumptions. This calculation resulted in a smaller sample size than that required for the first objective. Accordingly, the final sample size of 422 participants, derived from the first objective, was selected as it represents the largest required sample size and sufficiently addresses both objectives.

Sampling technique

The study was conducted in four public hospitals selected through simple random sampling from a total of eight public hospitals in the Jimma zone, ensuring unbiased representation. Researchers obtained data on the number of pregnant women attending antenatal care (ANC) at each hospital during the two months preceding data collection. The total sample size was proportionally allocated to each hospital based on ANC attendance, with larger hospitals contributing more participants. Within each hospital, participants were selected using systematic random sampling: the sampling interval (K) was calculated as $K = N/n$, where N represented the total eligible pregnant women (1,484) and n the required sample size (422). This yielded $K = 1{,}484 \div 422 \approx 3.516$, rounded to 4. The first participant was chosen via the lottery method, followed by every 4th woman until the sample size was met (Fig. 1).

Variables and measurements

The dependent variable was the knowledge and practice of pelvic floor muscle exercise. The knowledge was measured by 12 items that had only one possible correct response. The correct response was coded '1,' and the incorrect response was coded '0.' Then the sum score was computed, resulting in '0' as the minimum possible score and '12' as the maximum possible score. The respondents who got an overall knowledge score of more than or equal to half (≥ 6) were considered to have 'good knowledge,' while those who scored less than half (< 6) were considered to have 'poor knowledge. The practice was measured by 7 items that had only one possible correct response. The correct response was coded '1,' and the incorrect response was coded '0.' Then the sum score was computed, resulting in '0' as the minimum possible score and '7' as the maximum possible score. The respondents who got an overall knowledge score more than or equal to half (≥ 4) were considered to have 'good practice', while those scored less than half (< 4) were considered to have 'poor practice' [21].

Data collection procedure and data quality control

The data collection instrument was adapted after reviewing of relevant literature [4, 7, 11–17, 22–28]. The questionnaire has both open and closed-ended items. The structured questionnaire was initially prepared in English, translated into Afaan Oromo by a professional translator fluent in both languages and experienced in medical terminology, and then back-translated into English by an independent language expert (a university lecturer in linguistics proficient in both languages) to ensure conceptual equivalence and consistency. The reliability of the tools was checked by Cronbach's Alpha, which yielded a value of 0.813 for knowledge questions and 0.807 for practice questions, indicating a good level of internal consistency. Modifications were made to the arrangement of questions based on the specific objectives they addressed.

A pre-test was conducted on 5% of the sample size (21 pregnant women) at a non-selected hospital. Based on feedback, minor modifications were made, including rephrasing ambiguous questions for clarity, adjusting question sequencing for better logical flow, and adding examples to improve comprehension of PFME techniques. Face-to-face interviews were conducted by four BSc midwife data collectors and one BSc midwife supervisor, in a private room at the ANC clinic to

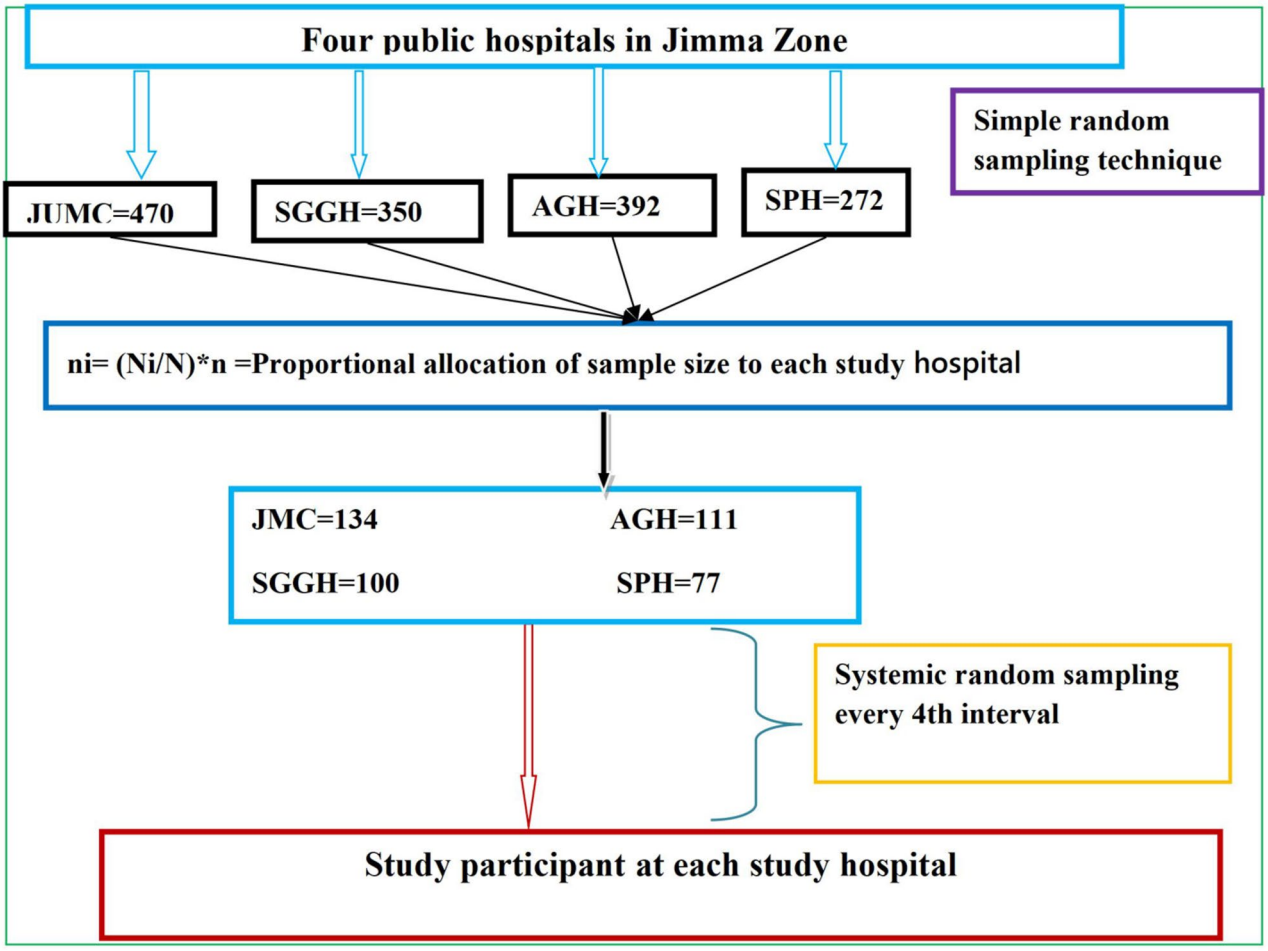

Fig. 1 Schematic presentation of the sampling procedure of Antenatal pelvic floor muscle exercises, knowledge, and practice in Ethiopia

ensure confidentiality and encourage honest responses. Interviewers were trained to use neutral, non-leading questions, read questions exactly as written, and avoid providing explanations that could influence answers, thereby minimizing social desirability and interviewer bias. Interviews were conducted in private, quiet rooms to minimize distractions and ensure participant comfort. Confidentiality was maintained through informed consent, the anonymization of identifiers with coded linkages for follow-ups, secure storage, and strict compliance with Institutional Review Board (IRB) guidelines. Consent forms were stored separately, with access restricted to authorized personnel only. The principal investigators and supervisors reviewed the collected data daily for completeness.

Data processing and analysis

After data collection, all questionnaires were reviewed for completeness, coded, and entered EPI Info 7 software. Subsequent analysis was conducted using IBM Statistical Package for Social Sciences (SPSS) version 25. Frequency tables were generated to illustrate the distribution of respondents' socio-demographic and obstetric histories. Knowledge items comprised 12 questions with three possible responses: Yes = 1, No = 2, and I don't know = 3. Each correct answer (Yes) was assigned a score of "1," while incorrect answers (No) or unsure responses were combined and assigned a score of "0." The knowledge scale total score ranged from 0 to 12. Participants who answered at least half of the knowledge questions correctly (≥ 6) were classified as having good knowledge of pelvic floor muscle exercises. The practice of pelvic floor muscle exercises was assessed using a five-point Likert scale consisting of 7 items, where pregnant women indicated their levels of practice. The practice score ranged from 0 to 7, with values assigned as follows: 1 for "never," 2 for "seldom," 3 for "usually," 4 for "frequently," and 5 for "always." In the analysis, "never" and "seldom" were combined and scored as "0," representing incorrect responses, while "usually," "frequently," and "always" were merged and scored as "1," representing correct responses. The total score was calculated for each participant, with those scoring at least half (≥ 4) classified as having good practice of pelvic floor muscle exercises.

Table 1 Socio-demographic characteristics of pregnant women attending antenatal care in Jimma zone public hospital, 2024($n=422$)

Variable	Category	Frequency	Percent
Age Category	≤ 20	155	36.7%
	21–30	59	14.0%
	31–40	91	21.6%
	≥ 40	117	27.7%
Religion	Muslim	266	63.0%
	Orthodox	103	24.4%
	Protestant	23	5.5%
	Catholic	20	4.7%
	Others*	10	2.4%
Marital status	Single	9	2.1%
	Married	354	83.9%
	Divorced	43	10.2%
	Widowed	16	3.8%
Residence place	Urban	194	46.0%
	Rural	228	54.0%
Educational status	No formal education	149	35.3%
	Primary school	90	21.3%
	Secondary school	105	24.9%
	College or university	78	18.5%
Occupation	Housewife	197	46.7%
	Self-employee	125	29.6%
	Government employee	100	23.7%
Time spent at work per day	1–5 h.	11	2.6%
	6–12 h.	78	18.5%
	≥13 h.	333	78.9%

Religion*: Wakefata, non-religious, and other African religions

To assess the association between independent variables and the outcome variable, both bivariable and multivariable logistic regression analyses were performed using forward/backward selection. Variables from the bivariable model with a p-value less than 0.25 were included in the multivariable logistic regression to mitigate the impact of confounding factors. Statistical significance was established at $p<0.05$. The magnitude of association between independent variables and the outcome variable was measured using odds ratios (OR) with a 95% confidence interval (CI). A collinearity diagnostic test was performed, confirming no severe multicollinearity, as variance inflation factors (VIF) were less than 10 and the Tolerance Test exceeded 10%. Normality checks revealed no outliers in the data. Model goodness-of-fit was assessed using the Hosmer and Lemeshow test, which indicated a good fit for factors associated with both knowledge (P-value = 0.678) and practice (P-value = 0.635). Finally, the results were presented in tables, figures, and text.

Table 2 Obstetric and clinical conditions of pregnant women attending antenatal care in Jimma zone public hospital, 2024($n=422$)

Variable	Category	Frequency	Percent
Gravidity	Primigravida	168	39.8%
	Multigravida	254	60.2%
Previous caesarean delivery	No	343	81.3%
	Yes	79	18.7%
Number of vaginal deliveries	No previous vaginal delivery	144	34.1%
	1–2	98	23.2%
	3–4	126	29.9%
	>4	54	12.8%
How is your general health?	Very good	385	91.2%
	Medium strength	37	8.8%

Results

Socio-demographic characteristics of pregnant women

We conducted interviews with 422 pregnant women, achieving a 100% response rate. Among the study participants, 155 (36.7%) were aged under 20 years. A significant majority, 266 (63.0%), identified as Muslim. Regarding marital status, most participants, 354 (83.9%), were married. Less than one-third, 149 (35.3%), had no formal education. Most pregnant women, 333 (78.9%), worked a minimum of 13 or more hours per day engaged in work, which includes both household and occupational activities. Nearly half of the respondents, 197 (46.7%), were housewives, and more than half, 228 (54.0%), resided in rural areas. These findings indicate that the study population is predominantly married, rural, and engaged in labour-intensive work, with a substantial proportion having limited formal education, factors that may influence awareness and practice of pelvic floor muscle exercises ("Table 1").

Obstetric and clinical conditions of participants

Among the study participants, 254 (60.2%) were multigravida, while 168 (39.8%) were primigravida. Most participants, 343 (81.3%), had not undergone a caesarean delivery in their previous childbirth. Regarding vaginal deliveries, 144 (34.1%) had no previous vaginal births, 98 (23.2%) had 1–2, 126 (29.9%) had 3–4, and 54 (12.8%) had more than 4. Most women, 385 (91.2%), reported very good general health, while 37 (8.8%) rated their health as medium. These obstetric characteristics are relevant to the study, as gravidity, delivery history, and general health may influence both awareness and engagement in pelvic floor muscle exercises, with multigravida women or those with multiple vaginal deliveries potentially having greater exposure to information or experience with PFME ("Table 2").

Knowledge of pelvic floor muscle exercises among pregnant women

Among the 422 study participants, approximately one-third, 135 (32%), demonstrated good knowledge of pelvic floor muscle exercises, with a 95% confidence interval of 27.5–36.5%. This finding indicates a moderate level of awareness among pregnant women, suggesting that while some women are informed about the benefits and techniques of pelvic floor muscle exercises, there remains a significant proportion with limited knowledge. This gap in awareness could be addressed through targeted educational interventions during antenatal care to promote better understanding and adoption of pelvic floor exercises ("Table 3").

Practice of pelvic floor muscle exercises of pregnant women

Only 40 (9.5%) of the 422 participants demonstrated good practice of pelvic floor muscle exercises, with a 95% confidence interval of 6.6–12.6%. This low prevalence indicates a substantial gap between knowledge and actual practice, suggesting that despite some awareness, most pregnant women do not routinely perform pelvic floor exercises. Barriers such as lack of counselling, high workload, or limited motivation may contribute, highlighting the need for targeted interventions to improve practice. ("Table 4")

Table 3 Frequency distribution of knowledge of pelvic floor muscle exercises among pregnant women attending antenatal care at Jimma zone public hospital, 2024, ($n=422$)

Variables	Category		
	Yes *n* (%)	No *n* (%)	Unsure *n* (%)
Have you heard exercises for the muscles in the pelvic	153(36.3)	247(58.5)	22(5.2)
Have you been taught how to do PFMEs	64(15.2)	333(87.9)	25(5.9)
Have you been taught about Kegel exercise	27(6.4)	380(90.0)	15(3.6)
Have you been taught about Pillow squeeze Exercises	12 (2.8)	400(94.8)	10(2.4)
Have you been taught about Bridging Exercises	17 (4.0)	280(66.4)	125(29.6)
Does pelvic floor muscle exercise have the Benefit	151(44.3)	146(26.1)	125(34.5)
Can PFMEs Prevent Urine Leak	148(35.0)	124(29.4)	150(35.6)
Can PFMEs Enhance sexual activity	139(32.9)	133(31.5)	150(35.6)
Can Pelvic Floor Muscle Exercises control? the leakage of stool and gas from the anus	148(35.0)	113(26.8)	161(38.2)
Can Pelvic Floor Muscle exercises reduce the risk of Pelvic organ prolapse	146(34.6)	125(29.6)	151(35.8)
Can you perform pelvic floor muscle Exercises while performing daily activity	118(28)	203(48.1)	101(23.9)
Pelvic Floor Muscle exercises should be done at least 3 times a day	79(18.7)	183 (43.4)	160(37.9)
Overall knowledge	Good N (%)		135(32%)
	Poor N (%)		287(68%)

Reasons for not practicing pelvic floor muscle exercises among pregnant women

Most study participants did not engage in pelvic floor muscle exercises. Specifically, 275 (65.1%) reported that they were unaware of pelvic floor muscle exercises, and 392 (92.9%) indicated a lack of motivation to perform them. These findings suggest that both insufficient knowledge and low motivation are key barriers to practice. Addressing these barriers through structured antenatal education, counselling, and motivational strategies is essential to improve uptake of pelvic floor muscle exercises among pregnant women (Fig. 2).

Factors associated with knowledge of pelvic floor muscle exercises among pregnant women

In bivariate logistic regression analysis, age, educational status, residence, total number of deliveries, previous caesarean section, and occupation were associated with knowledge of pelvic floor muscle exercises at $p<0.25$. In multivariable logistic regression analysis, age, educational status, residence, total number of deliveries, previous caesarean section, and occupation were associated with knowledge of pelvic floor muscle exercises at $p<0.05$.

Pregnant women aged 40 years or older had higher odds of good knowledge compared to those aged 20 years or younger (AOR = 2.61; 95% CI: 1.05–6.48; $p=0.038$). Women with a college or university education were more likely to have good knowledge than those with no formal education (AOR = 4.83; 95% CI: 1.72–13.53; $p=0.003$). Urban residents had substantially higher odds of good knowledge compared to rural residents (AOR = 11.23; 95% CI: 4.80–26.50; $p<0.001$). Multigravida women were more likely to have good knowledge than primigravida women (AOR = 4.78; 95% CI: 2.25–10.16; $p<0.001$), and women with a previous caesarean section had higher odds of good knowledge compared to those with no caesarean history (AOR = 6.15; 95% CI: 2.46–15.36; $p<0.001$).

Overall, educational status, urban residence, multigravidity, older age, and previous caesarean section were the most important factors associated with higher knowledge of pelvic floor muscle exercises among pregnant women. The following section presents the multivariable analysis for Knowledge, highlighting key determinants and their potential implications for antenatal interventions ("Table 5").

Table 4 Practice of pelvic floor muscle exercises of pregnant women attending antenatal care at Jimma zone public hospital, 2024 ($n=422$)

Variable	Category *n* (%)				
	Never	Seldom	Usually,	Frequently	Always
I have performed PFME when I'm pregnant.	340 (80.6%)	39 (9.2%)	20 (4.7%)	18 (4.3%)	5 (1.2%)
I have spent time to perform PFME.	335(79.4%)	51 (12.1%)	16 (3.8%)	18 (4.3%)	2 (0.5%)
I have tried to contract and relax the pelvic floor muscles.	340 (80.6%)	41 (9.7%)	19 (4.5%)	16 (3.8%)	6 (1.4%)
I have tried to quickly squeeze and release pelvic floor muscles.	286(67.8%)	106(25.1%)	19 (4.5%)	8 (1.9%)	3 (0.7%)
I have tried to lift my hips off the floor while lying back.	217(51.4%)	172(40.8%)	26 (6.2%)	5 (1.2%)	2 (0.5%)
I have discussed PFME with friends.	222(52.6%)	118(28.0%)	44(10.4%)	25 (5.9%)	3 (0.7%)
I have tried to search for information about PFME.	222(51.6%)	163(38.6%)	1 (0.2%)	70(16.6%)	4 (0.9%)
Overall practice	Good				40(9.5%)
	Poor				382(90.5%)

Factors associated with pelvic floor muscle exercises practice of among pregnant women

In bivariate logistic regression analysis, educational status, residence area, total number of pregnancies, and previous history of caesarean section were associated with the practice of pelvic floor muscle exercises at $p<0.25$. In multivariable logistic regression analysis, educational status, residence area, total number of pregnancies, and previous history of caesarean section were significantly associated with practice at $p<0.05$.

Pregnant women with a college or university education were 4.37 times more likely to practice pelvic floor muscle exercises compared to those with no formal education (AOR = 4.37; 95% CI: 1.53–12.49; $p=0.006$). Those with a primary-level education were 3.16 times more likely to engage in the exercises compared to women with no formal education (AOR = 3.16; 95% CI: 1.08–9.23; $p=0.036$). Urban residents had higher odds of practicing pelvic floor muscle exercises than rural residents (AOR = 3.76; 95% CI: 1.69–8.36; $p=0.001$). Additionally, women with a previous caesarean section were 2.86 times more likely to practice pelvic floor muscle exercises compared to those without a history of caesarean delivery (AOR = 2.86; 95% CI: 1.34–6.07; $p=0.001$).

Overall, educational attainment, urban residence, and a history of caesarean section were the main factors positively associated with pregnant women's engagement in pelvic floor muscle exercises, suggesting areas for targeted antenatal interventions ("Table 6").

Discussion

The current study found that while approximately one-third of pregnant women had good knowledge of pelvic floor muscle exercises (PFME), only 9.5% consistently practiced these exercises. Knowledge was significantly associated with age, educational level, residence, gravidity, and previous caesarean section, whereas practice was associated with education, residence, gravidity, and caesarean history.

The observed low level of knowledge (32%) is concerning, as it may limit women's motivation and ability to engage in PFME, which plays a crucial role in supporting pelvic floor health. Although these exercises are preventive, the cross-sectional design of this study does not allow causal inferences regarding long-term social, economic, or psychological outcomes.

Comparisons with other studies show both consistencies and discrepancies. The knowledge level in this study aligns with findings from Pune, India (32%) [4], and Gujarat, Pakistan (32.8%) [25], but is higher than studies in Punjab, Pakistan (24.9%) [29] and Thailand (27.9%) [23]. Conversely, it is lower than studies in Lahore, Pakistan (64.2%) [24], Malaysia (52–51.8%) [16, 27], Saudi Arabia (38–62.7%) [22], East Coast Malaysia (80.1%) [11], Egypt

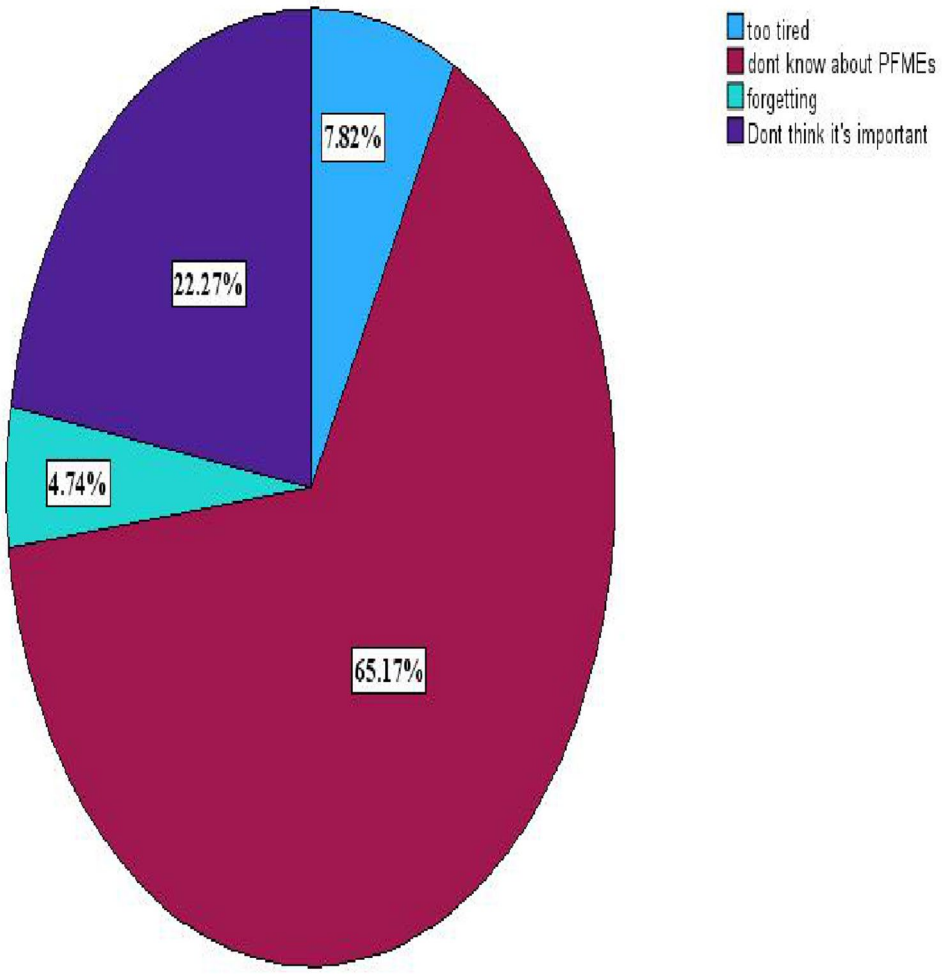

Fig. 2 Reasons for not performing pelvic floor muscle exercises among pregnant women attending antenatal care at Jimma zone public hospital, 2024

(76.5%) [28], and Northwest Ethiopia (42%) [13]. Differences may reflect variations in literacy levels, access to antenatal services, healthcare provider counselling, sample size, study period, and study setting.

The low practice rate (9.5%) observed in this study is similarly lower than rates reported in Australia (54.5%) [30], East Coast Malaysia (54.5%) [11], Saudi Arabia (38.5–38.8%) [7, 22] Thailand (10.7%), Malaysia (10.7%) [16], Egypt (32%) [28], and Nigeria (38.8%) [17], but higher than reports from Gujarat, Pakistan (6.5%) [25], and Northwest Ethiopia (7.2%) [13]. Discrepancies may be due to socio-demographic differences, study settings, sample sizes, methodology, and potential responder bias in interviewer-administered questionnaires. The higher proportion of participants with secondary or tertiary education in this study may also partly explain the higher PFME practice rate.

Educational attainment was positively associated with both knowledge and practice of PFME, consistent with findings from Malaysia and Ethiopia [13, 16]. Multigravida women demonstrated higher knowledge levels, supporting studies from Pune, India, and Belgium [4, 31], which found primiparous women had lower awareness of pelvic floor exercises. Urban residents and women with previous caesarean sections were also more likely to practice PFME, suggesting that exposure to healthcare services and counselling may enhance engagement.

Overall, these findings highlight the importance of targeted interventions to improve PFME knowledge and practice, particularly among women with lower educational levels and those residing in rural areas. Antenatal care services should integrate structured counselling, education sessions, and practical demonstrations to facilitate routine PFME engagement.

Strengths and limitations of the study

This study provides valuable evidence on the knowledge and practice of pelvic floor muscle exercises among pregnant women in Ethiopia, with a specific focus on the Jimma Zone. A key strength of the study is its relatively large sample size and multi-center design, involving four public hospitals, which enhances the representativeness

Table 5 Factors associated with knowledge of pelvic floor muscle exercises among pregnant women attending antenatal care at Jimma zone public hospital, 2024($n=422$)

Variables	Category	Knowledge of PFMEs		COR (95%CI)	AOR (95%CI)	*P*-value
		Good	Poor			
Age	≤ 20	56(36.1%)	99(63.9%)	1	1	
	21–30	23(39%)	36(61%)	1.13(0.61,2.09)	1.69(0.53,5.48)	0.375
	31–40	25(27.4%)	66(72.6%)	0.670(0.381,1.18)	2.73(0.85,8.74)	0.091
	≥ 40	31(26.5%)	86(73.5%)	0.64(0.38, 1.08)	2.61(1.05,6.48)	0.038
Educational status	No formal education	44(29.5%)	105(70.5%)	1	1	
	primary school	23(25.6%)	67(74.4%)	0.82(0.45,1.478)	1.41(0.55,3.62)	0.476
	secondary school	33(31.4%)	72(68.6%)	1.94(1.10,3.43)	1.750(0.69,4.42)	0.236
	college or university	35(44.9%)	43(55.1%)	1.82(1.04,3.21)	4.83(1.72,13.53)	0.003
Occupation	Housewife	51(25.8%)	146(75.2%)	1	1	
	Self-employed	38(30.4%)	87(69.6%)	1.25(0.761,2.06)	0.343(0.145,0.812)	0.015
	Government employed	46(46%)	54(54%)	2.44(1.47,4.05)	0.427(0.17,1.098)	0.077
Residence	Urban	91(46.9%)	103(53.1%))	3.70(2.40,5.70)	11.23(4.8, 26.5)	0.001
	Rural	44(19%)	184(81%)	1	1	
Total number of pregnancies	Primigravida	38(22.6%)	130(77.4%)	1	1	
	Multigravida	97(38%)	157(62%)	2.11(1.36,3.29)	4.78(2.25,10.16)	0.001
Previous Caesarean section	No	106(31.7%)	237(68.3)	1	1	
	Yes	29(36.7%)	50(63.3%)	1.30(0.78,2.16)	6.15(2.46,15.36)	0.001

Key: 1: Reference Category

Table 6 Factors associated with practice of pelvic floor muscle exercises among pregnant women attending antenatal care at Jimma zone public hospital, 2024, ($n=422$)

Variable	Category	Practice of PFMEs		COR (95%CI)	AOR (95%CI)	*P*-Value
		Good	Poor			
Educational status	No formal education	6(4.0%)	143(96%)	1	1	
	Primary school	11(12.2%)	79(87.8%)	3.32(1.18,9.31)	3.16(1.08,9.23)	0.036
	Secondary school	9(8.6%)	96(91.4%)	2.23(0.77,6.48)	2.18(0.724,6.58)	0.165
	College or university degree	14(17.9%)	64(82.1)	5.21(1.91,14.18)	4.37(1.53,12.49)	0.006
Residence	Urban	31(16.2%)	163(83.8)	4.63(2.14,9.98)	3.76(1.69,8.36)	0.001
	Rural	9(3.9%)	219(96.1%)	1	1	
Total number of pregnancies	Primigravida	7(4.2%)	161(95.8%)	1	1	
	Multi gravida	33(13%)	221(87%)	3.43(1.48,7.96)	2.60(0.91,7.45)	0.037
Previous caesarean section	No	23(6.7%)	320(93.3%	1	1	
	Yes	17(21.5%)	62(78.5%)	3.82(1.93,7.56)	2.86(1.34,6.07)	0.001

Key: – 1 = Reference Category

and generalizability of the findings within similar public healthcare settings.

However, the study also has several limitations. First, it included only pregnant women attending antenatal care at public hospitals, thereby excluding those receiving care in private health facilities or not attending antenatal services, which may limit the generalizability of the results. Second, the cross-sectional study design precludes the establishment of temporal or causal relationships between associated factors and pelvic floor muscle exercise practice. Additionally, the reliance on self-reported data may have introduced recall and social desirability biases, potentially affecting the accuracy of participants' responses.

Conclusion and recommendations

Conclusion

This study revealed a marked disparity between knowledge and practice of pelvic floor muscle exercises (PFME) among pregnant women attending antenatal care in public hospitals of Jimma Zone. Although approximately one-third of participants demonstrated good knowledge of PFME, only about one-tenth reported consistent practice. Knowledge of PFME was significantly associated with age, educational level, place of residence, gravidity, and previous cesarean section, while practice was associated with educational level, residence, gravidity, and prior cesarean section.

These findings indicate that knowledge alone does not translate into practice, highlighting the presence of substantial barriers to regular PFME engagement. Women

with lower educational attainment and those residing in rural areas were particularly less likely to practice PFME, underscoring inequities in access to information, counseling, and supportive maternal health services.

Recommendations

Healthcare providers should strengthen PFME counseling as an integral component of routine antenatal care, with particular attention to women with lower educational levels, primigravida women, and rural residents. Practical demonstrations of PFME, incorporation of standardized PFME counseling guidelines into antenatal care protocols, and reinforcement during follow-up visits are recommended. Additionally, integrating PFME education into group antenatal sessions and community-based maternal health programs may improve uptake. Future research should evaluate targeted interventions. such as structured counseling tools, visual aids, and digital health approaches, to promote sustained PFME practice and reduce the burden of pelvic floor dysfunction among pregnant women.

Abbreviations

ACOG	American College of Obstetrics and Gynecology
AGH	Agaro General Hospital
ANE	Antenatal Exercise
BSc	Bachelor of Science
CI	Confidence Interval
IRB	Institutional Review Board
JUMC	Jimma University Medical Center
MSc	Master of Science
OAB	Overactive Bladder
PFD	Pelvic Floor Disorder
PFM	Pelvic Floor Muscle
PFME	Pelvic Floor Muscle Exercise
PFMT	Pelvic Floor Muscle Training
SPH	Seka Primary Hospital
SGGH	Shenen Gibe General Hospital
SUI	Stress Urinary Incontinence
UI	Urinary Incontinence

Supplementary Information

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Supplementary Material 1.

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Data sharing statement

The datasets used during the current study were available from the corresponding author on reasonable request.

Authors' contributions

All authors made significant contributions to this work, including the conception, study design, execution, data acquisition, analysis, and interpretation. They also participated in drafting, revising, or critically reviewing the article. Furthermore, they gave final approval of the version to be published, agreed on the journal to which the article was submitted, and are accountable for all aspects of the work.

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Data availability

The datasets used during the current study were available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Before data collection, ethical approval and clearance to conduct the study were obtained from the Institutional Review Board (IRB) of Jimma University, Institute of Health, with reference number JUIH/IRB/455/23. An official letter of permission was obtained from each hospital. Written informed consent was obtained from each mother before participation in the study, following a comprehensive explanation of the study's objectives. Privacy and confidentiality were maintained throughout the interview process. The interviewee's name and address were not recorded in the questionnaire. The right to refuse participation or withdraw from the study at any time was fully respected. The questionnaire used for the interview took an average of 30 min to complete.

Consent for publication

No consent for this publication because there were no images or videos during the study.

Competing interests

The authors declare no competing interests.

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