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Expectant fathers' knowledge and attitudes towards postpartum depression and the associated factors: a cross-sectional study in a rural community, Sri Lanka

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Abstract

Introduction Postpartum depression is easily managed when detected early. Since mothers' and newborns' health is influenced by fathers, good knowledge and positive attitudes toward postpartum depression among fathers would help in early detection and early intervention.

Objective To describe the knowledge and attitudes of expectant fathers about postpartum depression and factors associated with their knowledge and attitudes about postpartum depression in a rural community in Sri Lanka.

Methods A descriptive cross-sectional study was conducted among 440 expectant fathers selected using cluster sampling. A pretested self-administered questionnaire was used with 30 knowledge statements with a maximum score of 30 points and 15 Likert scale attitude statements with a maximum score of 60 points. Good knowledge was defined as ≥ 50% of the total knowledge score. Positive attitudes were defined as ≥ 50% of the total attitude score. The chi-square test was applied to identify the significance of the associations between sociodemographic factors and knowledge and attitude levels. Multiple logistic regression was performed, and the results were expressed as adjusted odds ratios (aOR) and 95% confidence intervals (CI).

Results The response rate was 93.6%. Most of the expectant fathers (58.2%, n = 256) had never heard about postpartum depression. The median knowledge score was 10 (IQR 4–16), and 33.6% (n = 148) of participants had good knowledge. Good knowledge was significantly associated with a higher educational level ($p < 0.001$), having a close relative/friend with postpartum depression ($p < 0.001$), and having heard about postpartum depression before ($p < 0.001$). Logistic regression revealed significant associations only with higher educational level (aOR = 2.53; 95% CI = 1.54–4.15) and having heard about postpartum depression before (aOR = 5.46; 95% CI = 3.47–8.59). The median attitude score was 36 (IQR 31–40.75), and 83.4% (n = 367) had positive attitudes. Although the bivariate analysis showed that working in the private sector ($p = 0.04$) and expecting their first child ($p = 0.04$) were significantly associated with positive attitudes, logistic regression did not reveal any significant association.

Conclusions The majority of fathers had positive attitudes toward postpartum depression, but their knowledge was limited. Since their attitudes are favorable, the knowledge gap should be minimized by imparting knowledge to facilitate the early detection of postpartum depression among mothers in the area.

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Plain Language Summary

Postpartum depression (PPD) is a psychological condition affecting mothers after delivery, giving distressing consequences to the mother and the newborn. The consequences of unidentified or untreated PPD can be as severe as the death of the mother or the child. When spouses know the measures to scale back their vulnerability to PPD, they can take necessary measures to reduce the encounters which lead to PPD and can improve early help-seeking behaviour. However, the evidence suggests that males have lower knowledge levels related to PPD compared to females. Our study conducted to describe the knowledge and attitudes of expectant fathers about PPD and the factors associated with their knowledge and attitudes about PPD has found that 33.6% of expecting fathers in the sample had good knowledge and 83.4% of expecting fathers in the sample had positive attitudes towards postpartum depression. Higher education level and having heard about postpartum depression before were significantly associated with better knowledge. Despite most fathers having favorable attitudes, their limited knowledge highlights the need for targeted educational interventions to improve early detection and management of PPD in this community.

Keywords Postpartum depression, Expectant fathers, Knowledge, Attitudes

Introduction

Postpartum depression (PPD) is a psychological condition affecting mothers after delivery, giving distressing consequences to the mother and the newborn [1], which can ultimately lead to maternal deaths and infanticide [2]. Although the condition can occur until a year after delivery, it commonly occurs during the first three months [3]. Though the likelihood of developing depression in the postpartum period is twice as high as in other stages of women's lives [4], it usually goes unnoticed and undetected [5]. The global pooled prevalence of postpartum depression (PPD) exhibits a wide range, reflecting considerable variability across different regions and populations. For instance, the prevalence rates span from as low as 3% (95% CI 2%–5%) in Singapore to as high as 38% (95% CI 35%–41%) in Chile, as documented by various meta-analyses and systematic reviews [6–8]. This extensive range highlights the diverse socio-economic, cultural, and healthcare factors influencing PPD rates worldwide.

Although Sri Lanka has good maternal and child health indicators compared to other regional countries [9], the COVID-19 pandemic and the recent economic crisis worsened the challenges in maintaining good health [10]. Amidst these hardships, Sri Lankan women's psychological health, specifically that of mothers, might have come under considerable strain. On par with the increasing economic and social burdens, Sri Lanka showed a gradually increasing trend in PPD and postpartum psychiatric illnesses in 2015–2021[11, 12] and this period also witnessed fluctuating but notable occurrences of maternal suicides, with recorded cases in 2018, 2019, and 2021[11–13]. Furthermore, studies conducted in Sri Lanka found remarkable heterogeneity in PPD prevalence among regions. The studies that used the cutoff as 10 in Edinburgh Postnatal Depression Scale (EPDS) found it was 27.1% in Anuradhapura District [14] and 5.6% in Galle District [15], highlighting the urgency of addressing this issue.

The role of fathers in maternal and newborn health is increasingly recognized as pivotal [16], and it is widely discussed in global forums [17, 18]. When spouses know the measures to scale back their vulnerability to PPD, they can take necessary measures to reduce such encounters [19]. Similarly, insufficient knowledge and negative attitudes of fathers adversely affect mothers in identifying and acting on the initial signs and symptoms, thereby delaying the diagnosis of PPD [20]. However, knowledge and awareness of health issues related to pregnancy are often lacking among the Sri Lankan community [21, 22]. This lack of understanding can hinder early detection and intervention, putting both mothers and children at risk.

Several studies have found that males have lower knowledge levels related to PPD compared to females [23–25]. A study conducted in Australia using both men and women revealed a high level of awareness in the community, but there was a statistically significant lower level of knowledge about symptoms of PPD in males than in females [25]. The systematic review performed using qualitative studies has revealed that many partners were reluctant to access help, and the true situation of mothers with PPD is not divulged by fathers due to their negative attitudes [20, 26]. The studies have revealed overall positive attitudes among the general population and family members toward perinatal depression and the expected responsibilities of women in motherhood roles [25, 27].

Understanding expectant fathers' knowledge and attitudes toward PPD is crucial for promoting fathers' positive involvement in maternal and newborn care and preventing adverse outcomes. It is further essential for the development of hypotheses for future research and in developing interventions to enhance maternal health

services that can target to identify the factors to increase fathers' involvement. The primary aim of this study was to describe the knowledge and attitudes of expectant fathers about PPD and the factors associated with their knowledge and attitudes about PPD. The study was conducted in the Dompe Medical Officer of Health (MOH) area, located in Gampaha District of the Western Province, Sri Lanka.

Methods

The study was a community-based descriptive cross-sectional study conducted in the Dompe Medical Officer of Health area, situated in the Gampaha District, Western Province, Sri Lanka, which has rural socioeconomic characteristics [28]. The data collection took place from October 2022 to January 2023 among expectant fathers aged between 18 and 60 years at the time of data collection. The cluster sampling technique was used, and the clusters were the public health midwife (PHM) areas. The sample size for this study was calculated using the formula [29],

$$N = Z_{1-\alpha/2}\frac{P(100-P)}{d^2}$$

The Z is 1.96 for a 95% confidence level, P is 50% due to a lack of similar studies, and d is 0.05 for precision. This resulted in an initial sample size of 385, which was then adjusted to 423, using a design effect of 1.1 to account for intra-cluster correlations within the 100% rural population [28]. To further adjust for an anticipated 10% non-response rate, the total sample size was increased to 470.

$$423/0.9 = 470$$

Since each Public Health Midwife area had approximately 30 expectant mothers during the period of data collection, 16 clusters were selected randomly from 43 available areas.

$$470/30 = 15.66 = 16$$

This approach ensures precise statistical estimates by considering minor variations within the homogenous rural population. All expectant fathers in the 'Expectant mothers register' of the randomly selected PHM areas were recruited as study participants. The single mothers in the areas were identified with the help of the area PHM beforehand, and they were not inquired by any means into identifying the study participants.

A self-administered questionnaire was developed based on a conceptual framework under sociodemographic data, attitudes, and knowledge (Fig. 1).

Attitudes toward postpartum depression were measured using 15 statements and a five-point Likert scale, and each statement had "strongly disagree", "disagree", "Neither agree nor disagree", "agree" and "strongly agree" responses, with scores of zero, one, two, three and four, respectively. The minimum score was zero, and the maximum score was sixty. A higher score denotes more positive attitudes. Knowledge of postpartum depression was measured using 30 true/false/do not know statements and a correct answer was given one point. The "Do not know" response was incorporated to prevent including guessed correct answers to the knowledge score. Since it will be difficult to address groups with a lack of knowledge and incorrect knowledge separately in community interventions, there is no additional advantage of analyzing the prevalence of incorrect and absent knowledge separately. Therefore, incorrect and "do not know" answers were given zero points. The minimum score was zero, and the maximum score was thirty. Higher marks represent better knowledge. The questionnaire was based on local and international publications related to postpartum depression [3, 21, 23, 30–38] and the Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision (DSM-IV-TR) [39]. The questionnaire was translated into both Sinhala and Tamil languages and retranslated to English to determine its accuracy. It was subjected to judgmental validity by a panel of experts and assessed for face validity and content validity using the modified Delphi technique. The panel contained eight experts belonging to Consultant Psychiatrists and Consultant Community Physicians. The Content validity ratio (CVR) for each item was calculated using the following formula.

$$CVR = \frac{Ne - \frac{N}{2}}{\frac{N}{2}}$$

The Ne = the number of panelists who said the item was essential and N = the total number of panelists [40]. Then the Content Validity Index (CVI) was calculated separately for the knowledge and attitudes sections. The CVI for the knowledge section was 0.88 and the CVI for the attitude section was 0.8. The questionnaire was pretested with 20 participants in the adjacent Medical Officer of Health area.

Data analysis was performed in Statistical Package for the Social Sciences (SPSS) version 26. The frequency distribution tables were generated with median and interquartile ranges for the total knowledge and attitudes scores, as they were not normally distributed. The scores were dichotomized using 50% of the total score as the cut-off value. Using 50% of the total marks, helped to ensure a clear and unbiased dichotomy of knowledge and attitude scores in our non-normal score distributions. It was also guided by the consensus among the eight

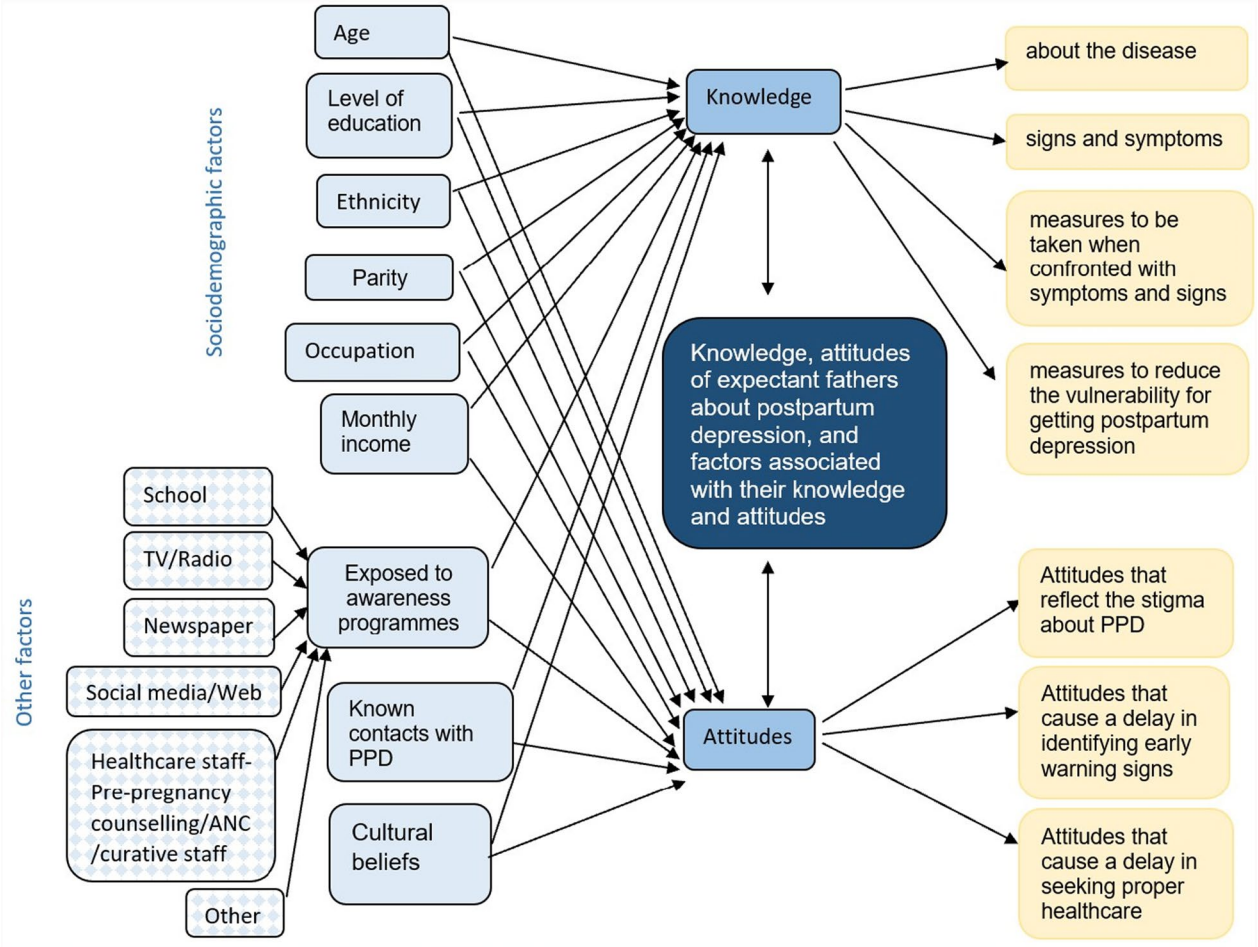

Fig. 1 The Conceptual Framework

professional experts representing Psychiatry and Public Health in the judgment. The collective decision was based on their clinical and community experiences considering both the practical implications of knowledge levels and the necessity for actionable intervention points.

Knowledge was categorized as good when the score was 15–30 points (≥ 50%) and poor when the score was 14 points or below. Attitudes toward PPD were categorized as positive when the score was 30—60 points (≥ 50%). Cross-tabulations were used with the chi-square test to identify the associations between sociodemographic factors and knowledge and attitude levels. Fisher's exact test was used when the expected value of a cell was less than five. The significance was calculated at a 5% significance level. P value < 0.2 in the bivariate analysis was considered as the cut-off point for selecting eligible variables for the logistic regression model in controlling the confounding factors. The final model was developed using backward stepwise elimination. The associations were measured by adjusted odds ratio with 95% confidence intervals. The significance level was 5% and the Hosmer and Lameshow goodness of fit test was used to assess the model adequacy.

Results

The response rate was 93.6%, and 440 expectant fathers participated with a mean age was 31.37 (SD = 5.248) years. The majority were Sinhalese (96.8%, n = 426) and Buddhist (93.2%, n = 410). Most participants had a monthly household income of more than Rs.50,000 per month (52%, n = 229) which was the national figure for the median household income of the rural sector in Sri Lanka [41], and the private sector was the primary workplace for 47.3% (n = 208) of participants. Nine participants (2%) were employed in healthcare services and 75% (n = 330) had completed up to GCE A/L. Nearly half of the participants were expecting their first child (47.7%, n = 210), and only 8.6% (n = 38) reported having encountered a close relative or friend with PPD (Table 1).

Table 1 Socio-demographic characteristics of the participants (n = 440)

Characteristics	Frequency (N = 440)	Percentage (100%)
Age (Years)		
≤ 30 Years	186	43.8
≥ 31 Years	252	57.2
Ethnicity		
Sinhalese	426	96.8
Non-Sinhalese (Tamil and Muslim)	14	3.2
Religion		
Buddhists	410	93.2
Non-Buddhists (Catholic/Christian/Islam/Hindu)	30	6.8
Education level		
Secondary education or below (GCE A/L or below)	330	75
Post-secondary education (Diploma, Graduated and Post graduated)	110	25
Number of children		
Expecting the first child	210	47.7
Having one or more children	230	52.3
Sector of Employment		
Public sector	85	19.3
Private sector	208	47.3
Other (Own Account Workers, Employers, Foreign employment, Unemployed)	147	33.4
Healthcare related Occupation		
Occupation not related to healthcare	431	98
Occupation related to healthcare	9	2
Monthly household income		
Below Rs.50,000	211	48
Above Rs.50,001	229	52
Participants' status of having a close relative or a friend with postpartum depression		
Had a close relative or a friend with postpartum depression	38	8.6
Had no relative or friend with postpartum depression	142	32.3
Status of having heard about postpartum depression before		
Had heard about postpartum depression before	184	41.8
Had never heard about postpartum depression before	256	58.2

Among the participants, 58.2% (n = 256) had never heard about PPD before the study. A total of 300 responses from 184 participants were distributed among the sources. The most common source of information was public health staff (21%, n = 63), followed by television/radio (15.3%, n = 46) and social media (14.3%, n = 43). Only 4% (n = 12) heard about PPD from curative health staff, while academic courses contributed to 0.7% (n = 2) of the sources (Fig. 2).

Expectant fathers' knowledge of postpartum depression

The knowledge score was a non-normal distribution with $p < 0.001$ in the Shapiro–Wilk test. The median knowledge score was 10 out of 30, with 33.6% (n = 148) of participants scoring at least 50% of the total score.

In assessing the knowledge of general details of PPD, the statement with the highest number of correct responses was 'Every mother who is given drug treatment to control postpartum depression has to continue it throughout her lifetime,' with 40.9% (n = 180) identified it as an incorrect statement. The statement with the lowest correct responses (15.5%, n = 68) was 'Postpartum depression usually lasts more than two weeks.' Regarding symptoms, 48% (n = 211) correctly identified that 'Mothers with postpartum depression can have feelings of self-harm,' while 'Most mothers who have postpartum depression are violent' received the lowest percentage of correct responses as 'No' (14.8%, n = 65). Regarding predisposing factors, 57.5% (n = 253) of expectant fathers knew that 'Good family support reduces the risk of

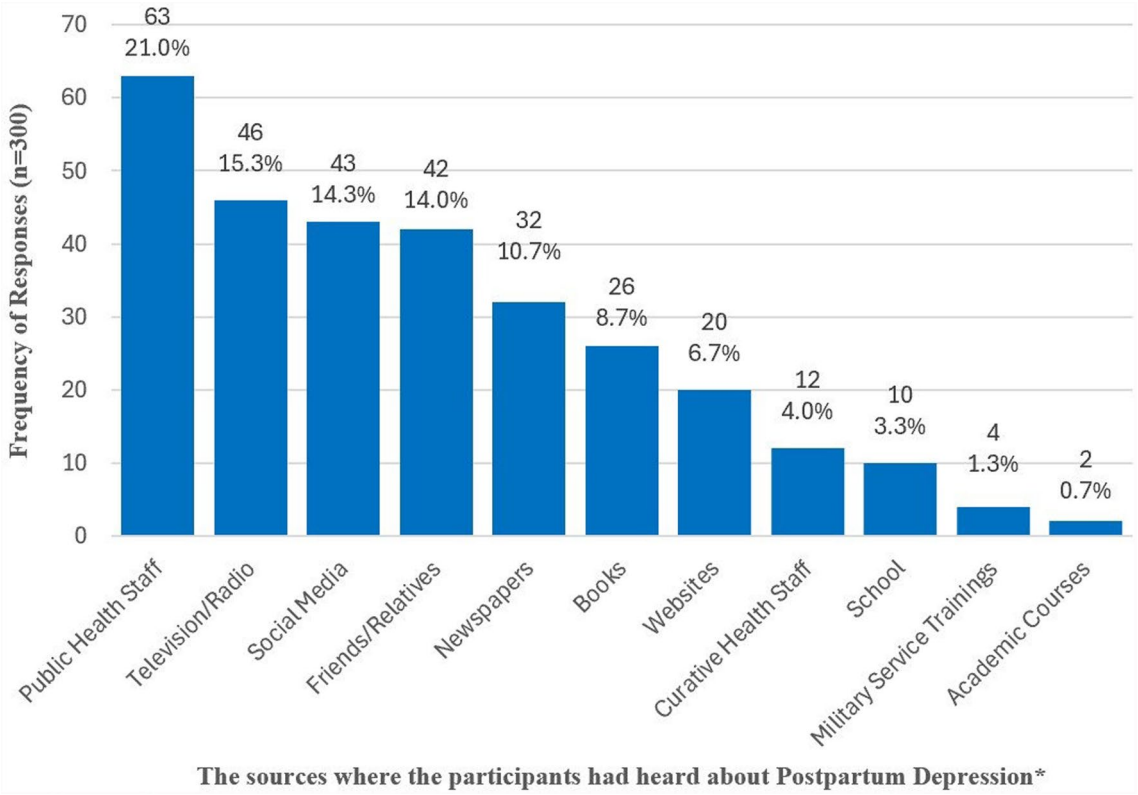

Fig. 2 The sources where the participants had heard about postpartum depression. * Multiple responses were allowed

postpartum depression.' The statement that received the lowest correct responses (23.6%, n = 104) was 'Delivering the baby by cesarean section reduces the risk of postpartum depression,' to which the answer was 'No' (Table 2).

Good knowledge was significantly associated with a higher educational level ($p < 0.001$), having a close relative/friend with postpartum depression ($p < 0.001$), and having heard about postpartum depression before ($p < 0.001$) in bivariate analysis (Table 3). After applying backward elimination to our initial logistic regression model, we arrived at the final model. The Hosmer–Lemeshow test significance value for the final model was 0.862. Logistic regression revealed significant associations only with higher educational level (aOR = 2.53; 95% CI = 1.54–4.15) and having heard about postpartum depression before (aOR = 5.46; 95% CI = 3.47—8.59) when the other variables held constant. Detailed parameter estimates and statistical information for the final model are presented in Table 4.

Expectant fathers' attitudes towards postpartum depression

The attitude score was a non-normal distribution with $p < 0.001$ in the Shapiro–Wilk test. The median attitude score was 36 (IQR 31 − 40.75) out of 60, and 83.4% (n = 367) had positive attitudes toward PPD. The majority of expectant fathers (48%, n = 213) agreed or strongly agreed with the statement, 'Mothers with thoughts of harming or killing the baby are not suitable for motherhood.' Additionally, 42.9% (n = 179) agreed or strongly agreed that 'Women must be able to bear the effects of postpartum depression if they decide to become pregnant', and 32.5% (n = 143) agreed or strongly agreed that 'Mothers with abnormal behavior patterns should be taken to a religious place to have their blessings.' However, 78.6% (n = 346) of fathers disagreed or strongly disagreed with the statement, 'Mothers with abnormal behavior patterns should be taken to a spiritual healer (kattadi),' and 73.4% (n = 323) disagreed or strongly disagreed with the idea that 'Postpartum depression can be predisposed by nonhuman-evil force.' Furthermore, 67.5% (n = 297) of participants opposed the notion of 'Not telling others about the condition if developed.' (Table 5).

Although the bivariate analysis showed that working in the private sector ($p = 0.04$) and expecting their first child ($p = 0.04$) were significantly associated with positive attitudes (Table 6), logistic regression did not reveal any significant association (Table 7). The

Table 2 Knowledge of postpartum depression among expectant fathers (n = 440)

	Knowledge assessing statements*	Correct Response	Responses (N = 440)		
			Correct response received	Incorrect response received	"Do not know" response received
			n (%)	n (%)	n (%)
On general details of postpartum depression					
1	It usually lasts more than two weeks	Yes	68 (15.5)	50 (11.4)	322 (73.1)
2	This kind of abnormal behavior after the delivery better managed with indigenous therapy	No	81 (18.4)	66 (15)	359 (66.6)
3	It occurs until one year after the delivery	Yes	100 (22.7)	59 (13.4)	281 (63.9)
4	Postpartum depression frequently occurs within three months after the delivery	Yes	101 (23)	56 (12.7)	283 (64.3)
5	Postpartum depression does not occur in women with healthy pregnancies	No	128 (29.1)	114(25.9)	198 (45)
6	Most mothers with Postpartum depression must be hospitalized for treatment	No	147 (33.4)	104 (23.6)	189 (43)
7	Postpartum depression does not have an effective treatment	No	178 (40.5)	25 (5.7)	237 (53.9)
8	Every mother who is given drug treatment to control postpartum depression must continue it throughout her lifetime	No	180 (40.9)	21 (4.8)	239 (54.3)
On symptoms of postpartum depression					
1	Most mothers who have postpartum depression are violent	No	65 (14.8)	192 (43.6)	183 (41.6)
2	Mothers with postpartum depression may have complaints of symptoms that do not respond to the treatments	Yes	82 (18.6)	103 (23.4)	255 (58)
3	Mothers with postpartum depression pay good attention to their hygiene	No	137 (31.1)	92 (20.9)	211 (48)
4	Mothers with postpartum depression withdraw from their loved ones	Yes	152 (34.5)	67 (15.2)	221 (50.3)
5	Mothers with postpartum depression may have thoughts of harming the baby	Yes	161 (36.6)	35 (8)	244 (55.4)
6	Postpartum depression makes the mothers worry excessively about the baby	Yes	164 (37.3)	34 (7.7)	242 (55)
7	Postpartum depression causes mothers to have altered eating habits	Yes	172 (39.1)	60 (13.6)	208 (47.3)
8	Mothers with postpartum depression have a persistently sad mood	Yes	174 (39.5)	68 (15.5)	198 (45)
9	Mothers with postpartum depression feel energetic more than usual	No	176 (40)	36 (8.2)	228 (51.8)
10	Postpartum depression can affect the mothers' sleeping pattern	Yes	180 (40.9)	38 (8.6)	222 (50.5)
11	Irritability towards her spouse can be due to postpartum depression	Yes	198 (45)	54 (12.3)	188 (42.7)
12	Mothers with postpartum depression can have feelings of self-harm	Yes	211 (48)	40 (9.1)	189 (42.9)
On predisposing factors for postpartum depression					
1	Deliver the baby by a cesarean section reduces the risk of postpartum depression	No	104 (23.6)	62 (14.1)	274 (62.3)
2	Hormonal imbalance after the delivery is a cause of postpartum depression	Yes	120 (27.3)	60 (13.6)	260 (59.1)
3	Exclusive breastfeeding increases the risk of postpartum depression	No	145 (33)	44 (10)	251 (57)
4	The probability of developing postpartum depression is less in twin deliveries	No	150 (34.1)	16 (3.6)	274 (62.3)

Table 2 (continued)

	Knowledge assessing statements*	Correct Response	Responses (N = 440)		
			Correct response received	Incorrect response received	"Do not know" response received
			n (%)	n (%)	n (%)
5	Not taking the vitamin supplements issued by the clinic is the cause of postpartum depression	No	153 (34.8)	58 (13.2)	229 (52)
6	Tragic life events increase the risk of postpartum depression	Yes	171 (38.9)	58 (13.2)	211 (47.9)
7	Prepregnancy mental illnesses increase the risk of postpartum depression	Yes	175 (39.8)	51 (11.6)	214 (48.6)
8	Roles and responsibilities with her reduce the risk of postpartum depression	No	174 (39.5)	55 (12.5)	211 (48)
9	Intolerable workloads increase the risk of postpartum depression	Yes	207 (47)	51 (11.6)	182 (41.4)
10	Good family support reduces the risk of postpartum depression	Yes	253 (57.5)	52 (11.8)	135 (30.7)

Hosmer–Lemeshow test significance value for the final model was 0.84.

Discussion

Our study attempted to describe the knowledge and attitudes of expectant fathers toward postpartum depression in a rural setting in Sri Lanka. The results revealed that fathers had positive attitudes towards postpartum depression with comparatively poor knowledge about postpartum depression.

Since Sri Lanka has a predominantly (77.4%) rural population [42], studying in a rural community was appropriate and generalizable. Most of the fathers were private-sector employees (47.3%), which aligns with national statistics indicating a higher percentage of private-sector employment [43]. The majority had education up to GCE A/L or below (75%) and the percentage shows a difference compared to the previous study conducted among expectant fathers in Sri Lanka regarding the knowledge of maternal organic disorders [22] which gives 97.2% of fathers educated up to GCE A/L or below. The difference might be due to regional variations in educational attainment, socioeconomic development, and access to educational resources in the country. Further, the proximity to urban centers might have provided more educational opportunities and influenced higher educational attainment among the residents of our study area. Nearly half of the sample (48%) had a monthly income of less than Rs. 50,000 per month which was the median household income of the rural population in Sri Lanka [41].

Knowledge of postpartum depression

The study revealed that only 33.6% of expectant fathers had good knowledge of postpartum depression. Similarly, the study conducted in Malaysia [24] has observed awareness of postpartum depression is poor among Malaysian adults. Several factors might have contributed to this, such as insufficient education and awareness opportunities, the cultural stigma associated with mental health issues that may prevent open discussions about postpartum depression, and the low priority given to mental health.

Similar to the study conducted in Malaysia [24], our study showed a non-normal distribution of knowledge and attitude scores. This can be attributed to the presence of technical terms in the study tools, which may have skewed the scores in one direction. The study conducted among the Portuguese general population [23] demonstrated high levels of knowledge, in contrast to our findings. The above study has been conducted as an internet survey with a self-selected sample, unlike our community survey, which employed probability sampling. Furthermore, their study sample comprised the general population, including both males and females, potentially contributing to higher overall knowledge levels. In contrast, our study focused exclusively on expectant fathers. Additionally, the study conducted among the Australian general population through a telephone survey also showed a high level of knowledge [25]. In both studies above, females consistently exhibited higher knowledge levels than males. These differences in study design, sampling methods, and participant demographics likely account for the variation in knowledge levels observed

Table 3 Association between knowledge of postpartum depression and socio-demographic characteristics of expectant fathers (n = 440)

Sociodemographic Characteristics	Knowledge		Significance
	Good n (%)	Poor n (%)	
Age			$p = 0.09$
≤ 30 Years	55 (29.2)	133 (70.8)	
≥ 31 Years	93 (36.9)	159 (63.1)	
Ethnicity			P = 1.0
Sinhalese	143 (33.6)	283 (66.4)	
Non-Sinhalese (Tamil and Muslim)	5 (35.7)	9 (64.3)	
Religion			$p = 0.12$
Buddhism	134 (32.7)	276 (67.3)	
Non-Buddhists (Catholic/Christian/Islam/Hindu)	14 (46.7)	16 (53.3)	
Sector of employment			$p = 0.13$
Public sector	25 (29.4)	60 (70.6)	
Private sector	80 (38.5)	128 (61.5)	
Other (Own Account Workers, Employers, Foreign employment, Unemployed)	43 (29.2)	104 (70.8)	
Healthcare related occupation			$p = 0.72$
Occupation related to healthcare	2 (22.2)	7 (77.8)	
Occupation not related to healthcare	146 (33.9)	285 (66.1)	
Monthly household income			$p = 0.16$
≤ Rs 50,000	64 (30.3)	147 (69.7)	
≥ Rs 50,001	84 (36.7)	145 (63.3)	
Education level			$p < 0.001$
Secondary education or below (GCE A/L or below)	87 (26.4)	243 (73.6)	
Post-secondary education (Diploma, Graduated, Post graduated)	61 (55.5)	49 (44.5)	
Number of children			$p = 0.38$
Expecting the first child	75 (35.7)	135 (64.3)	
Having one or more children	73 (31.7)	157 (68.3)	
Status of having a close relative or friend with postpartum depression			$p < 0.001$
Yes	23 (60.5)	15 (39.5)	
No	125 (31.1)	277 (68.9)	
Status of having heard about postpartum depression before			$p < 0.001$
Have never heard of Postpartum depression before	43 (16.8)	213 (87.2)	
Have heard of postpartum depression before	105 (57.1)	79 (42.9)	

across these studies. This discrepancy also could be attributed to greater opportunities for improving health literacy in developed countries, emphasizing the need for interventions to improve health-related literacy in less developed regions [44]. The study, conducted among family members accompanying mothers to healthcare institutions in India [27], a country with a similar developing status as Sri Lanka, demonstrated a higher level of knowledge about postpartum depression, contrary to our study results. This discrepancy may be attributed to the selection criteria of the Indian study, as individuals accompanying mothers to healthcare institutions are likely to be more health-conscious.

The National Mental Health Survey [45] conducted among different categories of professionals and the public, revealed the population had reasonable literacy about mental illnesses. In contrast to their findings, our study results revealed inadequate knowledge about postpartum depression. This might be due to postpartum depression being a selective specifier of major depressive disorder thereby a selected arm of general mental disorders. Though the population has broad literacy on mental disorders, most of them might have no clear idea what postpartum depression is. Further, this might be because it is a condition that affects only mothers and that it only occurs after childbirth.

Table 4 Binary Logistic Regression of knowledge of postpartum depression among expected fathers (n = 440)

Variables	Adjusted odds ratio	Significance	95% Confidence Interval
Age			
≤ 30 Years	1.00		
≥ 31 Years	1.37	0.178	0.87–2.16
Religion			
Buddhists	1.00		
Non-Buddhists (Catholic/Christian/Islam/Hindu)	2.14	0.066	0.95–4.80
Sector of employment			
Public sector	0.68	0.27	0.35–1.34
Private sector	1.38	0.22	0.82–2.34
Other (Own Account Workers, Employers, Foreign employment, Unemployed)	1.00		
Income			
< Rs.50,000	1.00		
> Rs.50,000	0.76	0.26	0.47–1.23
Education level			
Secondary education or below (GCE A/L or below)	1.00		
Post-secondary education (Diploma, Graduated, Post graduated)	2.53	< 0.001	1.54–4.15
Status of having a close relative or friend with postpartum depression			
No	1.00		
Yes	1.25	0.57	0.58–2.70
Status of having heard about postpartum depression before			
Have never heard of Postpartum depression before	1.00		
Have heard of postpartum depression before	5.46	< 0.001	3.47–8.59

Similar to some systematic reviews and qualitative studies conducted in developed countries [20, 46, 47], our study also showed poor knowledge among expectant fathers about postpartum depression, although it is difficult to compare the results due to the qualitative nature of those studies. As explained in a Sri Lankan publication [48], one of the barriers to reducing maternal suicides in Sri Lanka was "the lack of awareness and knowledge about perinatal psychiatric disorders", and the "lack of awareness and knowledge about perinatal psychiatric disorders" was endorsed by our results.

Our study revealed that 58.2% of the expectant fathers had never heard about postpartum depression before, similar to some of the fathers who said "they have not even heard of a condition like that" in a qualitative study conducted in the United States of America [47]. It might be due to cultural taboos and stigma towards psychological illnesses [21, 49], maternal-centric information dissemination, and limited engagement of healthcare providers with fathers [50] despite the development status of the country.

Among the 184 (41.8%) participants who had heard about postpartum depression, the majority had heard it from public health staff (21% of total responses). This finding suggests that public health staff may play a significant role in disseminating information about postpartum depression. This could be due to the commitment of public health staff to improving health education in antenatal sessions and promoting male participation in reproductive health care, as outlined in the National Policy on Maternal and Child Health of Sri Lanka [51]. Further research could investigate the specific impact of public health staff on these educational efforts. However, a significant gap remains, as evidenced by the 58.2% of fathers who had never heard about postpartum depression. This highlights the need to reassess and enhance the strategies used to increase fathers' knowledge and involvement in maternal and child care which ultimately supports the health and well-being of both mothers and children. Further, a considerable percentage of responses have been received to the modern way of communication such as social media (14.3%) and websites (6.7%) indicating an emerging method of knowledge transfer, to the fathers.

The majority of fathers (43.6%) expected mothers with postpartum depression to be violent. This might be due to having a perception that 'people with mental

Table 5 Attitudes toward postpartum depression among expectant fathers (n = 440)

	Attitude assessing statement (N = 440)	Responses				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		n (%)	n (%)	n (%)	n (%)	n (%)
1	Sadness is an attention-seeking behavior of the mother	23 (5.2)	64 (14.5)	133 (30.2)	137 (31.1)	83 (18.9)
2	Mothers with abnormal behavior patterns should be taken to the priest in a religious place to have their blessings	31 (7)	112 (25.5)	111 (25.2)	122 (27.7)	64 (14.5)
3	Mothers with abnormal behavior patterns should be taken to a spiritual healer (kattadi)	7 (1.6)	31 (7)	56 (12.7)	155 (35.2)	191 (43.4)
4	Postpartum depression was not there among mothers in older generations	7 (1.6)	62 (14.1)	210 (47.7)	126 (28.6)	35 (8.6)
5	Postpartum depression is a normal condition that every mother faces after the delivery	16 (3.6)	109 (24.8)	180 (40.9)	108 (24.5)	27 (6.1)
6	Postpartum depression is a sign of weakness	13 (3)	89 (20.2)	161 (36.6)	122 (27.7)	55 (12.5)
7	Postpartum depression can be predisposed by nonhuman-evil force	10 (2.3)	27 (6.1)	80 (18.2)	147 (33.4)	176 (40)
8	Postpartum depression always occurs due to the unpreparedness of women to become mothers	9 (2)	47 (10.7)	162 (36.8)	141 (32)	81 (18.4)
9	Women have postpartum depression because they have unrealistic expectations	5 (1.1)	72 (16.4)	165 (37.5)	144 (32.7)	54 (12.3)
10	Postpartum depression always occurs due to the incompetency of women in carrying out mothers' responsibilities	4 (0.9)	63 (14.3)	131 (29.8)	167 (38)	75 (17)
11	It is better not to tell others about the condition if developed	8 (1.8)	41 (9.3)	94 (21.4)	203 (46.1)	94 (21.4)
12	It does not need any intervention because it resolves with the time	8 (1.8)	53 (12)	132 (30)	159 (36.1)	88 (20)
13	The women must be able to bear the effects of postpartum depression if they decide to become pregnant	23 (5.2)	166 (37.7)	129 (29.3)	87 (19.8)	35 (8)
14	If mothers get postpartum depression, they will have depression throughout their life	3 (0.7)	20 (4.5)	182 (41.4)	171 (38.9)	64 (14.5)
15	Mothers with thoughts of harming the baby or even killing the baby are not suitable for motherhood	113 (25.7)	100 (22.7)	88 (20)	69 (15.7)	70 (15.9)

health disorders are violent' [52]. This might lead to negligence in the less energetic sad mood of affected mothers, delaying professional help-seeking.

In our study, good knowledge had significant associations with having postsecondary education (aOR = 2.53) and having a close relative or friend with postpartum depression (aOR = 5.46). Having a close relative or friend with postpartum depression may increase awareness and understanding of the condition, leading to better knowledge about it. This firsthand experience can also encourage seeking more information and resources about postpartum depression. The association with higher education level was also evident in the study conducted in the Portuguese general population similar to our study [23]. It might be due to individuals with postsecondary education often having greater access to information through formal education, which can lead to better knowledge about various topics, including postpartum depression. Further, higher education levels are often associated with better critical thinking skills [53], which may enable individuals to understand and retain information about postpartum depression more effectively. There was no statistically significant association of knowledge with age, ethnicity, religion, sector of employment, monthly household income, or the number of children, similar to other studies among general populations of other countries [25, 27]. It could be due to two main reasons. Initially, it might reflect a true non-existence of these associations, suggesting that knowledge about postpartum depression is uniformly distributed across these groups, warranting further investigation. Secondly, the measurement tools used to assess knowledge might not be sensitive enough to detect differences across demographic groups leading to nonsignificant associations even if actual differences exist.

Attitudes towards postpartum depression

In line with the forensic medicine case report published in Sri Lanka [21], 8.6% (n = 38) of our study sample believed that 'mothers with abnormal behavior patterns should be taken to a spiritual healer (kattadi)' and 8.4% (n = 37) believed that 'postpartum depression can be predisposed by nonhuman-evil force'. Although the percentage was small, that will put a similar percentage of mothers and their infants at risk. Hence, imparting knowledge about postpartum depression becomes

Table 6 Association between knowledge of postpartum depression and socio-demographic characteristics of expectant fathers (n = 440)

Sociodemographic characteristics	Attitudes		Significance
	Positive n (%)	Negative n (%)	
Age			$p = 0.06$
≤ 30 Years	164 (87.2)	24 (12.8)	
≥ 31 Years	203 (80.5)	49 (19.5)	
Ethnicity			$p = 0.71$
Sinhalese	356 (83.5)	70 (16.5)	
Non-Sinhalese (Tamil and Muslim)	11 (78.6)	3 (21.4)	
Religion			$p = 0.61$
Buddhism	343 (83.6)	67 (16.4)	
Non-Buddhists (Catholic/Christian/Islam/Hindu)	24 (80)	6 (20)	
Sector of employment			$p = 0.04$
Public sector	69 (81.2)	16 (18.8)	
Private sector	183 (88)	25 (12)	
Other (Own Account Workers, Employers, Foreign employment, Unemployed)	115 (78.2)	32 (21.8)	
Healthcare related occupation			$p = 0.37$
Occupation related to healthcare	9 (100)	0 (0)	
Occupation not related to healthcare	358 (81.3)	73 (18.7)	
Monthly household income			$p = 0.44$
≤ Rs 50,000	173 (82)	38(18)	
≥ Rs 50,001	194 (86.2)	35 (13.8)	
Education level			$p = 0.64$
Secondary education or below (GCE A/L or below)	269 (81.5)	61 (18.5)	
Post-secondary education (Diploma, Graduated, Post graduated)	98 (89.1)	12 (10.9)	
Number of children			$p = 0.04$
Expecting the first child	183 (87.1)	27 (12.9)	
Having one or more children	184 (80)	46 (20)	
Status of having a close relative or friend with postpartum depression			$p = 0.55$
Yes	33 (86.8)	5 (13.2)	
No	334 (83.1)	68 (16.9)	
Status of having heard about postpartum depression before			$p = 0.24$
Have never heard of Postpartum depression before	209 (81.6)	47 (18.4)	
Have heard of postpartum depression before	158 (85.9)	26 (14.1)	

essential and urgent to remove these misconceptions from the community. These misconceptions are due to culture and stigma with the demonological and astrological remedies that were commonly and continuously used for such symptoms in the early years. The same reasons act as the main barriers to overcoming these misconceptions [54]. Indian mothers seem to be more affected by these misconceptions, as 54.5% of the sample of family members believed "postpartum depression was caused by a ghost, by doing sin or by black magic"[27]. Negative myths were not prominent in the study among the Australian general population [25]. The cultural attitudes of the Australian community might be more supportive of a scientific understanding of postpartum depression. Further, 78.6% and 73.4% of fathers disagreed with the 'mothers with abnormal behavior patterns should be taken to a spiritual healer (kattadi)' and 'postpartum depression can be predisposed by nonhuman-evil force' consecutively, which was a positive finding toward fathers' attitudes.

Most of the available literature on fathers' knowledge and attitudes toward PPD is qualitative and has not gone into depth to see the associated factors. A study conducted in India to describe the knowledge and attitude of family members toward PPD [27] found that there were no statistically significant associations between the level of knowledge and age, religion, education level, gender,

Table 7 Binary Logistic Regression of attitudes towards postpartum depression among expected fathers (n = 440)

Variables	Adjusted odds ratio	Significance	95% Confidence Interval
Age			
< 30 years	1.00		
> 31 years	0.74	0.31	0.41–1.33
Sector of employment			
Public sector	1.21	0.60	0.60–2.41
Private sector	1.61	0.18	0.80–3.26
Other (Own Account Workers, Employers, Foreign employment, Unemployed)	1.00		
Monthly household income			
≤ Rs 50,000	1.00		
≥ Rs 50,001	1.30	0.33	0.77–2.19
Number of children			
Expecting the first child	1.00		
Having one or more children	0.70	0.23	0.39–1.25

having a known person with PPD and higher education level, but having a known person with PPD had a significant association with positive attitudes toward PPD. A recent similar study conducted in Portugal [23] in the general population revealed that younger age, being a female, higher educational level, being a health professional, and fewer years passed from childbirth had significant associations with a higher level of attitudes. Advanced age, male sex, a lower education level, being married/cohabitating, not being a health professional, and a higher number of years passed from childbirth had a significant association with favorable attitudes toward PPD. Evidence shows that men with higher incomes have a greater intention to recommend professional help for mental health problems in the postpartum period to their partners [55]. Similar to the other studies conducted in different study populations [23, 24, 27, 55], our study participants showed favorable attitudes toward postpartum depression irrespective of external factors. It is worthwhile to discuss the reasons for having favourable attitudes toward postpartum depression despite having a low level of knowledge among fathers in Sri Lanka. This phenomenon can be attributed to the high literacy levels prevalent in the Sri Lankan population [56], which facilitates the acquisition of favorable attitudes toward postpartum depression despite potential gaps in specific knowledge among fathers. Additionally, the greater level of female autonomy within traditional Sri Lankan society, coupled with minimal cultural resistance to women's empowerment which is rooted in the country's longstanding cultural practices, might play a crucial role [54, 57]. These factors might collectively contribute to the observed favorable attitudes toward postpartum depression, regardless of external demographic variables. Further research is warranted to assess these factors comprehensively, to understand the underlying factors contributing to the observed favorable attitudes toward postpartum depression, and to validate the consistency of these attitudes in broader and more diverse populations.

Limitations

There were 6.4% nonresponders despite the application of several measures to reduce the nonresponse rate. If only fathers with poor knowledge and negative attitudes refused to participate, our results of good knowledge and positive attitudes were likely to be overestimated. Although multiple measures were applied, there were possibilities of having demand characteristic response bias and social desirability response bias, which could have inflated the results for good knowledge and positive attitudes. Moreover, the extreme response bias could have affected the results either way. The study population had a more rural population, and the majority were Sinhala (96.8%) and Buddhist (93.2%), giving less representation from other ethnic and religious groups by limiting the generalizability of the findings to the communities having more people with other ethnic and religious groups. The clusters were selected randomly, and an adequate sample size was used to increase the external validity.

Since sensitive data were to be revealed and the principal investigator was a medical officer, there was a considerable probability of having social desirability bias and demand characteristics bias. Those were minimized by

using a self-administered questionnaire, an envelope to seal the response sheet before handing it over, and a ballot box to collect the response sheets. The probability of having extreme response bias due to the technical wording of the questionnaire was minimized by simplifying the statements appropriate to the Sri Lankan context, by adding a third option "Do not know" apart from the "Yes" and "No" options, and by pretesting the questionnaire. Judgmental validation was performed by a panel of experts with face validity and content validity using the modified Delphi technique. Confounding effects were controlled by using multiple logistic regression.

Conclusions

Our study revealed that while fathers generally had positive attitudes toward postpartum depression, their knowledge of the subject was comparatively poor. This discrepancy may be attributed to several factors, including insufficient education and awareness programs, cultural stigma surrounding mental health issues, and low prioritization of mental health education within the healthcare system. Despite high literacy levels and a robust network of preventive health services in Sri Lanka, our results indicate a significant gap in knowledge about postpartum depression among expectant fathers. This gap emphasizes the need for targeted educational initiatives and strategies to improve awareness and understanding of postpartum depression. Moreover, the observed positive attitudes toward postpartum depression, irrespective of external demographic variables, suggest that cultural factors such as high literacy levels, female autonomy, and minimal resistance to women's empowerment play a crucial role.

The study also highlighted that good knowledge was significantly associated with higher education and having a close relative or friend with postpartum depression. This indicates the importance of personal experience and educational attainment in promoting awareness. However, no significant association was found between knowledge and factors such as age, ethnicity, religion, sector of employment, income, or the number of children, suggesting a uniform distribution of knowledge across these groups.

Recommendations

The knowledge gap of expectant fathers in the area should be minimized by imparting knowledge to facilitate the early detection of postpartum depression among mothers. This will be related to minimal effort, as the expectant fathers had favourable attitudes towards postpartum depression. The measures adopted to impart knowledge to expectant fathers should be revisited to improve the efficiency of such methods. Social media and other electronic media should be tried as additional measures to improve the knowledge and attitudes of the expecting fathers in the area. Awareness programmes aimed at fathers should be more focused on giving knowledge specifically on how to identify the basic symptoms and predisposing factors. Future awareness programmes for newly married couples and expectant fathers should include information regarding the prevention and identification of postpartum depression to promote early help-seeking. Attention should be further focused on dispelling misconceptions among expectant fathers about postpartum depression.

This study has important implications for future research, highlighting the need to develop a measure for improving fathers' knowledge of postpartum depression. Further studies should be carried out to identify the level of knowledge and attitudes among expectant fathers in urban settings with high socioeconomic status and settings where people with other religions and ethnicities are as well and to evaluate whether the associated factors are different in those settings.

Overall, our findings highlight the need for comprehensive efforts to enhance the knowledge of postpartum depression among expectant fathers in Sri Lanka, with the help of the positive attitudes which already present. Future research should focus on developing and evaluating targeted interventions to improve mental health literacy and support the well-being of both mothers and children in diverse populations.

Abbreviations

aOR	Adjusted odds ratio
CI	Confidence intervals
CVR	Content validity ratio
CVI	Content validity index
IQR	Interquartile range
PPD	Postpartum depression
PHM	Public health midwife
ANC	Antenatal clinic
DSM-IV-TR	Diagnostic and statistical manual of mental disorders, fourth edition, text revision
SPSS	Statistical package for the social sciences

Supplementary Information

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Additional file 1. Additional Details on Sample Size Calculation and Sampling Techniques

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Author contributions
Conceptualization, implementation, and preparation of the manuscript were performed by KJ. Supervision, review, and editing were performed by CA. Both authors read and approved the final manuscript.

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Availability of data and materials
The datasets used for analysis during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, University of Kelaniya, Sri Lanka (P/87/08/2022). The administrative clearance was obtained from relevant health authorities. The ability to withdraw from the study at any time without giving any reason for withdrawing and without having any adverse effect on the care of the mother was conveyed to the participants. A participant information sheet was provided, informed written consent was obtained using a consent form, and anonymity and confidentiality were always maintained. The single mothers in the areas were identified with the help of the public health midwife beforehand, and they were not inquired by any means into identifying the study participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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