(RESEARCH ARTICLE)

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Assessment of pregnant women's knowledge on danger signs and symptoms of childbirth: A cross-sectional study in Dhaka City, Bangladesh

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Abstract

Background: Although pregnancy is a natural process, it can involve unexpected complications that pose serious risks to both mother and fetus. Maternal mortality remains a global public health concern, with around 830 women dying daily from preventable pregnancy- and childbirth-related causesmostly in developing countries. These deaths are primarily due to obstetric complications such as hemorrhage, eclampsia, sepsis, and obstructed labor. Early recognition of danger signs is crucial for prompt medical care and improved outcomes. This study aimed to assess pregnant women's knowledge of key danger signs during childbirth in Dhaka City, Bangladesh.

Methods: A cross-sectional study was conducted from April 2023 to April 2024 in three hospitals in Lalbag, Dhaka. A total of 262 pregnant women aged 18–49 years with at least three months of gestation were purposively selected. Data were collected through face-to-face interviews using a pretested semi-structured questionnaire. Descriptive statistics summarized participant characteristics, and Chi-square tests assessed associations between socio-demographic factors and knowledge levels. Knowledge was classified as "good" if participants identified at least three danger signs during pregnancy, two during labor, and two after childbirth. Ethical approval was obtained from Hamdard University Bangladesh, and informed consent was obtained from all participants.

Results: The mean age of participants was 23.37 ± 4.47 years, with most (61.1%) aged 19–23. Nearly half (48.2%) had delivered their last child at home. One-third of respondents had good knowledge of danger signs during pregnancy and childbirth, while only 12.2% had good knowledge after childbirth. Significant associations were found between knowledge during pregnancy and age (p = 0.0001), respondent's education (p = 0.012), and husband's education (p = 0.045). Knowledge after childbirth was also significantly associated with age (p = 0.024). Other socio-demographic variables showed no significant associations.

Conclusion: The study highlights that a considerable proportion of pregnant women had poor knowledge of danger signs during pregnancy, childbirth, and especially after childbirth. Younger age and lower educational attainment were associated with poorer awareness. Targeted health education and counseling interventions are essential to improve maternal knowledge and promote timely care-seeking behaviors, ultimately reducing maternal morbidity and mortality.

Keywords: Pregnancy;Danger Signs; Maternal Health; Knowledge; Childbirth; Postpartum Complications; Bangladesh; Antenatal Care; Cross-Sectional Study; Maternal Awareness

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1. Introduction

Pregnancy is a normal physiological process, yet it is often accompanied by both physical and psychological changes that can sometimes lead to life-threatening complications for the mother and fetus[1]. While most pregnancies and births occur without serious issues, all pregnancies carry inherent risks[2]. The World Health Organization (WHO) estimates that approximately 15% of pregnant women will experience potentially life-threatening complications that require skilled obstetric care, and in some cases, major medical interventions[1,3].

Globally, maternal mortality remains a pressing public health concern[4]. According to WHO, UNFPA, and UNICEF, about 830 women die every day from preventable causes related to pregnancy and childbirth, with 99% of these deaths occurring in developing countries[4,5]. These deaths are largely attributed to direct obstetric complications such as hemorrhage, hypertensive disorders, sepsis, obstructed labor, and unsafe abortion [6]. In addition to mortality, many women suffer from severe morbidity, including the development of obstetric fistula, reproductive tract infections, and infertility due to inadequately managed complications[7].

Danger signs are early symptoms indicating serious complications that may occur during pregnancy, labor, and the postpartum period[8]. These signs are not diagnoses in themselves but serve as vital indicators prompting immediate medical attention. Common danger signs during pregnancy include severe vaginal bleeding, convulsions, high fever, abdominal pain, severe headache, blurred vision, and reduced fetal movement[2,8]. During childbirth, danger signs include prolonged labor, excessive bleeding, and retained placenta, while postpartum danger signs involve continued bleeding, loss of consciousness, and fever[2].

Antenatal care (ANC) plays a crucial role in identifying risks early and educating pregnant women about danger signs to prevent severe maternal and fetal outcomes[9]. Regular ANC visits provide an opportunity for healthcare professionals to monitor the progress of pregnancy, detect complications at an early stage, and offer tailored advice to expectant mothers[10]. In particular, educating women about danger signs during ANC helps improve their health literacy and strengthens their decision-making capacity regarding when and where to seek medical assistance[11]. Providing structured health education during these visits not only raises awareness but also empowers women and their families to act swiftly in the event of complications, thereby reducing delays in seeking care[12]. Despite global progress in improving maternal health outcomes, maternal mortality ratios remain disproportionately high in low-resource settings due to factors such as inadequate access to skilled care, lack of transportation, and limited awareness[4]. In Bangladesh, for instance, the maternal mortality ratio (MMR) stands at 320 per 100,000 live births (UNICEF, 2009), which remains alarmingly high compared to high-income countries with well-established maternal health systems[13].

To address this critical issue, various interventions have been implemented in Bangladesh, particularly in line with Millennium Development Goal (MDG) 5, which aimed to reduce maternal mortality and improve maternal health[14]. These interventions include both supply-side improvements, such as increasing the availability of skilled birth attendants, and demand-side strategies aimed at influencing behavior and enhancing awareness[14,15]. Among the demand-side approaches, behavior change communication (BCC) has played a key role in educating women about pregnancy-related complications[16]. Visual tools, such as pictorial cards depicting common danger signs, have been introduced to support communication, especially among women with limited literacy[16,17]. However, despite these efforts, knowledge gaps still exist—especially among women in rural, low-income, and marginalized communities—highlighting the need for targeted, culturally appropriate educational interventions that address both awareness and access[18].

Awareness of danger signs during pregnancy, childbirth, and the postpartum period is the first and most critical step in preventing maternal complications and reducing mortality[19]. When women, along with their partners and families, are equipped with the knowledge to recognize these warning signs, they are more likely to respond promptly by seeking skilled care at an appropriate facility[20]. Early recognition and timely intervention are essential in avoiding delays that often contribute to preventable maternal and neonatal deaths[21]. Strengthening awareness through community-based programs and healthcare system integration can lead to more timely referrals, better preparedness, and ultimately, improved maternal and neonatal outcomes[20].

This study was conducted to assess the knowledge of pregnant women regarding danger signs related to pregnancy and childbirth. Specifically, it aimed to evaluate their understanding of key danger signs during pregnancy, childbirth, and the postpartum period. The study also explored the subsequent healthcare-seeking actions taken by the women if any danger sign was recognized. In addition, it sought to examine the socio-demographic characteristics of the respondents to identify potential associations with their level of awareness. These objectives provided a comprehensive framework

to better understand existing knowledge gaps and inform strategies for improving maternal health education and outcomes.

2. Methodology

2.1. Study Design

It was a cross-sectional study with no intervention.

2.2. Study Period

The study was conducted from April 2023 to April 2024.

2.3. Study Place

The study was conducted in three hospitals: Medisun Healthcare Limited, Medilife Hospital Limited, and Green Health Hospital, located in the Lalbag sub-district of Dhaka city, Bangladesh.

2.4. Study Population

The study population included pregnant women (aged 18–49 years) who were receiving healthcare services in the outpatient department (OPD) of the selected hospitals.

2.5. Inclusion Criteria

Pregnant women aged between 18 and 49 years

Pregnant women with at least three months of gestation

2.6. Exclusion Criteria

Pregnant women who were unwilling to participate in the study

2.7. Sample Size

The sample size was calculated using the standard formula

$$n = z^2pq \; / \; d^2$$

Where

- n = required sample size
- z = z-value at 95% confidence level = 1.96
- p = anticipated population proportion = 0.22 (based on Hibstu and Siyoum, 2017)
- q = 1 − p = 0.78
- d = margin of error = 0.05

Substituting the values

- n = $(1.96)^2$ × 0.22 × 0.78 / $(0.05)^2$
- n = 262.37

Thus, the calculated sample size was n = 262.

2.8. Sampling Method

Participants for this study were selected using a purposive sampling approach, targeting individuals who met the study criteria.

2.9. Data Collection Instrument

Data collection was carried out using a semi-structured questionnaire administered through face-to-face interviews. Prior to the main data collection, the questionnaire was pretested, and necessary adjustments were made to enhance clarity and relevance.

2.10. The questionnaire was divided into several sections:

- Section 1: Socio-demographic and economic information of the participants
- Section 2: Details related to delivery, such as:
  - Duration of pregnancy (in months)
  - Number of pregnancies experienced
  - Number of children born
  - Place of delivery
  - History of high-risk pregnancies
- Section 3: Awareness of danger signs occurring during pregnancy
- Section 4: Knowledge of danger signs during labor and childbirth
- Section 5: Understanding of danger signs following childbirth

2.11. Data Collection Procedure

Face-to-face interviews were conducted with participants until the required sample size was achieved.

2.12. Data Analysis Plan

Once data collection was completed, the responses were carefully checked and manually edited to ensure accuracy before coding and entry into the SPSS software (version 25) for analysis.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the participants' characteristics. Knowledge levels were classified as either good or poor. Participants were considered to have good knowledge if they could identify at least three danger signs during pregnancy, two during labor, and two after delivery [22]. Relationships between categorical variables were analyzed using the Chi-square test, with a significance level set at $p < 0.05$.

2.13. Ethical Considerations

The study was conducted in accordance with ethical standards to protect participants' rights. All collected data were used solely for research purposes and maintained confidential within the research team.

Ethical clearance was obtained from the Ethical Committee of Hamdard University Bangladesh. Informed consent was secured from all participants prior to data collection. Participants were assured of confidentiality and were informed of their right to decline participation or withdraw at any point without any consequences.

Each interview was conducted privately to ensure confidentiality, and participants' anonymity was preserved. The findings of this research were intended to provide evidence-based recommendations to improve maternal health interventions.

3. Results

Table 1 Socio-demographic and lifestyle characteristics

Variable	Category	Frequency(f)	Percentage %)	Mean ± SD
Age (in years)	19–23	160	61.1	23.37 ± 4.47
	24–28	64	24.4	
	29–33	26	9.9	
	>33	12	4.6	
	Total	262	100.0	

Religion	Islam	256	97.7	
	Hindu	6	2.3	
	Total	262	100.0	
Educational Status	Illiterate	18	6.9	
(of respondents)	Up to primary	60	22.9	
	Up to secondary	132	50.4	
	Higher secondary and above	52	19.8	
	Total	262	100.0	
Educational Status	Illiterate	26	9.9	
(of husbands)	Up to primary	62	23.7	
	Up to secondary	95	36.3	
	Higher secondary and above	79	30.2	
	Total	262	100.0	
Number of Family Members	Up to 4	171	65.3	
	5–6	66	25.2	
	>6	25	9.5	
	Total	262	100.0	
Monthly Family Income	Up to 10,000	154	58.8	13,832.06 ± 13,894.05
(in Bangladeshi Taka)	10,001–20,000	74	28.2	
	>20,000	34	13.0	
	Total	262	100.0	
Duration of Pregnancy	Second trimester	144	55.0	
	Third trimester	118	45.0	
	Total	262	100.0	
Number of Pregnancy	One	131	50.0	
	Two	86	32.8	
	Three	39	14.9	
	Four	6	2.3	
	Total	262	100.0	
Number of Children's Birth	One	74	64.9	
	Two	36	31.6	
	Three	4	3.5	
	Total	114	100.0	
Number of Living Children	One	74	67.9	
	Two	34	31.2	

	Three	1	0.9	
	Total	109	100.0	
Age of Youngest Child (years)	Up to 3	21	19.2	7.48 ± 3.64
	4–6	25	23.0	
	7–9	33	30.3	
	Above 9	30	27.5	
	Total	109	100.0	

This cross-sectional study assessed the socio-demographic and pregnancy-related characteristics of 262 pregnant women in Dhaka City, Bangladesh, to understand their knowledge of danger signs and symptoms during childbirth (Table1).

The majority of respondents (61.1%) were aged between 19 and 23 years, with an average age of 23.37 ± 4.47 years, indicating a relatively young population of pregnant women. Almost all participants identified as Muslim (97.7%), reflecting the predominant religion of the study area. Regarding education, half of the women (50.4%) had completed up to secondary education, while 19.8% had attained higher secondary education or above. The educational status of their husbands showed a similar pattern, with 36.3% having completed up to secondary school and 30.2% holding higher secondary or above qualifications. This educational background could influence the women's awareness and understanding of pregnancy-related health information.

Family structures predominantly consisted of smaller households, with 65.3% reporting up to four family members. Monthly family income varied, with a majority (58.8%) earning up to 10,000 takas, and an average income of approximately 13,832 takas (±13,894), indicating a low to middle socioeconomic status for most participants.

Regarding pregnancy characteristics, more than half of the women (55%) were in their second trimester, while 45% were in the third trimester, reflecting a balanced distribution across the later stages of pregnancy. Half of the women (50%) were experiencing their first pregnancy, and the majority had given birth to one or two children. The number of living children also reflected this trend, with 67.9% having one living child.

The age of the youngest child among those with previous births averaged 7.48 years (±3.64), with nearly one-third (30.3%) falling between 7 and 9 years old. This suggests that many respondents had children several years prior, which may influence their exposure to maternal health education.

In essence, the demographic and pregnancy profiles indicate a young, predominantly Muslim group of pregnant women with varied but generally moderate educational attainment and low to middle-income status. These factors are crucial for tailoring educational interventions aimed at improving awareness and knowledge of danger signs during childbirth, ultimately contributing to better maternal and neonatal outcomes in Dhaka City.
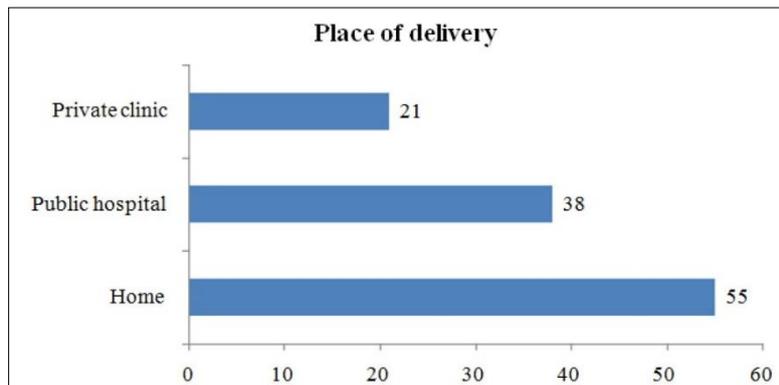

Figure 1 Distribution of the respondents according to place of delivery of the last child (n=114)

Table 2 Association between socio-demographic status and level of knowledge regarding danger signs during pregnancy

Socio-demographic Status	Category	Poor f (%)	Good f (%)	χ^2	df	p
Age (in years)	19-23	119 (69.2)	41 (45.6)	19.855	3	0.0001
	24-28	31 (18.0)	33 (36.7)			
	29-33	12 (7.0)	14 (15.6)			
	>33	10 (5.8)	2 (2.2)			
Educational status of respondent	Illiterate	13 (7.6)	5 (5.6)	5.837	3	0.0120
	Up to primary	43 (25.0)	17 (18.9)			
	Up to secondary	89 (51.7)	43 (47.8)			
	Higher secondary and above	27 (15.7)	25 (27.8)			
Educational status of husband	Illiterate	18 (10.5)	8 (8.9)	8.039	3	0.045
	Up to primary	43 (25.0)	19 (21.1)			
	Up to secondary	69 (40.1)	26 (28.9)			
	Higher secondary and above	42 (24.4)	37 (41.1)			
Type of family	Nuclear	81 (47.1)	39 (43.3)	0.0336	1	0.562
	Joint	91 (52.9)	51 (56.7)			
Monthly family income (in taka)	Up to 10000	102 (59.3)	52 (57.8)	0.847	2	0.655
	10001-20000	50 (29.1)	24 (26.7)			
	>20000	20 (11.6)	14 (15.6)			
Religion	Islam	167 (97.1)	89 (98.9)	0.852	1	0.356
	Hinduism	5 (2.9)	1 (1.1)			
Residence	Urban	72 (41.9)	37 (41.1)	0.145	1	0.907
	Rural	100(58.1)	53 (58.9)			

Figure 1 shows that almost half of the respondents 48.2% (n=55) delivered their child at home. Others delivered their child in public hospitals 33.3 % (n=38) and private clinics 18.4% (n=21).

Table 3 Association between socio-demographic status and level of knowledge regarding danger signs during child birth

Socio-demographic Status	Category	Poor f (%)	Good f (%)	χ^2	df	p
Age (in years)	19-23	117 (65.0)	43 (52.4)	4.201	3	0.241
	24-28	38 (21.1)	26 (31.7)			
	29-33	17 (9.4)	9 (11.0)			
	>33	8 (4.4)	4 (4.9)			
Educational status of respondent	Illiterate	13 (7.2)	5 (6.1)	1.586	3	0.663
	Up to primary	43 (23.9)	17 (20.7)			
	Up to secondary	86 (47.8)	46 (56.1)			
	Higher secondary and above	38 (21.1)	14 (17.1)			

Educational status of husband	Illiterate	20 (11.1)	6 (7.3)	4.031	3	0.258
	Up to primary	46 (25.6)	16 (19.5)			
	Up to secondary	66 (36.7)	29 (35.4)			
	Higher secondary and above	48 (26.7)	31 (37.8)			
Type of family	Nuclear	83 (46.1)	37 (45.1)	0.022	1	0.882
	Joint	97 (53.9)	45 (54.9)			
Monthly family income (in taka)	Up to 10000	112 (62.2)	42 (51.2)	3.210	1	0.201
	10001-20000	48 (26.7)	26 (31.7)			
	>20000	20 (11.1)	14 (17.1)			
Religion	Islam	177 (98.3)	79 (96.3)	0.999	1	0.318
	Hinduism	3 (1.7)	3 (3.7)			
Residence	Urban	76 (42.2)	33 (40.2)	0.091	1	0.763
	Rural	104 (57.8)	49 (59.8)			

The analysis revealed a significant association between age and the level of knowledge regarding danger signs during pregnancy (χ^2 = 19.855, df = 3, p = 0.0001). Women aged 19–23 years had the highest proportion of poor knowledge (69.2%), while the proportion of good knowledge was more common in older age groups, particularly those aged 24–28 (36.7%) and 29–33 (15.6%). This suggests that younger women tend to have lower awareness of danger signs during pregnancy compared to older women (Table 2).

There was also a statistically significant association between the educational status of the respondents and their level of knowledge (χ^2 = 5.837, df = 3, p = 0.0120). Women with higher secondary education and above had a greater proportion of good knowledge (27.8%) compared to those who were illiterate (5.6%) or had only primary education (18.9%). This indicates that a higher level of maternal education is positively associated with awareness of pregnancy-related danger signs.

Similarly, the educational status of the husband showed a significant relationship with the respondent's level of knowledge (χ^2 = 8.039, df = 3, p = 0.045). Women whose husbands had higher secondary education and above had the highest proportion of good knowledge (41.1%), suggesting that the husband's education level may also play a role in influencing maternal awareness.

In contrast, no statistically significant associations were found between level of knowledge and other socio-demographic factors including type of family (χ^2 = 0.0336, df = 1, p = 0.562), monthly family income (χ^2 = 0.847, df = 2, p = 0.655), religion (χ^2 = 0.852, df = 1, p = 0.356), and residence (χ^2 = 0.145, df = 1, p = 0.907). This indicates that these variables did not significantly influence the level of knowledge regarding danger signs during pregnancy among the respondents in this study.

The analysis of the association between socio-demographic characteristics and the level of knowledge regarding danger signs during childbirth revealed that none of the variables showed statistically significant associations, as all p-values were above the conventional significance threshold of 0.05 (Table 3).

Specifically, age did not have a significant relationship with knowledge level (χ^2 = 4.201, df = 3, p = 0.241). Although a higher proportion of good knowledge was observed among women aged 24–28 (31.7%) compared to younger and older groups, the differences were not statistically meaningful.

Similarly, the educational status of the respondents was not significantly associated with knowledge (χ^2 = 1.586, df = 3, p = 0.663). The percentage of good knowledge was highest among those with up to secondary education (56.1%), but this trend did not reach statistical significance.

The educational level of the husband also did not show a significant association (χ^2 = 4.031, df = 3, p = 0.258), even though women whose husbands had higher secondary education and above had a slightly higher proportion of good knowledge (37.8%).

With regard to family type, the knowledge level did not vary significantly between nuclear and joint families (χ^2 = 0.022, df = 1, p = 0.882), indicating that family structure had no effect on awareness.

Monthly family income also showed no significant influence on the level of knowledge (χ^2 = 3.210, df = 1, p = 0.201). While women from higher-income families (>20,000 taka) had slightly higher levels of good knowledge (17.1%), this difference was not statistically meaningful.

No significant relationship was found between religion and knowledge (χ^2 = 0.999, df = 1, p = 0.318), even though Hindu women had a slightly higher proportion of good knowledge (3.7%) than expected relative to their population size.

Lastly, place of residence (urban vs. rural) also did not significantly affect the level of knowledge (χ^2 = 0.091, df = 1, p = 0.763), with rural and urban respondents showing very similar levels of awareness.

Table 4 Association between socio-demographic status and level of knowledge regarding danger signs after child birth

Socio-demographic Status	Category	Poor f (%)	Good f (%)	χ^2	df	p
Age (in years)	19-23	148 (69.0)	12 (37.5)	9.484	3	0.024
	24-28	53 (23.0)	11 (34.4)			
	29-33	20 (8.7)	6 (18.8)			
	>33	9 (3.9)	3 (9.4)			
Educational status of respondent	Illiterate	13 (5.7)	5 (15.6)	5.865	3	0.118
	Up to primary	56 (24.3)	4 (12.5)			
	Up to secondary	116 (50.4)	16 (50.0)			
	Higher secondary and above	45 (19.6)	7 (21.9)			
Educational status of husband	Illiterate	24 (10.4)	2 (6.3)	2.263	3	0.520
	Up to primary	52 (22.6)	10 (31.2)			
	Up to secondary	86 (37.4)	9 (28.1)			
	Higher secondary and above	68 (29.6)	11 (34.4)			
Type of family	Nuclear	102 (44.3)	18 (56.2)	1.603	1	0.205
	Joint	128 (55.7)	14 (43.8)			
Monthly family income (in taka)	Up to 10000	135 (58.7)	19 (59.4)	1.758	2	0.415
	10001-20000	63 (27.4)	11 (34.4)			
	>20000	32 (13.9)	2 (6.2)			
Religion	Islam	225 (97.8)	31 (96.9)	0.114	1	0.736
	Hinduism	5 (2.2)	1 (3.1)			
Residence	Urban	94 (40.9)	15 (46.9)	0.417	1	0.518
	Rural	136 (59.1)	17 (53.1)			

The findings indicate that age was significantly associated with the level of knowledge regarding danger signs after childbirth (χ^2 = 9.484, df = 3, p = 0.024). Specifically, women aged 19–23 years had the highest percentage of poor knowledge (69.0%), while women in older age groups such as 24–28 and 29–33 demonstrated better knowledge proportions (34.4% and 18.8%, respectively). This suggests that younger women, especially those in the youngest age group, were less likely to recognize danger signs after delivery, highlighting the need for age-targeted health education(Table 4).

In contrast, no statistically significant association was found between the educational status of the respondent and knowledge level (χ^2 = 5.865, df = 3, p = 0.118), though women with higher education (secondary and above) tended to

report better knowledge. For instance, those with higher secondary education and above had slightly better knowledge (21.9%) than those who were illiterate (15.6%) or had only primary education (12.5%), suggesting a possible trend without reaching statistical significance.

Similarly, the husband's educational status was not significantly associated with the respondents' knowledge (χ^2 = 2.263, df = 3, p = 0.520). Women whose husbands had higher secondary education and above had a modestly higher proportion of good knowledge (34.4%), but the variation across education levels did not yield a significant result.

There was no significant difference in knowledge based on family type (χ^2 = 1.603, df = 1, p = 0.205). Both nuclear and joint family settings had comparable distributions of knowledge, with slightly higher good knowledge among women in nuclear families (56.2%).

Monthly family income also did not significantly affect knowledge level (χ^2 = 1.758, df = 2, p = 0.415). While households with income between 10,001–20,000 taka had the highest proportion of good knowledge (34.4%), and the lowest was seen among households earning more than 20,000 taka (6.2%), the differences were not statistically meaningful.

Additionally, religion was not significantly related to knowledge level (χ^2 = 0.114, df = 1, p = 0.736). Both Muslim and Hindu women showed similar distributions of knowledge, though the small number of Hindu participants limits interpretation.

Lastly, residence (urban vs. rural) was also not significantly associated with knowledge (χ^2 = 0.417, df = 1, p = 0.518). Women in urban areas had a slightly higher proportion of good knowledge (46.9%) than those in rural areas (53.1%), but this difference was not statistically meaningful.

4. Discussion

Pregnancy is a physiological process, yet complications can arise unexpectedly, posing significant risks to maternal and neonatal health. Early recognition and timely management of obstetric danger signs are essential to reduce maternal morbidity and mortality. The present study was conducted to assess pregnant women's knowledge of danger signs during pregnancy, childbirth, and the postpartum period.

The findings revealed that the mean age of respondents was 23.37 ± 4.47 years, which aligns closely with a study conducted in southern India, where the mean age was 24.7 ± 3 years[22]. More than half (58.4%) of the participants were from rural areas, as the study was conducted in a tertiary hospital that serves both rural and urban populations. A similar pattern of rural representation was observed in the study in Southern Ethiopia[23].

Most respondents (54.2%) belonged to joint families, reflecting prevailing rural norms in Bangladesh, although the trend is gradually shifting towards nuclear families. Nithya et al. (2017) also reported a predominance of joint families among their study population[24]. Furthermore, 65.3% of the participants had a family size of up to four members, consistent with findings from Ethiopia, where 62% of respondents reported similar household sizes[25].

Participants were purposively selected based on having at least three months of gestation. As a result, 55% were in the second trimester and 45% in the third, with none in the first trimester. This differs from previous studies that included women from all trimesters [26,27].

Nearly half of the participants (48.2%) reported delivering their previous child at home, while 33.3% delivered in public hospitals and 18.4% in private facilities. This shows a better institutional delivery rate compared to the Bangladesh Demographic and Health Survey (BDHS, 2016), which reported 62% of births at home[28,29]. This difference may reflect the impact of ongoing maternal and child health interventions in the study area[28].

A quarter of the respondents (24.4%) had a history of high-risk pregnancies, including complications such as prolonged labor, pre-labor rupture of membranes, convulsions, hemorrhage, stillbirth, or retained placenta. All sought care from health facilities. Comparatively, Mwilike et al. (2018) in Tanzania reported a 17.4% prevalence of high-risk pregnancies[30].

Most respondents (88.9%) reported understanding at least one danger sign during pregnancy, similar to a study in Malaysia where 83.7% had some knowledge[30]. In terms of information sources, 61.5% learned from health workers

and 26% from family members, a trend echoed in Tangential (2015), where 68% cited health workers and 38.8% family[31].

In the current study, 56.2% recognized severe abdominal pain as a danger sign during pregnancy, which is close to the 60.7% reported by Nithya et al. (2017)[22]. Overall, one-third of respondents had good knowledge about pregnancy-related danger signs, a finding consistent with Hailu et al. (2010) in Ethiopia (30.4%). Other studies reported higher levels of good knowledge: 47.0% and 49.2% [22,32].

Regarding childbirth danger signs, the most commonly mentioned were ruptured membranes without labor onset (54.0%), heavy vaginal bleeding (32.9%), prolonged labor (27.3%), and retained placenta (18.6%). These findings are comparable with studies from Nepaland Ethiopia [33,34].

However, 68.7% of participants had poor knowledge regarding childbirth danger signs, and only 31.3% demonstrated good knowledge. This aligns with findings from India (27.2%) and Ethiopia (41.3%) [33,34].

Postpartum danger sign knowledge was particularly low—only 12.2% had good knowledge. This is consistent with global trends. Nithya et al. (2017) and Hailu et al. (2010) reported 21.2% and 37.7% respectively, indicating that knowledge in the postpartum domain is generally inadequate[33,34].

Statistical analysis revealed a significant association between age and knowledge of danger signs during pregnancy and after childbirth. This finding is consistent with studies by Teng et al. (2015), Ossai et al. (2015), and Hibstu and Siyoum (2017)[35–37]. Furthermore, the educational status of husbands was significantly associated with maternal knowledge (p = 0.045), a relationship also reported by Nithya et al. (2017)[22].

However, no significant association was found between the respondents' own educational level and their knowledge (p = 0.118), possibly because 93.1% of the study population was literate. In contrast, Nithya et al. (2017) found a strong link between education and knowledge, highlighting a contextual difference[22].

All participants in the current study stated that they would seek health facility care if they experienced danger signs. This could be influenced by the fact that the study was conducted in a tertiary hospital where participants were already engaged with maternal healthcare services.

Limitations of the study

This study has several limitations. Firstly, it employed a purposive sampling technique and was conducted in a single tertiary hospital, which may limit the generalizability of the findings to the wider population. Secondly, the reliance on self-reported data introduces the possibility of recall and social desirability biases, as respondents may have over- or under-reported their knowledge. Thirdly, the exclusion of women in the first trimester of pregnancy may have resulted in an incomplete understanding of knowledge levels across all stages of pregnancy. Lastly, the cross-sectional design of the study prevents the establishment of any causal relationships between socio-demographic factors and knowledge levels.

5. Conclusion

Adequate knowledge of danger signs during pregnancy, childbirth, and the postpartum period is essential for timely recognition of complications and seeking appropriate care, thereby reducing maternal morbidity and mortality. This cross-sectional study, conducted among 262 pregnant women, aimed to assess their awareness of obstetric danger signs. Approximately one-quarter of the participants reported a history of high-risk pregnancy. While nearly one-third demonstrated good knowledge of danger signs during pregnancy and childbirth, only a small proportion—around one-tenthhad good knowledge of danger signs after childbirth. A significant association was found between the respondents' age and their level of knowledge regarding danger signs during pregnancy and the postpartum period. These findings highlight the need for targeted health education and awareness programs to improve pregnant women's understanding of maternal danger signs, ultimately contributing to better maternal health outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

Noconflict-of-interestto be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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