Scientific Publications

Open Journal of Medical Sciences, 2026, 6, 6798
www.scipublications.com/journal/ojms
DOI: 10.31586/ojms.2026.6798

Article

Knowledge and Attitude Regarding the Prevention of Hypertension Among Pregnant Women Attending a Private Hospital in Bangladesh: A Cross-Sectional Study

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Abstract:

Background: Hypertensive disorders of pregnancy are a leading cause of maternal and perinatal morbidity and mortality, with a disproportionate burden in low- and middle-income settings such as Bangladesh. This study assessed knowledge and attitude regarding hypertension prevention among pregnant women at a private hospital in Dhaka and their association with socio-demographic characteristics. **Methods:** A descriptive cross-sectional study was conducted among 122 pregnant women attending antenatal care at Ashulia Women and Children Hospital, Dhaka, using systematic random sampling. Data were collected via face-to-face interviews using a pre-tested, bilingual, structured questionnaire (10-item knowledge and 10-item attitude scales; Cronbach's alpha 0.814 and 0.795). Scores were dichotomized as low (≤50%) or high (>50%). Chi-square tests examined associations with socio-demographic variables ($p<0.05$). **Results:** Overall, 50.8% of women had high knowledge and 60.7% had a favorable attitude toward hypertension prevention; 63.9% had a high combined perception score. Knowledge was significantly associated with age ($\chi^2=18.177$, $p<0.001$), highest among women aged 20-29 years. Attitude was significantly associated with number of children ($\chi^2=9.545$, $p=0.023$), most favorable among women with two children. Education and occupation showed no significant association with either. Gaps persisted around dietary intervention, organic foods, and bed rest, despite high perceived importance of prevention (81.1%) and social media influence (81.1%). **Conclusion:** Knowledge and attitude toward hypertension prevention were moderate to favorable, with age and family size as the key socio-demographic correlates. Age-specific and family-inclusive education, potentially via social media, may be more effective than broadly targeted interventions.

Keywords: Hypertension; Pregnancy; Knowledge; Attitude; Antenatal care; Cross-sectional study; Bangladesh

How to cite this paper:
Farheen, Z., Rani, R., Sharma, R., Abbas, A., Roy, M., Jannat, R., Faruk, M. O., & Rizwan, A. A. M. (2026). Knowledge and Attitude Regarding the Prevention of Hypertension Among Pregnant Women Attending a Private Hospital in Bangladesh: A Cross-Sectional Study. *Open Journal of Medical Sciences, 6*(1), 1-12.
DOI: 10.31586/ojms.2026.6798

Received: July 11, 2026
Revised: August 27, 2026
Accepted: September 7, 2026
Published: September 9, 2026

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Highlights

What is Known on the Topic

- Hypertensive disorders of pregnancy are a major contributor to maternal and perinatal morbidity and mortality worldwide, and Bangladesh carries a substantial

burden of both general adult hypertension and hypertension-related complications in pregnancy.

- Knowledge and attitude are recognized as key modifiable precursors of preventive behavior and timely care-seeking for hypertension, and knowledge-attitude-practice (KAP) gaps regarding maternal nutrition, blood pressure monitoring, and related conditions have repeatedly been documented among Bangladeshi women in rural, public-hospital, and refugee-camp settings.
- Socio-demographic factors such as age, education, occupation, and parity are commonly examined as correlates of health knowledge and attitude in this literature, but their relative importance appears to vary across settings and populations, and evidence specific to hypertension prevention among pregnant women attending private hospitals in Bangladesh has been limited.

What this Paper Adds

- This is among the first studies to specifically quantify knowledge and attitude regarding hypertension prevention, using a validated bilingual instrument, among pregnant women attending antenatal care at a private hospital in Dhaka, Bangladesh.
- It identifies maternal age and number of children, rather than education or occupation, as the socio-demographic factors significantly associated with knowledge and attitude, respectively, refining which factors should be prioritized when designing antenatal health education in this population.
- It pinpoints specific, actionable knowledge gaps around dietary intervention, organic foods, and bed rest that persist despite generally favorable overall attitudes and a strong self-reported influence of social media, pointing to concrete targets for future antenatal counselling and digital health education.

Key Findings

- Just over half of participants (50.8%) had high knowledge and 60.7% had a favorable attitude toward hypertension prevention, with 63.9% achieving a high combined perception score.
- Knowledge level was significantly associated with maternal age (χ^2=18.177, p<0.001), peaking among women aged 20-29 years, while attitude level was significantly associated with number of children (χ^2=9.545, p=0.023), most favorable among women with two children; neither education nor occupation was significantly associated with knowledge or attitude.
- Despite high perceived importance of prevention (81.1%) and strong social media influence (81.1%), fewer than half of women recognized the value of dietary intervention or organic foods, and only a third considered bed rest beneficial, highlighting specific, addressable gaps in preventive knowledge.

1. Introduction

Hypertension is one of the leading causes of death worldwide, responsible for an estimated 45% of deaths from heart disease and 51% of deaths from stroke globally [1]. Worldwide trends indicate that more than a quarter of the global adult population, approximately 972 million people, are hypertensive, with nearly three-quarters of them living in developing countries [2,3]. The global prevalence of hypertension is projected to continue rising, underscoring hypertension control as a public health priority, particularly for cardiovascular morbidity and mortality in low- and middle-income countries [3,4].

The burden is especially pronounced in the Asia-Pacific region, which accounts for approximately 65% of the world's population; in this region, hypertension prevalence ranges from 5% to 47% among men and 7% to 38% among women, figures comparable to those in Western developed countries [5]. In Bangladesh specifically, the prevalence of hypertension among adults is estimated at 26.4%, with a higher rate among women (28.4%)

than men (24.1%) [6], and cardiovascular disease attributable in part to hypertension remains a leading cause of death nationally [7]. This burden is compounded by a broader South Asian cardiometabolic paradox, in which populations of South Asian descent face disproportionately high cardiometabolic risk that traditional dietary protective factors, including fish consumption, may increasingly fail to offset amid regional shifts from capture fisheries toward aquaculture [8]

Hypertensive disorders of pregnancy, including gestational hypertension, pre-eclampsia, and eclampsia, are a distinct and significant contributor to maternal and perinatal morbidity and mortality, with global prevalence estimates ranging from 5% to 10% of pregnancies [9]. In Bangladesh, hypertensive disorders complicate a substantial proportion of pregnancies, and their prevention and early detection remain a persistent public health challenge [10]. Consequences of unmanaged hypertension in pregnancy include preterm birth, fetal growth restriction, and longer-term cardiovascular risk for both mother and child [11,12].

Adequate knowledge of the risk factors, warning signs, and preventive measures for hypertension empowers pregnant women to adopt healthy behaviors and seek timely care, both of which are essential for early detection and management of hypertensive disorders [9]. Conversely, gaps in knowledge and unfavorable attitudes have repeatedly been linked to suboptimal preventive practices and delayed care-seeking among pregnant women in low-resource settings [11]. Assessing knowledge and attitude is therefore a necessary first step toward designing effective preventive and educational interventions.

A growing body of Bangladeshi research has documented similar knowledge gaps among women across related maternal and cardiometabolic health domains, including knowledge of blood pressure monitoring in pregnancy in rural settings [13], antenatal nutrition knowledge among mothers attending secondary-level hospitals [14], and the interplay of socio-demographic characteristics and lifestyle factors in hypertension management among women more broadly [15]. These studies, together with earlier assessments of nutrition-related knowledge and attitude among pregnant women in Dhaka [16], suggest that knowledge-practice gaps persist across diverse healthcare settings in Bangladesh and that context-specific, facility-based data remain necessary to guide local intervention design. However, comparable evidence from private-hospital antenatal populations, where care-seeking patterns and socio-demographic profiles may differ from public or rural facilities, has been limited.

This study was therefore conducted at Ashulia Women and Children Hospital, Dhaka, to assess the knowledge and attitude regarding the prevention of hypertension among pregnant women attending antenatal care, and to examine the association of knowledge and attitude with socio-demographic characteristics. The specific objectives were to: (i) determine the level of knowledge about the prevention of hypertension among pregnant women; (ii) explore pregnant women's attitudes toward preventive measures for hypertension; (iii) identify socio-demographic factors associated with knowledge of hypertension prevention; and (iv) identify socio-demographic factors associated with attitude toward hypertension prevention.

2. Methods

2.1. Study design, setting, and period

A descriptive cross-sectional study was conducted at Ashulia Women and Children Hospital, a roughly 250-bed private facility in Dhaka, Bangladesh, established to serve the healthcare needs of underprivileged segments of the surrounding population. Data collection took place over six months, from April to September 2024.

2.2. Study population and sample size

The study population comprised pregnant women attending antenatal care (ANC) services at the study hospital. The required sample size was estimated using G*Power analysis, with an effect size of 0.3 and an error probability (α) of 0.05, yielding a minimum bivariate sample size of 122, which was achieved.

2.3. Sampling technique and eligibility criteria

A systematic random sampling technique was used to select participants from among women attending ANC services. Women were eligible if they were attending ANC at the study hospital, provided written informed consent, and could understand either English or Bangla. Women with pre-existing chronic hypertension or other chronic illnesses were excluded.

2.4. Instrument, validity, and reliability

Data were collected using a structured, interviewer-administered questionnaire comprising three sections: socio-demographic characteristics (age, education, occupation, and number of children); a 10-item knowledge scale addressing causes, risk factors, preventive measures, complications, and management of hypertension in pregnancy; and a 10-item attitude scale addressing perceived importance, perceived manageability, and specific preventive practices. Content validity was established through review by an expert panel, and reliability was assessed through pretesting; internal consistency (Cronbach's alpha) was 0.814 for the knowledge scale and 0.795 for the attitude scale, and test-retest assessment supported instrument stability. The questionnaire was translated from English to Bangla and back-translated to English by the expert panel to finalize the bilingual instrument.

2.5. Pilot testing and data collection

The questionnaire was pretested among 12 pregnant women at Shaheed Ahsanullah Master Hospital, Tongi, Dhaka, before the main study. Data for the main study were then collected through face-to-face interviews conducted by the research team.

2.6. Scoring and classification

Each correct response on the knowledge scale and each favorable response on the attitude scale was scored 1, with a maximum of 10 points on each scale. Participants scoring 6-10 (>50%) were classified as having high knowledge or a favorable attitude, and those scoring 0-5 (≤50%) were classified as having low knowledge or an unfavorable attitude. A combined perception score (knowledge plus attitude, range 0-20) was calculated for each participant and classified as high (11-20, >50%) or low (0-10, ≤50%) using the same threshold.

2.7. Statistical analysis

Data were analyzed using IBM SPSS Statistics version 29. Descriptive statistics (frequencies and percentages) were used to summarize socio-demographic characteristics, knowledge items, and attitude items. The chi-square test was used to examine associations between socio-demographic variables and knowledge and attitude levels; a p-value <0.05 was considered statistically significant.

2.8. Ethical considerations

The study protocol was reviewed and approved by the Institutional Review Board of Grameen Caledonian College of Nursing. Written informed consent was obtained from all participants prior to data collection, and confidentiality was maintained by anonymizing participant data.

3. Results

3.1. Socio-demographic characteristics

A total of 122 pregnant women completed the study. Most participants (66.4%) were aged 20-29 years, and 26.2% were aged 30-34 years, while 7.4% were aged 15-19 years. More than half (58.2%) had attained at least a bachelor's degree. Participants were fairly evenly distributed across occupational categories, with private employment (29.5%) and garment work (25.4%) the most common. Most women (82.8%) had two or more children (Table 1).

Table 1. Socio-demographic characteristics of participants (N=122).

Characteristic	n	%
Age (years)		
15-19	9	7.4
20-24	41	33.6
25-29	40	32.8
30-34	32	26.2
Educational level		
Secondary education	28	23.0
Higher secondary education	23	18.9
Bachelor's degree	40	32.8
Above graduation	31	25.4
Occupation		
Housewife	25	20.5
Garment worker	31	25.4
Private employment	36	29.5
Government job holder	30	24.6
Number of children		
1	21	17.2
2	50	41.0
3	27	22.1
More than 3	24	19.7

3.2. Knowledge regarding prevention of hypertension

High cholesterol levels (48.4%) and unhealthy eating habits (44.3%) were most frequently identified as causes of high blood pressure in pregnancy, while age above 40 years (63.1%) was the most frequently identified risk factor. A healthy diet and regular exercise (83.6%) were the most commonly recognized preventive measure, and prompt medical consultation with low-dose medication (77.9%) was the most commonly cited specific preventive step. Intrauterine growth retardation (74.6%) was the most frequently recognized complication of hypertension in pregnancy, and pre-eclampsia (52.5%) was

the most frequently recognized immediate complication. Controlling blood pressure with bed rest (52.5%) and increased antenatal visits with regular monitoring (67.2%) were the most frequently identified care and management approaches (Table 2). Overall, 62 participants (50.8%) demonstrated high knowledge and 60 (49.2%) demonstrated low knowledge regarding hypertension prevention.

Table 2. Most frequently selected response for each knowledge item (N=122). Full item-level response distributions across all four options per item are available from the corresponding author on request.

Knowledge item (most frequent response)	n	%
Common cause: high cholesterol levels	59	48.4
Risk factor: age more than 40 years	77	63.1
Preventive measure: healthy diet and regular exercise	102	83.6
Specific step: consult doctor, low-dose medication	95	77.9
Complication: intrauterine growth retardation	91	74.6
Immediate complication: pre-eclampsia	64	52.5
Impact on child health: fixed (preterm) birth	60	49.2
Care approach: control blood pressure and bed rest	64	52.5
Management: increased ANC visits and monitoring	82	67.2
Fluid balance: medication per diagnostic evaluation	86	70.5

3.3. Attitude toward prevention of hypertension

Most participants (81.1%) recognized the importance of preventing hypertension during pregnancy, and 72.1% believed it could be effectively managed and prevented. A similarly large proportion (81.1%) reported being encouraged by social media to adopt preventive measures. However, only 41.8% considered organic foods beneficial for pregnancy-induced hypertension, and only 47.5% were aware that dietary intervention could prevent gestational hypertension and pre-eclampsia. Awareness of the indicative blood pressure threshold for gestational hypertension (54.1%) and of the risks of low birth weight (45.9%) were similarly moderate, and only 33.6% believed complete bed rest was beneficial for prevention (Table 3). Overall, 74 participants (60.7%) demonstrated a favorable attitude and 48 (39.3%) demonstrated an unfavorable attitude toward hypertension prevention.

Table 3. Pregnant women's attitude toward prevention of hypertension (N=122). HTN = hypertension.

Attitude item	Yes n (%)	No n (%)
Importance of preventing hypertension in pregnancy	99 (81.1)	23 (18.9)
Hypertension can be effectively managed/prevented	88 (72.1)	34 (27.9)
Inspired by social media to take preventive measures	99 (81.1)	23 (18.9)
Information received is easy to understand/apply	72 (59.0)	50 (41.0)
Organic foods beneficial vs. conventional diet	51 (41.8)	72 (58.2)

Attitude item	Yes n (%)	No n (%)
Aware that dietary intervention can prevent gestational HTN/pre-eclampsia	58 (47.5)	64 (52.5)
Aware that multiple pregnancies affect blood pressure	74 (60.7)	48 (39.3)
Aware of indicative BP threshold for gestational HTN	66 (54.1)	56 (45.9)
Aware that low birth weight relates to maternal HTN complications	56 (45.9)	66 (54.1)
Believing complete bed rest is beneficial	41 (33.6)	81 (66.4)

3.4. Association between socio-demographic characteristics and knowledge

Knowledge level was significantly associated with maternal age (χ^2=18.177, p<0.001); women aged 20-24 and 25-29 years showed the highest proportions of high knowledge (24.6% and 14.8% of the total sample, respectively), whereas the youngest (15-19 years) and oldest (30-34 years) groups showed the lowest. No significant association was observed between knowledge level and educational level (χ^2=2.878, p=0.411), occupation (χ^2=2.722, p=0.437), or number of children (χ^2=5.006, p=0.171) (Table 4).

Table 4. Association between socio-demographic characteristics and knowledge level.

Variable	Low knowledge n (%)	High knowledge n (%)	χ^2	p-value
Age (years)			18.177	<0.001
15-19	3 (2.5)	6 (4.9)		
20-24	11 (9.0)	30 (24.6)		
25-29	22 (18.0)	18 (14.8)		
30-34	24 (19.7)	8 (6.6)		
Educational level			2.878	0.411
Secondary education	17 (13.9)	11 (9.0)		
Higher secondary education	11 (9.0)	12 (9.8)		
Bachelor's degree	20 (16.4)	20 (16.4)		
Above graduation	12 (9.8)	19 (15.6)		
Occupation			2.722	0.437
Housewife	12 (9.8)	13 (10.7)		
Garment worker	19 (15.6)	12 (9.8)		
Private employment	15 (12.3)	21 (17.2)		
Government job holder	14 (11.5)	16 (13.1)		
Number of children			5.006	0.171
1	7 (5.7)	14 (11.5)		
2	30 (24.6)	20 (16.4)		
3	13 (10.7)	14 (11.5)		
More than 3	10 (8.2)	14 (11.5)		

3.5. Association between socio-demographic characteristics and attitude

Attitude level was significantly associated with number of children (χ^2=9.545, p=0.023); women with two children showed the highest proportion of favorable attitude (31.1% of the total sample), compared with those with one child (9.8%), three children (11.5%), or more than three children (8.2%). No significant association was observed between attitude level and age (χ^2=0.843, p=0.839), educational level (χ^2=2.014, p=0.569), or occupation (χ^2=4.613, p=0.202) (Table 5).

Table 5. Association between socio-demographic characteristics and attitude level.

Variable	Low attitude n (%)	High attitude n (%)	χ^2	p-value
Age (years)			0.843	0.839
15-19	4 (3.3)	5 (4.1)		
20-24	18 (14.8)	23 (18.9)		
25-29	15 (12.3)	25 (20.5)		
30-34	11 (9.0)	21 (17.2)		
Educational level			2.014	0.569
Secondary education	13 (10.7)	15 (12.3)		
Higher secondary education	8 (6.6)	15 (12.3)		
Bachelor's degree	13 (10.7)	27 (22.1)		
Above graduation	14 (11.5)	17 (13.9)		
Occupation			4.613	0.202
Housewife	11 (9.0)	14 (11.5)		
Garment worker	9 (7.4)	22 (18.0)		
Private employment	12 (9.8)	24 (19.7)		
Government job holder	16 (13.1)	14 (11.5)		
Number of children			9.545	0.023
1	9 (7.4)	12 (9.8)		
2	12 (9.8)	38 (31.1)		
3	13 (10.7)	14 (11.5)		
More than 3	14 (11.5)	10 (8.2)		

3.6. Overall perception (combined knowledge and attitude)

When knowledge and attitude scores were combined into a single perception score, 78 participants (63.9%) had a high overall perception of hypertension prevention, while 44 (36.1%) had a low overall perception, indicating that most pregnant women in this sample held a broadly favorable combination of understanding and disposition toward hypertension prevention.

4. Discussion

This cross-sectional study found that pregnant women attending antenatal care at a private hospital in Dhaka had roughly evenly split knowledge (50.8% high) but a more favorable attitude (60.7% high) toward the prevention of hypertension, with nearly two-thirds achieving a high combined perception score. Maternal age was the only socio-demographic factor significantly associated with knowledge, while number of children was the only factor significantly associated with attitude.

The finding that knowledge peaked among women aged 20-29 years and was lowest among the youngest (15-19 years) and oldest (30-34 years) groups is consistent with other Bangladeshi studies examining socio-demographic correlates of hypertension-related knowledge and lifestyle behavior among women, which similarly point to age-patterned gaps in awareness [15]. Comparable age-related gradients in maternal knowledge have also been reported in antenatal nutrition knowledge assessments among Bangladeshi mothers attending secondary-level hospitals [14] and in rural blood pressure monitoring knowledge surveys [13], suggesting that very young and, in some settings, older pregnant women may need particular outreach. The absence of a significant association between education or occupation and either knowledge or attitude in this sample echoes broader observations from the region that awareness, treatment, and control of hypertension do not always track cleanly with educational attainment [5] and reinforces the value of demographically tailored rather than uniformly delivered health education.

The significant association between number of children and attitude, with women with two children showing the most favorable attitudes, plausibly reflects the influence of accumulated antenatal experience and family or peer support on health-related disposition. Related Bangladeshi evidence on the antenatal experiences of working pregnant women, including garment-sector employees who made up a quarter of the present sample, has documented how occupational and family circumstances shape maternal health-seeking behavior and support networks [17], which may help explain why family composition, rather than education or occupation alone, distinguished attitude levels in this study. The broader importance of family and social support networks for health-related attitudes in resource-limited Bangladeshi populations has also been demonstrated among older adults in Rohingya refugee camps, where perceived social support was closely linked to psychosocial wellbeing [18], underscoring family and community support as a recurring correlate of favorable health attitudes across diverse vulnerable groups in Bangladesh.

Despite generally favorable attitudes, specific gaps were evident: fewer than half of participants recognized the value of dietary intervention for gestational hypertension or of organic foods, and only a third considered bed rest beneficial. These findings parallel a wider pattern in Bangladeshi maternal nutrition research, in which dietary knowledge and practice among pregnant women are frequently found to lag behind general health awareness, including studies of dietary behavior and nutritional status among pregnant women [18], food security and dietary diversity in low-resource antenatal populations [19], and dietary behavior among pregnant and lactating women in hill-district settings [20].

This gap also resonates with an emerging framework proposing that unaddressed internal cues around eating, or "food noise", represent a missing piece in the broader treatment and prevention of obesity-related cardiometabolic conditions [21], suggesting that dietary counselling for hypertension prevention may need to extend beyond simple food lists to address the behavioral and cognitive dimensions of eating. Similar gaps in nutrition-related knowledge, service delivery, and food security have been documented among other vulnerable populations in Bangladesh, including livelihood-related food insecurity among Rohingya refugees [22] and challenges in the classification and service delivery of childhood malnutrition in the world's largest refugee camp [23], suggesting

that nutrition-specific counselling gaps are not unique to antenatal hypertension care but reflect a broader need for strengthened nutrition education and service delivery across resource-limited settings in Bangladesh. Together, these findings suggest that nutrition-specific counselling, rather than general hypertension education alone, may be needed to close this gap.

The strong self-reported influence of social media (81.1%) on preventive behavior is a notable finding with practical implications: it suggests that digital and social media channels could be leveraged as low-cost platforms for disseminating accurate, evidence-based information on hypertension prevention to pregnant women, provided that content is designed to counter the specific misconceptions identified here, such as those around dietary intervention and bed rest.

More broadly, this pattern of favorable general attitudes coexisting with gaps in specific domains of preventive knowledge mirrors findings from other Bangladeshi knowledge-attitude-practice surveys among women, including studies of knowledge regarding fast food and hypertension risk among young hypertensive patients [24], knowledge of myocardial infarction among nurses [25], and anemia knowledge among women attending tertiary hospitals [26]. Taken together, this body of Bangladeshi KAP research points to a recurring pattern in which general health awareness is not always matched by depth of condition-specific preventive knowledge, underscoring the ongoing need for structured, condition-specific health education across maternal and women's health services.

4.1. Implications for Practice

- Antenatal counselling on hypertension prevention should be age-stratified rather than delivered uniformly, with additional structured input for the youngest and oldest attendees, since knowledge tracked with maternal age rather than with education or occupation.
- Family-inclusive counselling, engaging husbands, mothers-in-law, and other family members, particularly for first-time mothers, may help build the favorable attitudes associated with accumulated family and parity-related support in this study.
- Routine counselling should explicitly correct the specific misconceptions identified here, around dietary intervention, organic foods, and bed rest, and could leverage social media and mobile-health platforms, given their strong self-reported influence on preventive behavior, to deliver accurate information at scale.

4.2. Limitations and Recommendations

- This was a single-center, cross-sectional study at a private hospital, which limits generalizability to other facility types or regions and precludes causal inference; self-reported data and dichotomized (low/high) scoring may also have introduced bias or obscured finer gradations of knowledge and attitude.
- Future work should develop and evaluate age-targeted, family-inclusive educational interventions, including mobile and social media-based materials, and incorporate explicit nutrition-specific counselling (dietary intervention, food choices, and the role of bed rest) into routine antenatal care.
- Multi-center and longitudinal studies across public and private facilities in Bangladesh, ideally using continuous scoring and qualitative approaches, are needed to confirm these associations and to test the effectiveness of targeted interventions on maternal knowledge, attitude, and outcomes.

5. Conclusion and Recommendations

Pregnant women attending antenatal care at this private hospital in Dhaka demonstrated moderate knowledge and generally favorable attitudes toward the prevention of hypertension, with clear gaps around dietary intervention, organic foods, and bed rest. Maternal age was significantly associated with knowledge, and number of children was significantly associated with attitude, while education and occupation showed no significant association with either. These findings support a shift away from broadly targeted educational or occupational interventions toward the age-specific, family-inclusive, and nutrition-focused counselling strategies outlined above, with social media as a potentially valuable delivery channel. Confirming these associations and testing such targeted interventions across multiple facilities and over time remains an important priority for future research.

Declarations

Ethics approval and consent to participate

The Institutional Review Board of Grameen Caledonian College of Nursing approved the study protocol. Written informed consent was obtained from all participants prior to enrolment.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

Funding

The study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' contributions

ZF and RR contributed equally to this work and share first authorship; both were responsible for conceptualization, methodology, investigation, formal analysis, and writing of the original draft. RS, AA, MR, RJ, MOF, and AAMR contributed to data collection, data curation, review and editing. All authors read and approved the final manuscript.

Acknowledgements

The authors thank the administration and antenatal care staff of Ashulia Women and Children Hospital, and all the pregnant women who participated in this study.

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