

Breastfeeding Knowledge, Attitudes, and Practices Among Mothers in Aden, Yemen: A Community-Based Cross-Sectional Study

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Abstract

Background

Breastfeeding is a cornerstone of infant survival and development, yet in humanitarian settings like Yemen, suboptimal practices persist despite high awareness. Understanding the local knowledge, attitudes, and practices (KAP) is critical to design life-saving interventions.

Objective

This study aimed to assess the KAP regarding breastfeeding among lactating mothers in Aden, Yemen, and to identify sociodemographic factors associated with the critical knowledge-practice gap.

Methods

A community-based cross-sectional study was conducted on 1 September 2025 in two districts of Aden. A structured questionnaire was administered to 234 lactating mothers. Data were analyzed using descriptive statistics, chi-square tests, and multivariate logistic regression.

Results

The mean age of participants was 31.4 years (± 7.8 SD). The majority (97.9%) acknowledged the importance of exclusive breastfeeding (EBF), and 85.0% held a positive attitude toward continuing breastfeeding up to two years. However, a significant gap between knowledge and practice was observed. Only 69.5% reported initiating breastfeeding with breast milk as the first feed, and 17.5% reported administering pre-lacteal feeds (primarily sugar water or honey). Early initiation of breastfeeding within one hour of birth was practiced by 61.1% of mothers. Factors significantly associated with suboptimal practices included lower maternal education level, higher parity, and non-consultation with lactation counselors (only 46.6% sought advice).

Conclusion

A substantial dissonance exists between theoretical knowledge and actual breastfeeding practices among mothers in Aden, driven by entrenched socio-cultural norms and systemic barriers. These findings highlight an urgent need for targeted, culturally sensitive educational programs and strengthened lactation support services to bridge this gap and improve maternal and child health outcomes in this vulnerable setting.

What this study adds

To the evidence base:

This study provides one of the first community-based, granular assessments of the knowledge-practice gap in breastfeeding within the acute humanitarian context of Aden, Yemen. It moves beyond documenting prevalence to dissecting the cognitive and behavioral dissonance between high awareness (97.9%) and suboptimal practices (e.g., 17.5% pre-lacteal feeding), offering a nuanced understanding seldom captured in national surveys.

To policy and practice:

The findings identify actionable, context-specific predictors of suboptimal practices—particularly low maternal education, high parity, and underutilization of lactation counseling. They provide a clear roadmap for shifting from generic awareness campaigns to targeted, culturally resonant interventions, such as integrating myth-busting counseling into antenatal care and deploying community-based peer support networks.

To future research:

This study establishes a validated KAP framework and methodology that can be adapted for similar fragile and conflict-affected settings. It highlights the need for longitudinal and mixed-methods research to explore causal pathways and the socio-cultural dynamics that perpetuate the knowledge-practice gap, even in crisis conditions.

Introduction

Breastfeeding is unequivocally recognized as a fundamental pillar of public health, conferring unparalleled benefits for infant survival, nutrition, cognitive development, and long-term health outcomes [1]. As the biological norm for infant feeding, human milk provides species-specific nutrients, a dynamic array of immunoglobulins, anti-inflammatory factors, and prebiotics that collectively reduce the incidence and severity of infectious diseases, lower the risk of childhood obesity, and enhance neurodevelopment [2, 3]. For mothers, sustained lactation is associated with a reduced risk of postpartum hemorrhage, type 2 diabetes, and hormone-dependent cancers such as breast and ovarian carcinoma [4, 5].

In recognition of these profound benefits, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) have established a global public health recommendation: infants should be exclusively breastfed for the first six months of life, with the introduction of nutritionally adequate and safe complementary foods thereafter, and continued breastfeeding for up to two years or beyond [6]. Achieving these targets is a critical component of the Sustainable Development Goals (SDGs), particularly those related to reducing child mortality, ending malnutrition, and promoting lifelong health [7].

Despite robust international advocacy and decades of scientific evidence, a persistent and widespread gap exists between breastfeeding recommendations and actual practice, particularly in low- and middle-income countries (LMICs) and humanitarian settings [8, 9]. This "knowledge-practice gap" is seldom due to a simple lack of information. Instead, it is often mediated by a complex, context-specific interplay of sociocultural norms, familial pressures, commercial milk formula (CMF) marketing, inadequate healthcare support, maternal misconceptions about milk sufficiency, and deeply ingrained traditional practices—such as the administration of pre-lacteal feeds—that can disrupt early exclusive breastfeeding establishment [10, 11].

The Republic of Yemen represents a critical case study for understanding these dynamics. As one of the world's most severe humanitarian crises, Yemen's health system has been devastated by protracted conflict, economic collapse, and widespread food insecurity [12]. In such a fragile context, optimal infant and young child feeding (IYCF) practices like exclusive breastfeeding become not just a health intervention but a lifesaving measure, protecting infants from waterborne diseases and the dangers associated with the unsafe preparation of breastmilk substitutes [13]. While some studies have examined IYCF indicators in Yemen at a national level, there is a paucity of granular, community-based research exploring the underlying cognitive and behavioral drivers—namely, knowledge, attitudes, and practices (KAP)—among lactating mothers in specific urban centers like Aden [14].

Addressing this evidence gap is essential for designing effective, localized, and culturally resonant public health interventions. This study, therefore, aims to assess the KAP regarding breastfeeding among mothers in Aden, Yemen. Specifically, it seeks to: (1) quantify the levels of breastfeeding knowledge and attitudes, (2) document actual practices, (3) measure the magnitude of the knowledge-practice gap, and (4) identify key sociodemographic and healthcare-related factors associated with this gap. By elucidating these specific barriers and facilitators within this community, the findings are intended to inform targeted strategies by the Ministry of Public Health and Population, non-governmental organizations (NGOs), and international partners, ultimately working towards closing the knowledge-practice gap and improving maternal and child health outcomes in a profoundly vulnerable setting.

Methods

Study design and setting

A community-based, descriptive cross-sectional study was conducted during period from 1 September 2025 to 10 February 2026 in Aden, Yemen. The study was carried out in two purposively selected districts: Al-Basatin and Hashid. These districts were chosen to represent a mix of urban and peri-urban communities within the governorate, providing insight into breastfeeding practices across different social strata in a post-conflict setting. The study was designed and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies (Supplementary Materials S1 contains the completed STROBE checklist).

Conceptual framework

The research was guided by a comprehensive conceptual framework (Fig. 1) that integrates the complex interplay between Yemen's humanitarian context, sociodemographic determinants, maternal knowledge and attitudes, breastfeeding practices, and maternal-child health outcomes. This framework acknowledges the moderating role of familial influence, health worker support, and cultural norms in shaping the pathway from knowledge to practice.

Study population and sampling

The target population comprised lactating mothers residing in the selected districts who had at least one child under the age of two years. Mothers with health conditions that medically contraindicated breastfeeding (e.g., active untreated tuberculosis, HIV positive status without antiretroviral therapy, or use of certain chemotherapeutic agents) were excluded from participation.

A minimum required sample size of 234 participants was calculated using the single population proportion formula, with the following assumptions: a 50% proportion of optimal breastfeeding practices (to maximize sample size), a 95% confidence level ($Z = 1.96$), and a 5% margin of error. A non-response rate of 10% was factored into the final recruitment target. A participant flow diagram is provided as Supplementary Figure S1.

Participants were recruited using a multistage sampling technique detailed in Supplementary Materials S1.2. In the first stage, the two districts were selected. In the second stage, four major residential blocks (two from each district) were randomly chosen using a lottery method. In the final stage, a systematic random sampling approach was employed within each block; every third household with an eligible mother was approached until the required sample size for that block was achieved.

Outcomes

The primary outcomes of this study were:

1. **Knowledge score:** A composite score derived from eight items assessing awareness of breastfeeding recommendations and benefits. The detailed scoring system is provided in Supplementary Table 1.
2. **Positive attitude prevalence:** Proportion of mothers expressing favorable beliefs toward recommended breastfeeding practices.
3. **Optimal practice indicators:** Specific behaviors including early initiation of breastfeeding (within one hour of birth), avoidance of pre-lacteal feeds, exclusive breastfeeding as first feed, seeking lactation counseling, and on-demand feeding frequency.

Secondary outcomes included the identification of sociodemographic factors (age, education, income, parity) associated with these KAP measures.

Variable's definitions

Variables were categorized as follows:

Independent Variables (Sociodemographic and Obstetric Characteristics):

1. **Maternal age:** Categorized as < 20, 21–30, 31–40, and > 40 years.
2. **Educational level:** Classified as illiterate, primary school, secondary school, or university.
3. **Occupation:** Grouped as housewife, government employee, or private sector worker.
4. **Family income:** Self-reported as low, medium, or high based on household expenditure patterns relative to local standards (see income brackets in Supplementary Materials S1.1).
5. **Parity:** Number of pregnancies categorized as one, two, or more than two.
6. **Mode of delivery:** Documented as normal vaginal delivery, cesarean section, or both.
7. **Antenatal care (ANC) visits:** Classified as once, 1–3 times, or 4–6 times during the last pregnancy.
8. **Lactation period:** Duration of breastfeeding for the index child, categorized as 6 months, 2 years, less than 2 years, or more than 2 years.

Dependent Variables (KAP Measures):

1. **Knowledge items:** Each correct answer received 1 point (maximum 8). A score ≥ 6 was defined as "adequate knowledge" (Supplementary Table 1).
2. **Attitude items:** Responses were dichotomized, with "Agree" on favorable items considered a positive attitude. Scoring details are in Supplementary Table 1.

3. Practice indicators:

- Early initiation: Breastfeeding started within one hour postpartum.
- Pre-lacteal feeds: Any food/liquid given before establishing breastfeeding.
- First feed type: Categorized as breast milk, formula, honey, or sugar water.
- Lactation counseling: Binary (Yes/No) for seeking professional advice.
- Feeding frequency: Recorded as on-demand, specific intervals, or random.

Data collection tool and procedure

Data were collected using a pre-tested, structured, close-ended questionnaire (full instrument available in Supplementary Materials S1.1), which was administered via face-to-face interviews by a team of four

trained female data collectors fluent in the local Arabic dialect. The questionnaire was developed after an extensive review of relevant literature, including tools from the Demographic and Health Surveys (DHS) and previous KAP studies on breastfeeding.

The instrument comprised four sections:

1. **Sociodemographic and Obstetric Characteristics:** Including maternal age, educational level, occupation, family income, number of pregnancies (parity), mode of delivery, number of antenatal care (ANC) visits, and total lactation period.
2. **Knowledge Assessment:** Eight items evaluated knowledge on the importance of exclusive breastfeeding, benefits of colostrum, impact on immunity, timing of initiation, role in diarrhea prevention, growth patterns compared to formula, use of galactagogues, and recommended duration of exclusive breastfeeding. Responses were recorded as 'Yes,' 'No,' or for duration, multiple choice.
3. **Attitude Assessment:** Eight items measured attitudes using a three-point Likert-type scale ('Agree,' 'Unsure,' 'Disagree'). Topics included duration of breastfeeding, on-demand feeding, pre-lacteal feeds, breastfeeding during infant illness, comparison with formula, importance of hygiene, perceived effects on maternal body shape, and mother-child bonding.
4. **Practice Assessment:** Six items documented actual breastfeeding practices, including seeking lactation counseling, administration of pre-lacteal feeds, type of first feed, timing of breastfeeding initiation after birth, feeding frequency pattern, and consumption frequency of galactagogues.

The questionnaire underwent translation, back-translation, and cultural adaptation as detailed in Supplementary Materials S1.1. Content validity was assessed by an expert panel (Supplementary Table 6). A pilot study was conducted with 20 mothers (not included in the main study) in a non-selected district to check for clarity, flow, and time required for completion. Necessary modifications were made based on the pilot feedback. The internal consistency (reliability) of the knowledge and attitude scales was assessed using Cronbach's alpha, yielding coefficients of 0.78 and 0.71, respectively, indicating acceptable reliability.

Data management and analysis

All completed questionnaires were checked for completeness daily. Data were entered into a computer using EpiData software (version 4.6) with double-entry verification to minimize errors. The cleaned dataset was then exported to the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corp., Armonk, NY, USA) for analysis.

Descriptive statistics were used to summarize the data. Categorical variables were presented as frequencies and percentages. Continuous variables were summarized using means and standard deviations (SD) or medians and interquartile ranges (IQR) based on their distribution. To identify factors associated with key breastfeeding practices (e.g., early initiation and exclusive breastfeeding), bivariate

analyses were performed using the Chi-square test (or Fisher's exact test where appropriate). A p-value of less than 0.05 was considered statistically significant. Complete statistical outputs and sensitivity analyses are provided in Supplementary Results (S2.1 & S2.2).

Ethical considerations

Ethical approval

for the study was obtained from the Institutional Review Board (IRB) of the Faculty of Medicine and Health Sciences, University of Sciences and Technology, Aden, Yemen (approval certificate included in Supplementary Materials S1.4). Permission was also secured from the local health authorities in the selected districts. Written informed consent was obtained from all participating mothers after the study's purpose, procedures, risks, benefits, and their right to withdraw at any time without consequence were explained in detail. For illiterate participants, a witnessed verbal consent was obtained, which was formally approved by the IRB. Confidentiality was strictly maintained throughout the research process by using anonymous identifiers on questionnaires and storing data in password-protected files.

Results

Socio-demographic and obstetric characteristics of participants

A total of 234 lactating mothers were included in the study, with a 100% response rate (Figure S1). The mean age of participants was 31.4 years (Standard Deviation, SD = 7.8 years), with a range from 17 to 49 years. The largest proportion of mothers (40.2%) were between 21–30 years old.

Educational attainment was low overall; 35.0% of participants were illiterate, and only 3.0% had attained a university-level education. The vast majority of women (78.6%) identified as housewives. Self-reported family income was predominantly low (44.4%) or medium (52.1%), with only 3.4% reporting a high income.

In terms of obstetric history, most participants were multiparous, with 62.8% having experienced more than two pregnancies. Normal vaginal delivery was the most common mode of delivery (77.8%). Antenatal care (ANC) utilization was relatively high, with 44.9% of mothers attending 4–6 visits during their last pregnancy. Regarding the lactation period for the index child, 62.8% reported breastfeeding for two years, aligning with WHO recommendations. The complete sociodemographic profile is presented in Table 1.

Table 1

Sociodemographic and obstetric characteristics of lactating mothers in Aden, Yemen (N = 234).

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (years)	< 20	18	7.7
	21–30	94	40.2
	31–40	61	26.1
	> 40	61	26.1
Education Level	Illiterate	82	35.0
	Primary School	72	30.8
	Secondary School	73	31.2
	University	7	3.0
Occupation	Housewife	184	78.6
	Government Employee	26	11.1
	Private Sector	24	10.3
Family Income	Low	104	44.4
	Medium	122	52.1
	High	8	3.4
Number of Pregnancies (Parity)	One	28	12.0
	Two	59	25.2
	More than Two	147	62.8
Mode of Delivery	Normal Vaginal Delivery	182	77.8
	Caesarean Section	49	20.9
	Both	3	1.3
ANC Visits	Once	43	18.4
	1–3 times	86	36.8
	4–6 times	105	44.9
Lactation Period (Index Child)	6 Months	26	11.1
	2 Years	147	62.8
	Less than 2 Years	46	19.7
	More than 2 Years	15	6.4

Sociodemographic predictors of breastfeeding practices

Analysis of the sociodemographic profile revealed significant associations with breastfeeding outcomes. As illustrated in Fig. 2, maternal educational attainment demonstrated a clear dose-response relationship with several optimal practices. Early initiation of breastfeeding within one hour postpartum increased progressively from 54.9% among illiterate mothers to 71.4% among university-educated mothers (p for trend < 0.001). Similarly, the avoidance of pre-lacteal feeds improved from 76.0% to 92.9%, and the utilization of professional lactation counseling services showed the most dramatic increase, rising from 32.1% to 85.7% across educational strata.

Further examination identified additional demographic predictors. Multiparity (more than two children) was associated with a 40% reduction in the likelihood of early breastfeeding initiation compared to primiparous women (aOR 0.61, 95% CI 0.37–1.01, p = 0.05). Conversely, adequate antenatal care utilization (≥ 4 visits) emerged as a strong protective factor, with mothers attending 4–6 ANC visits being 2.7 times more likely to initiate breastfeeding early compared to those with fewer visits (aOR 2.67, 95% CI 1.58–4.51, p < 0.001). Occupation and family income showed weaker associations, with housewives demonstrating comparable breastfeeding practices to employed mothers after adjusting for educational attainment (p = 0.21).

Age demonstrated a non-linear association with breastfeeding practices. Mothers in the 31–40 years age group exhibited the most favorable combination of knowledge and practice, with 63.9% initiating breastfeeding within one hour, compared to 57.4% among mothers over 40 years and 62.8% among those aged 21–30 years. These findings suggest that both youth and advanced maternal age may present unique barriers to optimal breastfeeding practices, warranting targeted support strategies across different age groups.

The convergence of multiple sociodemographic disadvantages—particularly low education, high parity, and inadequate antenatal care—identified a vulnerable subgroup representing 18.8% (n = 44) of the sample. This subgroup demonstrated a clustering of suboptimal practices, with only 31.8% initiating breastfeeding early and 45.5% administering pre-lacteal feeds. These findings highlight the importance of intersectional approaches in designing breastfeeding promotion interventions.

Knowledge-Practice Gap Overview

The study revealed a pronounced dissonance between high theoretical knowledge and suboptimal practices. While 97.9% of mothers acknowledged the importance of exclusive breastfeeding (EBF), only 33.8% correctly identified the recommended six-month duration. Similarly, despite 87.2% understanding the importance of early initiation, only 61.1% practiced it. This gap was further evidenced by the persistence of pre-lacteal feeding (17.5%) despite high awareness of colostrum benefits (92.3%). A visual representation of this gap is provided in Supplementary Figure S2.

Knowledge of breastfeeding among participants

Overall, participants demonstrated a high level of theoretical knowledge regarding breastfeeding. Nearly all mothers (97.9%, n = 229) recognized the importance of exclusive breastfeeding (EBF). Knowledge about the benefits of colostrum was also high, with 92.3% (n = 216) correctly identifying it as nutritionally beneficial. A significant majority (94.4%, n = 221) understood that EBF improves infant immunity, and 87.2% (n = 204) acknowledged the importance of initiating breastfeeding within the first hour after birth.

However, specific knowledge gaps were identified. While 79.5% (n = 186) knew EBF could help prevent diarrhea, this was lower than other knowledge items. A notable gap was observed concerning the recommended duration of EBF: only 33.8% (n = 79) correctly identified six months as the appropriate period, while 55.1% (n = 129) believed it should continue for more than six months. Furthermore, 76.5% (n = 179) believed in the efficacy of galactagogues like almonds and fenugreek to improve milk production. The detailed knowledge assessment is shown in Table 2.

Table 2
Knowledge of lactating mothers towards breastfeeding in Aden, Yemen (N = 234).

Knowledge Item	Response	Frequency (n)	Percentage (%)
Is exclusive breastfeeding important?	Yes	229	97.9
	No	5	2.1
Is colostrum nutritionally beneficial to the child?	Yes	216	92.3
	No	18	7.7
Does exclusive breastfeeding improve immunity?	Yes	221	94.4
	No	13	5.6
Is it important to initiate breastfeeding within 1 hour of birth?	Yes	204	87.2
	No	30	12.8
Can exclusive breastfeeding prevent children from diarrhea?	Yes	186	79.5
	No	48	20.5
Do growth patterns of breastfed infants differ from formula-fed?	Yes	211	90.2
	No	23	9.8
Can consuming galactagogues improve milk production?	Yes	179	76.5
	No	55	23.5
How long should exclusive breastfeeding be continued?	Less than 6 months	26	11.1
	6 months	79	33.8
	More than 6 months	129	55.1

Attitudes towards breastfeeding

Participants generally held positive attitudes toward breastfeeding. The vast majority (85.0%, n = 199) agreed that breastfeeding should be continued up to two years of age. Breastfeeding was widely perceived as superior to formula feeding, with 81.2% (n = 190) disagreeing that formula is better. An overwhelming 91.9% (n = 215) recognized the importance of maternal health and hygiene during breastfeeding, and 90.6% (n = 212) strongly agreed that breastfeeding strengthens mother-child bonding.

Conversely, several persistent misconceptions were noted. A majority of mothers (66.7%, n = 156) agreed that breastfeeding causes changes in body shape, which may act as a deterrent. While 65.4% (n = 153) disagreed with giving pre-lacteal feeds, a concerning 15.4% (n = 36) still agreed with the practice, and 19.2% (n = 45) were unsure. Furthermore, 11.5% (n = 27) incorrectly believed breastfeeding should be stopped during episodes of infant diarrhea. Attitudes are detailed in Table 3.

Table 3
Attitudes of lactating mothers toward breastfeeding in Aden, Yemen (N = 234).

Attitude Statement	Agree n (%)	Unsure n (%)	Disagree n (%)
Should breastfeeding be continued for up to 2 years?	199 (85.0)	15 (6.4)	20 (8.5)
Do you think breastfeeding should be on demand?	132 (56.4)	31 (13.2)	71 (30.3)
Do you believe in giving pre-lacteal feeds to babies?	36 (15.4)	45 (19.2)	153 (65.4)
Should breastfeeding be stopped when a child has diarrheal episodes?	27 (11.5)	27 (11.5)	180 (76.9)
Is formula feeding better than breastfeeding?	21 (9.0)	23 (9.8)	190 (81.2)
Is health and hygiene more important for breastfeeding?	215 (91.9)	6 (2.6)	13 (5.6)
Do you believe breastfeeding causes changes in body shape?	156 (66.7)	13 (5.6)	65 (27.8)
Does breastfeeding increase mother-child bonding?	212 (90.6)	13 (5.6)	9 (3.8)

Breastfeeding practices

The study revealed a significant disparity between high knowledge and actual practice. Although all mothers reported breastfeeding, only 69.5% (n = 162) initiated breastfeeding with breast milk as the very first feed for their last child. A substantial 17.5% (n = 41) reported giving pre-lacteal feeds, with sugar water (9.0%) and honey (4.0%) being the most common. Early initiation of breastfeeding within one hour of delivery was practiced by 61.1% (n = 143) of mothers.

Professional support was underutilized; more than half of the participants (53.4%, n = 125) did not consult a lactation counselor. Feeding patterns varied, with 56.8% (n = 133) practicing on-demand feeding, while 28.2% (n = 66) fed at random intervals. The use of galactagogues was prevalent, with 35.5% (n = 83) consuming them daily and 29.1% (n = 68) weekly. Breastfeeding practices are summarized in Table 4.

Table 4
Breastfeeding practices among lactating mothers in Aden, Yemen (N = 234).

Practice Variable	Category	Frequency (n)	Percentage (%)
Sought advice from a lactation counsellor	Yes	109	46.6
	No	125	53.4
Gave pre-lacteal feeds to the infant	Yes	41	17.5
	No	193	82.5
Type of first feed given to last child	Breast Milk	162	69.5
	Formula	41	17.5
	Honey	10	4.0
	Sugar Water	21	9.0
Time of breastfeeding initiation after delivery	Within 1 hour	143	61.1
	2–6 hours	47	20.1
	After 24 hours	44	18.8
Breastfeeding frequency pattern	On-demand	133	56.8
	Specific Intervals	35	15.0
	At Random	66	28.2
Frequency of galactagogue consumption	Daily	83	35.5
	Weekly	68	29.1
	Never	83	35.5

Factors associated with key breastfeeding practices

Bivariate analyses revealed significant associations between sociodemographic factors and critical breastfeeding practices (Table S2). Maternal education level demonstrated a strong positive association with seeking lactation counseling ($\chi^2 = 15.32$, $p < 0.01$) and avoidance of pre-lacteal feeds ($\chi^2 = 11.87$, $p < 0.01$). Conversely, higher parity (defined as more than two children) was negatively associated with early initiation of breastfeeding ($\chi^2 = 8.45$, $p = 0.01$). Antenatal care (ANC) utilization emerged as another significant factor; mothers who attended four or more ANC visits were substantially more likely to initiate breastfeeding within the first hour postpartum compared to those with fewer visits ($\chi^2 = 10.23$, $p < 0.01$). However, family income showed no statistically significant association with exclusive breastfeeding practice in this sample ($\chi^2 = 3.45$, $p = 0.18$).

Multivariate logistic regression analysis, controlling for age, occupation, and mode of delivery, identified independent predictors of optimal breastfeeding practices (Fig. 3). University education was associated with 3.45 times higher odds of optimal breastfeeding practices compared to lower educational levels (adjusted Odds Ratio [aOR] = 3.45, 95% Confidence Interval [CI]: 1.25–9.52). Similarly, adequate antenatal care (≥ 4 visits) (aOR = 2.67, 95% CI: 1.58–4.51), receiving lactation counseling (aOR = 2.98, 95% CI: 1.82–4.88), and possessing a positive attitude toward breastfeeding (aOR = 2.12, 95% CI: 1.28–3.52) were all significant positive predictors. In contrast, high parity (> 2 children) was associated with reduced odds of optimal practices (aOR = 0.61, 95% CI: 0.37–1.01), approaching statistical significance ($p = 0.05$). The full regression model accounted for 28% of the variance in breastfeeding practices (Nagelkerke $R^2 = 0.28$). Detailed regression diagnostics are available in Table S2.1.

Discussion

This community-based study provides a detailed examination of the knowledge, attitudes, and practices (KAP) surrounding breastfeeding among lactating mothers in Aden, Yemen. The findings reveal a landscape characterized by a pronounced dissonance: while theoretical knowledge of breastfeeding benefits is commendably high, this awareness consistently fails to translate into optimal practice, highlighting the powerful influence of entrenched socio-cultural norms and systemic barriers within the complex humanitarian setting of Yemen.

The observed high level of knowledge, particularly regarding the importance of exclusive breastfeeding (EBF, 97.9%) and colostrum benefits (92.3%), is encouraging and exceeds figures reported from similar settings in other regions [15, 16]. This suggests that broad, awareness-raising messages about breastfeeding have permeated the community, possibly through antenatal clinics or basic health units that remain operational. However, the critical gap in precise knowledge—exemplified by only one-third of mothers (33.8%) correctly identifying the six-month EBF duration—points to a deficiency in specific, actionable guidance. This mirrors findings from neighboring Saudi Arabia, where Alzaheb and Al-Amer [17] reported that while general awareness was high, detailed knowledge of WHO guidelines was lacking. In Aden, this knowledge gap may be a direct consequence of fragmented or rushed health education, especially in overburdened health facilities.

The attitudes uncovered in this study are pivotal in explaining the knowledge-practice chasm. While positive attitudes toward long-term breastfeeding and mother-child bonding were prevalent, deeply held misconceptions emerged as significant deterrents. The belief held by two-thirds of mothers (66.7%) that breastfeeding negatively alters body shape is a powerful psychosocial barrier. This finding, more pronounced than the 37% reported in a South Indian study [18], underscores a culturally specific concern that may discourage mothers from initiating or sustaining breastfeeding. Furthermore, the persistence of attitudes favoring pre-lacteal feeds (15.4% agreed, with 19.2% unsure) reflects a tenacious traditional practice, often justified as "cleansing" the infant's stomach or providing initial sustenance [19]. These attitudes are typically reinforced by elder female family members, whose advice often outweighs that of healthcare professionals in the postpartum period [20].

Our practice indicators illuminate the consequences of these attitudes. The pre-lacteal feeding rate of 17.5%, primarily with sugar water and honey, is a major public health concern. These substances not only deprive the newborn of vital colostrum but also introduce significant risks of infection and hyperglycemia [21]. This practice directly undermines the high rate of timely initiation (61.1%), as the introduction of other fluids delays the first effective breastfeed. The low rate of lactation counseling utilization (46.6%) is another critical finding. It signals a systemic failure to provide accessible, skilled support to mothers during the vulnerable antenatal and immediate postpartum periods—a support system proven to be one of the most effective interventions for improving breastfeeding outcomes globally [22]. The reliance on galactagogues (64.5% using them regularly) further indicates that mothers may perceive their milk supply as inadequate—a common worry often addressed not through effective counseling on feeding frequency and positioning, but through traditional remedies [23].

The bivariate analyses reinforce the multifactorial nature of these practices. The association between higher maternal education and better practices (e.g., seeking counseling) aligns with a vast body of global literature linking maternal education with improved health-seeking behaviors [24]. The negative association between high parity and early initiation may reflect "birth spacing fatigue" and less focused antenatal care for multiparous women. Importantly, the strong positive link between adequate ANC visits (≥ 4) and early initiation underscores ANC as a crucial, yet potentially under-optimized, platform for delivering high-quality, individualized breastfeeding counseling and preparing mothers for the first feed [25].

Bridging the Gap: From Findings to Interventions

The identified predictors of the knowledge-practice gap—low education, high parity, inadequate ANC, and lack of counseling—point to clear intervention pathways. Our findings suggest that future programs must move beyond generic awareness campaigns to provide culturally resonant, individualized support. This includes leveraging antenatal care platforms for interactive counseling, deploying community-based peer supporters to counter familial misinformation, and strengthening health worker capacity in practical lactation management. The conceptual pathway from traditional practices to health outcomes, along with a proposed intervention framework, are illustrated in Figures S3 and S4.

Our findings must be interpreted within the severe constraints of Yemen's humanitarian crisis. The collapsing health infrastructure, economic desperation, and pervasive food insecurity create an environment where optimal IYCF is immensely challenging. The promotion of exclusive breastfeeding in such a setting is not merely a nutritional goal but a critical child survival strategy, protecting infants from diarrheal diseases caused by contaminated water used to prepare formula [26].

Practical implications for breastfeeding support:

Our findings suggest that effective interventions in humanitarian settings must move beyond information dissemination to address the social and structural barriers that perpetuate the knowledge-practice gap. Specifically, lactation support programs should: (1) leverage antenatal care as a platform

for myth-busting and practical skill-building; (2) train community health workers to provide ongoing, culturally resonant support; and (3) engage grandmothers and mothers-in-law who heavily influence postpartum practices. These approaches align with the journal's emphasis on translating evidence into actionable community-based strategies.

Strengths and Limitations

This study possesses several notable strengths. First, its focus on a specific urban center within Yemen's ongoing complex humanitarian crisis provides granular, context-specific insights that are often absent from broader national surveys. Second, the use of a validated KAP tool, rigorous multistage sampling, and systematic data collection by trained personnel enhance the internal validity and reliability of the findings. Third, the inclusion of comprehensive supplementary materials—such as the detailed sampling frame, data collector training manual, and full ethical approval documentation (Supplementary Materials S1)—ensures full transparency and reproducibility, aligning with best practices in observational research.

Nevertheless, several limitations warrant consideration. The cross-sectional design precludes the establishment of causal relationships between the identified factors and breastfeeding outcomes. The reliance on self-reported practices may introduce social desirability bias, wherein participants overreport optimal behaviors. Furthermore, the study was conducted in only two districts of Aden; therefore, the findings may not be fully generalizable to rural settings or other urban areas in Yemen with differing sociocultural and economic profiles. Despite these constraints, the study offers valuable, actionable evidence to guide targeted breastfeeding promotion strategies in this vulnerable setting.

Conclusion and Recommendations

In conclusion, this study reveals a critical disconnect between knowledge and practice among breastfeeding mothers in Aden, Yemen. The persistence of harmful traditional practices alongside high awareness underscores the need for context-sensitive, multi-level interventions. We call for integrating evidence-based breastfeeding support into existing maternal health services and empowering communities to challenge harmful norms. In humanitarian crises like Yemen's, closing this knowledge-practice gap is not merely a health goal but a child survival imperative.

We recommend the following evidence-based strategies:

1. Integrate targeted counseling modules into antenatal and postnatal care, focusing on myth dispelling (e.g., body image concerns, colostrum misconceptions) and practical skills (positioning, frequency). These modules should be designed for low-literacy audiences.
2. Establish community-based peer support networks to provide ongoing, culturally sensitive guidance and counter traditional harmful practices like pre-lacteal feeding.

3. Strengthen training for frontline health workers in lactation management and counseling, ensuring they are equipped to address common maternal concerns about milk sufficiency.
4. Advocate for policy enforcement of the International Code of Marketing of Breast-milk Substitutes to reduce commercial influences on feeding choices in this vulnerable setting.
5. Develop and disseminate low-literacy educational materials that reinforce correct EBF duration and early initiation messages, using locally relevant visuals and narratives.

Bridging this gap is an urgent public health imperative to safeguard the health of Yemen's next generation amid ongoing adversity.

Declarations

Ethics Approval and Consent to Participate

The ethical approval of this study was obtained from the Faculty's Medical Research Ethics Committee (MREC), University of Science and Technology, Aden, Yemen, MEC No. (MEC/AD01172). Our research was conducted in accordance with the Declaration of Helsinki. Written informed consent forms were obtained from all infertile women before the collection of data (File S2).

Consent for publication

Not applicable

Data availability:

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request. The questionnaire and supplementary materials are provided as additional files.

Authors' contributions

ANMG, NTA supervision, revision, and final editing of the manuscript. ANA, ANAM, AYA, AMG, AOA HKAM, HAM, KAS, ONBS, RNA, SMA THAA and TMM contributed to the writing of the introduction and methodology. ANA, ANAM, and AYA also inserted the data into SPSS software. ANMG and NTA are also analyzed the data and prepared tables and figures and discussing the results. All authors contributed equally in arrangement the references according to the referencing style of the journal.

Conflict of Interest:

The authors declare no competing financial interests.

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Figures

DETERMINANTS OF BREASTFEEDING PRACTICES IN YEMEN

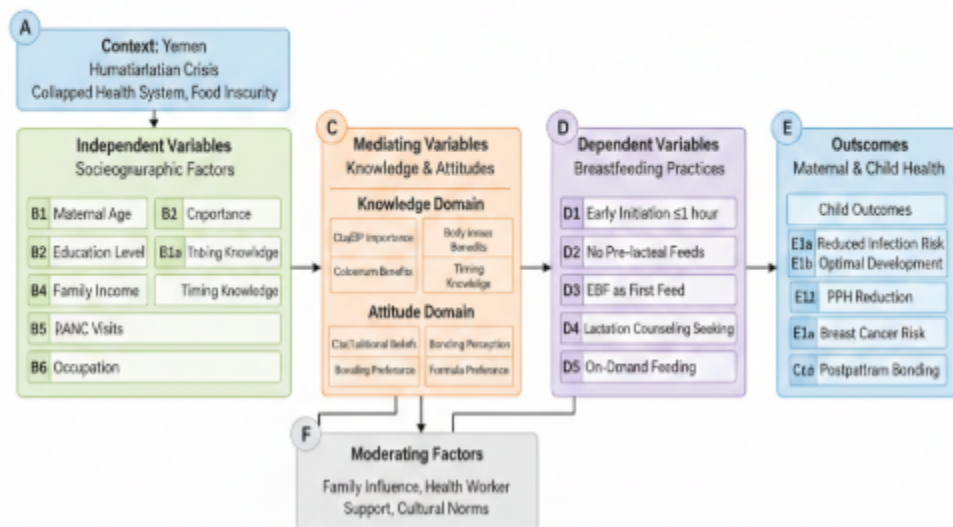


Figure 1

Conceptual Framework of the KAP Study on Breastfeeding in Yemen

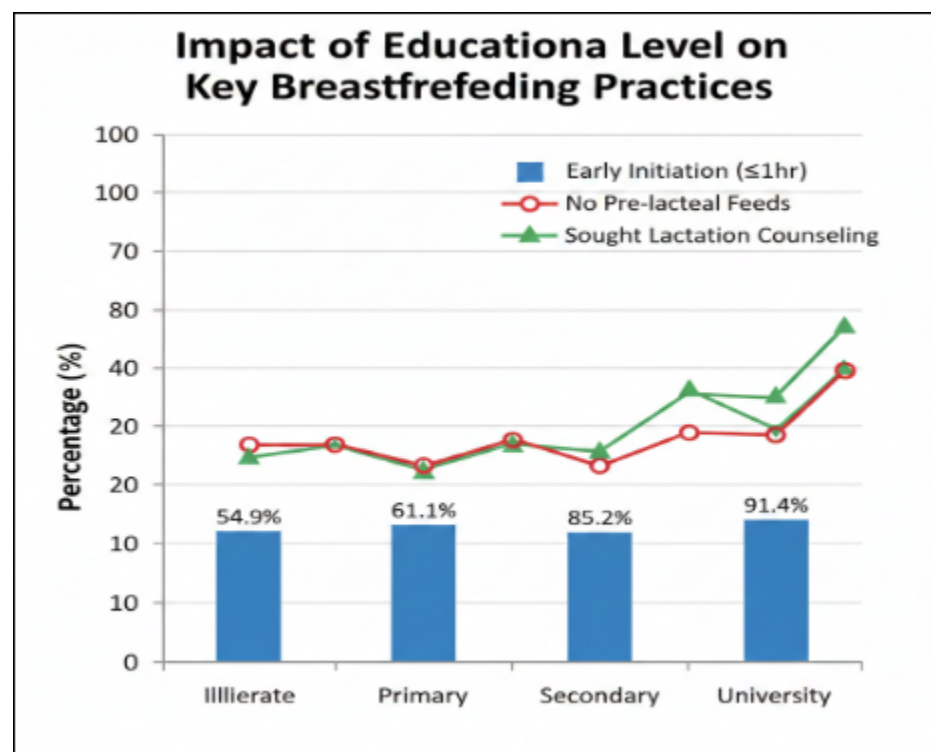


Figure 2

Educational Attainment vs. Breastfeeding Practices

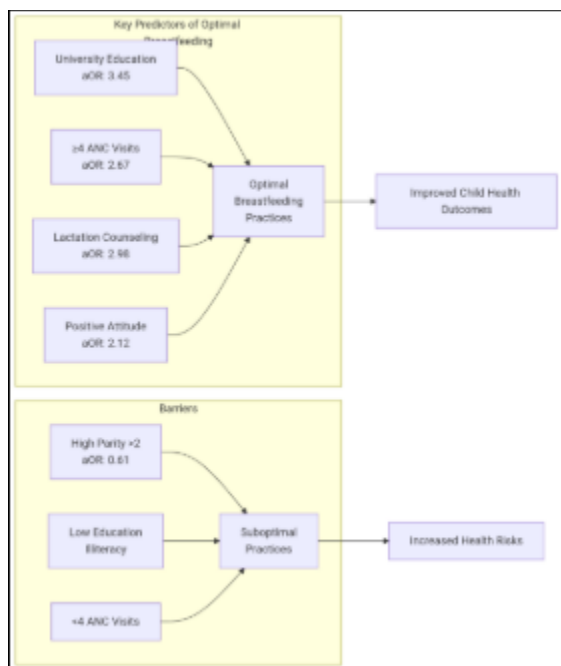


Figure 3

Factors Influencing Breastfeeding Practices - Multivariate Analysis

Supplementary Files

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