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Determinant of breastfeeding practice among mothers in Soran city: a cross-sectional study in 2024–2025

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Abstract

Background and objective: Breastfeeding practices are essential for child health and development, yet may be influenced by maternal demographics and feeding behaviors. This study aimed to assess the level of breastfeeding practice among mothers in Soran City and examine its association with sociodemographic characteristics.

Methods: This cross-sectional study was conducted from January 1st to April 12th, 2025, in five primary health care centers in Soran City, using Convenience sampling. The questionnaire included demographic information and a breastfeeding practice assessment tool. Breastfeeding practice levels were determined using a composite score based on type of feeding, duration, frequency, and use of supplementary feeding. Statistical analysis was performed using Stata version 12 (StataCorp LLC, College Station, TX). Chi-square and ordinal regression analyses were conducted to assess the associations between breastfeeding practice levels and demographic variables.

Results: A total of 400 mothers participated in the study. The mean breastfeeding practice score was 4.65 ± 2.21, indicating an overall moderate level of practice. The majority of mothers (373 out of 400; 93.3%) delivered in health facilities, and 328 mothers (82.0%) reported breastfeeding as the primary feeding method. Significant associations were found between breastfeeding practice levels and both socioeconomic status ($\chi^2 = 11.72$, $P = 0.02$) and household size ($\chi^2 = 11.64$, $P = 0.01$). However, ordinal regression analysis showed that no single demographic factor independently predicted breastfeeding practice levels, with all P-values exceeding 0.05 in the model.

Conclusion: The study demonstrated that mothers in Soran exhibited moderate levels of breastfeeding practice. Policymakers and healthcare providers should design targeted educational programs to promote optimal breastfeeding behaviors and address barriers related to socioeconomic and household conditions.

Keywords: Breastfeeding, Infant Nutrition, Maternal Health, Practice Levels, Public Health.

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Introduction

Breastfeeding is the natural process of feeding an infant with milk produced by the mother's mammary glands, providing optimal nutrition during the critical early stages of life (1). Despite its recognized importance, global breastfeeding rates remain concerning, with only 44% of infants worldwide being exclusively breastfed during their first six months (2). In the Middle East region, exclusive breastfeeding rates vary considerably, ranging from 20% to 58% across different countries (3, 4). The Kurdistan Region of Iraq reports particularly low rates between 17.5% and 35.8%, falling significantly short of international targets (5). Early cessation remains a major challenge, with approximately 60% of mothers discontinuing breastfeeding earlier than desired (6). These suboptimal rates are alarming given that proper breastfeeding practices could prevent an estimated 823,000 annual deaths in children under five years globally (7).

The composition of breast milk makes it uniquely suited for infant nutrition, containing essential proteins, fats, carbohydrates, vitamins, minerals, and bioactive compounds that cannot be replicated in artificial formulas (6, 8). Human milk adapts to meet the changing needs of growing infants, with its composition varying throughout lactation stages and even within single feeding sessions (9). Beyond its nutritional value, breast milk provides crucial immunological protection through antibodies, particularly immunoglobulin A (IgA), which coats the infant's intestinal lining and provides defense against pathogens (10). The presence of lactoferrin, lysozyme, and oligosaccharides further enhances the infant's immune system while promoting the development of beneficial gut microbiota (11).

The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) strongly advocate for exclusive breastfeeding during the first six months of life, followed by continued breastfeeding alongside appropriate complementary foods for up to two years or beyond (12). These recommendations stem from extensive evidence demonstrating the multifaceted benefits of breastfeeding for both infant health and maternal wellbeing. International health organizations emphasize that breastfeeding represents a critical public health intervention that contributes to achieving several Sustainable Development Goals (13). For infants, breastfeeding provides immediate protection against infectious diseases, particularly gastrointestinal and respiratory infections, which remain leading causes of infant morbidity and mortality in developing countries (14). Moreover, the protective effects extend beyond infancy, with breastfed children showing reduced risks of chronic

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conditions including obesity, type 2 diabetes, and allergic diseases (15).

Mothers also derive substantial health benefits from breastfeeding, including reduced risks of breast and ovarian cancers, improved postpartum recovery, and enhanced psychological wellbeing through the release of oxytocin and prolactin (16-18). The practice facilitates mother-infant bonding and provides natural child spacing through lactational amenorrhea (19). Despite these well-documented advantages, numerous barriers impede optimal breastfeeding practices, including maternal employment constraints, inadequate healthcare support, cultural misconceptions, and aggressive marketing of breast milk substitutes (20). Social and family support systems play crucial roles in breastfeeding success, with studies consistently showing that mothers with strong support networks maintain breastfeeding for longer durations (21, 22).

While extensive research has examined breastfeeding practices in various global contexts, there remains a notable gap in understanding the specific factors influencing breastfeeding behaviors in smaller urban centers within the Kurdistan Region, particularly in Soran district. The existing literature from Iraq predominantly focuses on major cities, leaving peripheral areas understudied despite their unique socioeconomic and cultural characteristics. This knowledge gap is significant as localized data is essential for developing targeted interventions that address community-specific barriers and leverage local facilitators of breastfeeding success. Understanding the current breastfeeding practices, knowledge levels, and influencing factors among mothers in Soran is crucial for healthcare planners and policymakers to design evidence-based strategies that can improve infant and maternal health outcomes in this region. Therefore, the present study aims to assess breastfeeding practices among mothers in Soran district, during the 2024-2025 period.

Research Questions: How do mothers in Soran City practice breastfeeding during the period 2024–2025?

Methods

Study Design, Setting, Period, and Sampling: This cross-sectional study was conducted from January 1st to April 12th, 2025, using a convenience sampling method. Data were collected from mothers attending five primary health care centers, in Soran City, Kurdistan Region, Iraq.

Sample Size: The sample size for this study was calculated using the infinite population formula, based on a 95% confidence level, a 5% margin of error, and an assumed population proportion of 50%, which yielded a recommended sample size of 385 participants. However, due to the availability of more

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data, an additional 15 participants were included, resulting in a final sample size of 400.

Inclusion/exclusion: The inclusion criteria for this study required participants to be mothers residing in Soran City who were attending primary health care centers during the data collection period and who had at least one child under the age of two. Mothers who refused to participate or were unable to complete the questionnaire due to health or personal reasons were excluded from the study.

Study Tools and Data Collection: The data collection tool used in this study was a structured questionnaire divided into two main parts. The first part focused on sociodemographic and background information, including the mother's age, educational level, occupation, socioeconomic status, number of household members, and number and gender of children. The second part assessed breastfeeding practices, with items related to the type and duration of feeding, frequency of breastfeeding, mode and place of delivery, and the use of supplementary feeding. The questionnaire was initially developed in English and then translated into Kurdish using the forward–backward translation method to ensure linguistic and conceptual equivalence. For content validity, the questionnaire was reviewed by 10 professors from various specialties, including community medicine, pediatrics, nursing, and public health. Data were collected through direct distribution of the questionnaire to eligible mothers at selected primary health care centers in Soran. Each participant was given approximately 10–15 minutes to complete the questionnaire, and assistance was provided when needed to clarify any questions.

Pilot Study: The study questionnaire regarding breastfeeding practices was pilot tested from September 1st to October 1st, 2024, to evaluate its clarity, internal consistency, and reliability prior to the main data collection. A total of 25 mothers participated in the pilot study. The internal consistency of the questionnaire items was assessed using Cronbach's alpha, which yielded a value of 0.91, indicating excellent reliability (23). It is important to note that the data collected during the pilot phase were excluded from the final analysis.

Measures

Sociodemographic Characteristics

The first section of the questionnaire collected detailed sociodemographic data from the participating mothers. This included age, educational level, occupation, socioeconomic status, household size, number of children, and the gender of the infant. These variables were selected to explore their potential associations with breastfeeding practices.

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Breastfeeding Practice Assessment Tool

The second section of the questionnaire was a structured, self-developed tool designed to assess breastfeeding practices among mothers. It included items on type of feeding (exclusive or non-exclusive breastfeeding), duration of breastfeeding, frequency per day, and the use of supplementary feeding. Breastfeeding practice levels were calculated using a composite score derived from these four key variables. Each response was scored based on its alignment with WHO-recommended practices, with higher scores indicating better adherence. The total possible score ranged from 0 to 8, with participants scoring 0–2 categorized as having poor practice, 3–5 as fair, and 6–8 as good breastfeeding practice. The reliability of the breastfeeding practice scale was evaluated using Cronbach's alpha, yielding a coefficient of 0.91, indicating excellent internal consistency (23).

Ethical Approval and Inform Consent

This study was conducted in accordance with the guidelines of the Institutional Research Ethics Board and the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the College of Medicine – Hawler Medical University, and formal authorization was granted before the commencement of data collection. Oral informed consent was obtained from all participants after explaining the purpose and nature of the study. Participation was entirely voluntary, and respondents were assured of the confidentiality and anonymity of their responses.

Statistical Analysis:

Data were summarized and reported with frequency and percentage for qualitative variables, while quantitative variables were presented with mean and standard deviation. The association between breastfeeding practice levels and demographic variables was assessed using the Chi-square test, followed by ordinal regression analysis to evaluate adjusted relationships. Data analysis was performed using Stata version 12 (StataCorp LLC, College Station, TX), and significance levels were considered at ≤0.05.

Results

Demographic characteristics:

A total of 400 mothers participated in the current study. The mean age of the participants was 30.09 ± 6.18 years, with the majority aged 30–39 years (189 mothers, 47.3%), followed by those aged 20–29 (171 mothers, 42.8%). Regarding educational level, 124 mothers (31.0%) had secondary education, while 101 (25.3%) had primary education, 96 (24.0%) were illiterate, and 79 (19.8%) had college or postgraduate qualifications. In terms of occupation, most participants were housewives (317 mothers, 79.3%), while 83 (20.7%) were employed or engaged in other types of work. Concerning

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economic status, the majority reported an average income (366 mothers, 91.5%), with 18 (4.5%) indicating low income and 16 (4.0%) reporting above-average income. When asked about household size, 213 (53.3%) of participants lived in households with 4–6 people, 103 (25.8%) lived in households with 1–3 people, and 84 (21.0%) in households of more than 6 people. The mean breastfeeding practice score was 4.65 ± 2.21, with 178 (44.5%) of mothers demonstrating a fair level of practice, 150 (37.5%) showing good practice, and 72 (18.0%) indicating poor practice. Overall, the mothers exhibited a fair level of breastfeeding practice. Detailed demographics and other variables are presented in Table 1.

Table 1. Demographic and Clinical Characteristics of Mothers (n=400)

Variables	Characteristics n=400	F	%
Age (year)	< 20	6	1.5
	20-29	171	42.8
	30-39	189	47.3
	≥ 40	34	8.5
	Mean ± SD	30.09 ± 6.18	
Educational Level	Illiterate	96	24.0
	Primary Education	101	25.3
	Secondary Education	124	31.0
	College or Postgraduate	79	19.8
Occupation	Housewife	317	79.3
	Employed / Other	83	20.7
Economic Status	Low (Below Average Income)	18	4.5
	Medium (Average Income)	366	91.5
	High (Above Average Income)	16	4.0
How many people live in your household?	1-3	103	25.8
	4-6	213	53.3
	More than 6	84	21.0
Practice Levels	Poor	72	18.0
	Fair	178	44.5
	Good	150	37.5
	Mean ± SD	4.65± 2.21	

Note: F= Frequency, %= Percentage, and breastfeeding practice levels were calculated using a composite score derived from four key variables: type of feeding, duration of breastfeeding, frequency of breastfeeding, and use of supplementary feeding. Each response was scored based on its alignment with WHO-recommended practices, with higher scores indicating better adherence. The total possible score ranged from 0 to 8. Participants scoring 0–2 were categorized as having poor practice, 3–5 as fair, and 6–8 as good breastfeeding practice.

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Breastfeeding Practice Levels among Mothers in Soran City

The results illustrated that the majority of participants demonstrated fair breastfeeding practices, comprising approximately 44.5% of the sample, followed by good practice at around 37.5%. A smaller portion of the mothers, 18.0%, reported poor breastfeeding practices. (Figure 1)

Breastfeeding-Related Characteristics

The results showed that most mothers had either one or two infants, with 228 (57.0%) reporting one infant and 171 (42.8%) having two. The overwhelming majority of births occurred in health facilities (373 mothers, 93.3%), indicating strong reliance on institutional delivery services. The mode of delivery was nearly evenly distributed, with 198 mothers (49.5%) undergoing normal vaginal delivery and 202 (50.5%) delivering via cesarean section. Regarding infant feeding practices, a significant proportion of mothers, 328 (82.0%), reported breastfeeding, while 72 (18.0%) did not. The most common duration of breastfeeding was 6–12 months, reported by 176 mothers (44.0%), followed by 18–24 months (86, 21.5%) and 12–18 months (65, 16.3%), whereas 73 mothers (18.3%) had never breastfed. In terms of frequency, 137 mothers (34.3%) breastfed 7 or more times daily, 127 (31.8%) breastfed 4–6 times, and 64 (16.0%) breastfed 1–3 times; 72 (18.0%) were not breastfeeding. Additionally, 163 mothers (40.8%) used supplementary feeding, while the majority, 237 (59.3%), did not. For further details, see Table 2.

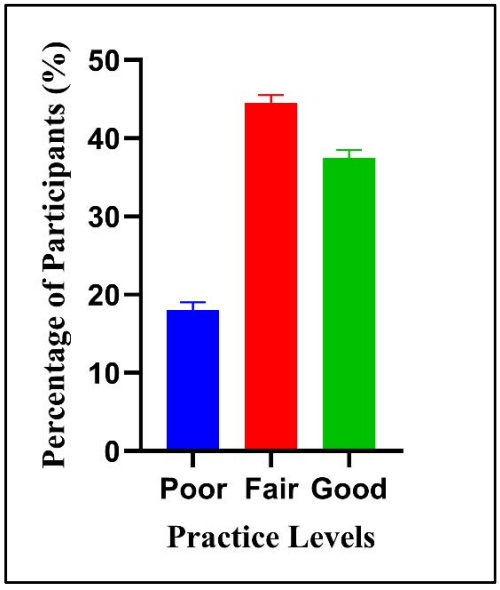

Figure 1. Distribution of Breastfeeding Practice Levels Among Mothers in Soran City (n = 400)

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Table 2. Breastfeeding-Related Characteristics (N = 400)

Variable	Category	F	%
Number of Infants	One infant	228	57.0
	Two infants	171	42.8
	Three infants	1	0.3
	Mean ± SD	11.91 ± 6.28	
Infant's Gender	Male	228	57.0
	Female	172	43.0
Birth Order	First child	123	30.8
	Second–Fourth child	236	59.0
	Fifth or more	41	10.3
Mode of Delivery	Normal vaginal delivery	198	49.5
	Cesarean section	202	50.5
Place of Delivery	Home	27	6.8
	Health Facility	373	93.3
Type of Feeding	Breastfeeding	328	82.0
	Non-Breastfeeding	72	18.0
Duration of Breastfeeding	Never breastfed	73	18.3
	6–12 months	176	44.0
	12–18 months	65	16.3
	18–24 months	86	21.5
Frequency of Breastfeeding	1–3 times	64	16.0
	4–6 times	127	31.8
	7 or more times	137	34.3
	Not breastfeeding	72	18.0
Supplementary Feeding	No	237	59.3
	Yes	163	40.8

Note: F= Frequency, %= Percentage

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Breastfeeding Practice Levels by Demographic Characteristics

The results revealed that breastfeeding practice levels varied across demographic characteristics, with some variables showing statistically significant associations. Although age group, educational level, and occupation showed no significant associations with breastfeeding practice (P >0.05), certain trends were observed. Mothers aged 30–39 years had the highest proportion of good practice (80 out of 189, 42.3%), while those under 20 had the lowest. Education-wise, mothers who were illiterate surprisingly showed a relatively high proportion of good practice (43 out of 96, 44.8%), though this was not statistically significant (P = 0.22). Regarding economic status, a significant association was found (P = 0.02), with 44.4% of mothers in the low-income group and 37.7% of those in the medium-income group demonstrating good practice. Similarly, a significant relationship was found between household size and practice level (P = 0.01), where 41.3% of mothers living in households with 4–6 members had good practice, compared to only 32.0% of those in smaller households and 34.5% in larger ones. For more details, refer to Table 3.

Ordinal Regression Parameter Estimates for Breastfeeding Practice

The results revealed that none of the examined socio-demographic variables showed a statistically significant association with breastfeeding practice in the ordinal regression model. Although the reference categories (e.g., ≥40 years of age, college or postgraduate education, employed/other, high income, and households with more than 6 members) were used for comparison, the p-values for all other groups exceeded 0.05, indicating no significant predictors. For example, mothers aged 30–39 years had an estimate of 0.40 (95% CI: -0.32 to 1.11, P = 0.28), and those who were illiterate had an estimate of 0.28 (95% CI: -0.41 to 0.97, P = 0.43), both showing weak, non-significant relationships. Similarly, neither occupation nor socioeconomic status nor household size significantly predicted breastfeeding practice. For more details, refer to Table 4.

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Table 3. Breastfeeding Practice Levels by Demographic Characteristics (N = 400)

Demographic Information	Categories	Practice Levels			N	P- Value
		Poor	Fair	Good		
Age group (Years)						
	< 20	2 (33.33%)	3 (50.00%)	1 (16.67%)	6	0.31
	20-29	38 (22.22%)	76 (44.44%)	57 (33.33%)	171	
	30-39	27 (14.29%)	82 (43.39%)	80 (42.32%)	189	
	≥ 40	5 (14.71%)	17 (50.00%)	12 (35.29%)	34	
Educational Level						
	Illiterate	11 (11.46%)	42 (43.75%)	43 (44.79%)	96	0.22
	Primary Education	15 (14.85%)	49 (48.51%)	37 (36.63%)	101	
	Secondary Education	30 (24.19%)	53 (42.74%)	41 (33.06%)	124	
	College or Postgraduate	16 (20.25%)	34 (43.04%)	29 (36.71%)	79	
Occupation						
	Housewife	58 (18.30%)	137 (43.22%)	122 (38.49%)	317	0.6-
	Employed / Other	14 (16.87%)	41 (49.40%)	28 (33.73%)	83	
Economic Status						
	Low (Below Average Income)	0 (0.00%)	10 (55.56%)	8 (44.44%)	18	0.02
	Medium (Average Income)	72 (19.67%)	156 (42.62%)	138 (37.70%)	366	
	High (Above Average Income)	0 (0.00%)	12 (75.00%)	4 (25.00%)	16	
How many people live in your household?						
	1-3	25 (24.27%)	45 (43.69%)	33 (32.04%)	103	0.01
	4-6	41 (19.25%)	84 (39.44%)	88 (41.31%)	213	
	More than 6	6 (7.14%)	49 (58.33%)	29 (34.52%)	84	

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Table 4. Ordinal Regression Parameter Estimates for Breastfeeding Practice

Variables	Practice			
	Estimate	P-value	95% CI	
			LB	UB
Age group (Years)				
< 20	-0.40	1.34	-2.13	0.65
20-29	0.08	0.85	-0.68	0.83
30-39	0.40	1.11	-0.32	0.28
≥ 40	0 a	–	–	–
Educational Level				
Illiterate	0.28	0.97	-0.41	0.43
Primary Education	0.00	0.66	-0.66	0.99
Secondary Education	-0.26	0.35	-0.88	0.40
College or Postgraduate	0 a	–	–	–
Occupation				
Housewife	0.08	0.64	-0.49	0.79
Employed / Other	0 a	–	–	–
Socioeconomic Status				
Low (Below Average Income)	0.50	1.81	-0.81	0.46
Medium (Average Income)	-0.08	0.87	-1.04	0.87
High (Above Average Income)	0 a	–	–	–
How many people live in your household?				
1-3	-0.17	0.45	-0.80	0.59
4-6	0.11	0.62	-0.40	0.67
More than 6	0 a	–	–	–

Note: Abbreviations: LB, lower bound; UP, upper bound.
a This parameter is reference

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Discussion

The present study was conducted to assess breastfeeding practices among mothers in Soran and identify the factors influencing these practices in the context of contemporary maternal and child health challenges. Overall, the results revealed that the participating mothers demonstrated fair breastfeeding practices, with most showing moderate engagement with recommended infant feeding behaviors and a positive attitude toward breastfeeding over alternative feeding methods.

Breastfeeding remains a cornerstone of infant health and development, providing optimal nutrition and immunological protection during the critical early months of life (24). In the Kurdish region, including Soran, rapid socioeconomic changes and evolving healthcare systems have created unique challenges for maintaining traditional breastfeeding practices while adapting to modern lifestyles. Despite global efforts to promote exclusive breastfeeding, there remains a significant gap in understanding local breastfeeding patterns and the factors that influence maternal feeding decisions in this specific cultural context. The absence of recent comprehensive data on breastfeeding practices in Soran has limited the ability of healthcare providers to develop targeted interventions. Given the importance of these details, we aimed to assess the current state of breastfeeding practices among mothers in Soran and identify the key determinants influencing these behaviors.

The demographic profile of our study participants, characterized by mothers with at least secondary education and predominantly housewife status, reflects the evolving educational landscape and traditional family structures in the region. This educational achievement among mothers aligns with global trends showing improved female literacy rates and educational access in developing regions (21, 25). The predominance of housewives in our sample mirrors patterns observed in many Middle Eastern countries where traditional gender roles persist despite modernization efforts (26). This demographic composition provides valuable insights into the social context within which breastfeeding decisions are made.

The educational level of mothers in our study compares favorably with international standards, where maternal education has consistently been identified as a positive predictor of breastfeeding practices (27). However, unlike studies from Western countries where higher education often correlates with longer breastfeeding duration, our findings suggest a more complex relationship influenced by cultural factors unique to the Kurdish context

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(28). The housewife status of most participants differs from trends in industrialized nations where maternal employment significantly impacts breastfeeding patterns (29). This occupational profile may actually facilitate better breastfeeding practices by allowing mothers more time and flexibility for infant feeding, though it also reflects limited economic opportunities for women in the region.

The encouraging finding that most mothers delivered in health facilities and preferred breastfeeding over alternative methods demonstrates significant progress in maternal healthcare utilization and breastfeeding promotion efforts. This institutional delivery rate surpasses many developing countries' averages and approaches standards seen in more developed healthcare systems (30). The preference for breastfeeding indicates successful penetration of global health messages promoting optimal infant feeding practices, though the translation of preference into sustained practice remains a challenge requiring continued support (31).

The observed patterns of frequent breastfeeding and extended duration among participants suggest a strong cultural foundation supporting traditional infant feeding practices. These behaviors align with World Health Organization recommendations and contrast positively with declining breastfeeding rates observed in many urbanizing societies (32). However, the characterization of practices as "fair" rather than "good" or "excellent" indicates room for improvement in achieving optimal breastfeeding standards.

The meaningful associations between socioeconomic status and breastfeeding practices revealed in our study echo findings from diverse global contexts while presenting unique regional characteristics (2). Mothers from average-income households demonstrating better practices differs from some international studies showing either positive linear relationships with income or U-shaped curves where both low and high-income groups show better practices (33). This middle-income advantage in our context may reflect a balance between having sufficient resources for proper nutrition while maintaining traditional values less influenced by commercial formula marketing targeting affluent families (34). The relationship between household size and breastfeeding practices adds another dimension to understanding the social determinants of infant feeding behaviors. Moderately sized families showing better practices suggests an optimal balance between available support systems and resource allocation. This finding contrasts with studies from highly individualistic societies where smaller nuclear families often struggle with breastfeeding support, and extremely large families in

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resource-poor settings face competing demands (35). The Kurdish family structure, with its emphasis on extended family support while transitioning toward smaller family units, may create an ideal environment for sustaining breastfeeding practices**.**

The absence of strong independent predictors in the regression model, despite consistent trends across categories, reveals the complex, multifactorial nature of breastfeeding behaviors. This finding aligns with ecological models of health behavior that emphasize the interaction of individual, interpersonal, community, and societal factors. Unlike studies in more homogeneous populations where specific demographic factors emerge as strong predictors, our results suggest that breastfeeding practices in Soran are shaped by intricate combinations of cultural norms, family dynamics, and socioeconomic conditions that cannot be reduced to simple demographic variables.

This study has several limitations that should be acknowledged when interpreting the findings. The cross-sectional design prevents establishing causal relationships between factors and breastfeeding practices, limiting our understanding of how these behaviors develop over time. The study's focus on a single geographic area may limit generalizability to other Kurdish regions or similar cultural contexts. Future research should employ longitudinal designs to track breastfeeding patterns from pregnancy through weaning, include objective measures of breastfeeding exclusivity and duration, and expand to multiple sites for broader applicability. Development and evaluation of culturally appropriate interventions targeting identified modifiable factors would provide practical strategies for improving breastfeeding outcomes in the region.

Conclusion

The study demonstrated that mothers in Soran exhibited moderate levels of breastfeeding practice. Policymakers and healthcare providers should design targeted educational programs to promote optimal breastfeeding behaviors and address barriers related to socioeconomic and household conditions. These interventions should be tailored to the cultural and economic context of the region, ensuring accessibility and effectiveness across different population groups**.** Future research is recommended to explore additional factors influencing breastfeeding practices, such as maternal knowledge, family support, cultural beliefs, and access to postnatal care. Longitudinal studies could help track breastfeeding patterns over time and identify long-term impacts on child health. Furthermore, qualitative studies are encouraged to gain deeper insights into mothers' experiences and perceived challenges related to breastfeeding, which may inform more

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comprehensive and responsive health strategies.

Competing interest

The authors declare that they have no competing interests.

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