Original Article

Knowledge, Attitudes, and Practices of Mothers with Acutely Malnourished Children Regarding Child Feeding and Malnutrition Prevention in Sudan

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Abstract

Background: Malnutrition remains a global health issue, endangering the lives of millions of children, especially in developing nations. It profoundly affects a child's physical and mental development, leading to severe and often irreversible consequences. **Objectives:** This study aims to assess the knowledge, attitudes, and practices of mothers with acutely malnourished children concerning child feeding and the prevention of malnutrition. **Subjects and Methods:** A cross-sectional hospital-based study was conducted involving 139 mothers with acutely malnourished children admitted to the malnutrition ward at Mohammed Al-Ameen Hamid Pediatric Hospital between May 2022 and December 2022. Data were collected through direct interviews with the surveyed mothers utilizing a validated, structured questionnaire. Analysis of data was performed using SPSS software version 20. **Results:** The study revealed that 78.4% of mothers possessed adequate knowledge, 80.6% exhibited favorable attitudes, and 55.4% demonstrated good child-feeding practices and malnutrition prevention practices. A significant correlation between mothers' education and practice was identified ($P = 0.025$). Furthermore, data analysis highlighted the significant association between mothers' knowledge and attitude ($P = 0.007$), mothers' knowledge and practice ($P = 0.006$), and mothers' attitudes and practice ($P = 0.033$). **Conclusion:** Most mothers exhibited sufficient knowledge and positive attitudes regarding child feeding and malnutrition prevention; however, there is a need to translate this awareness into improved practices.

Keywords: Acute malnutrition, antenatal care, breastfeeding, immunization, Sudan

Introduction

Malnutrition persists as a prevalent global concern, particularly in developing countries.[1] Undernutrition manifests in several forms: wasting (low weight-for-height), stunting (low height-for-age), underweight (low weight-for-age), and deficiencies in essential vitamins and minerals.[2] These manifestations result in various physiological changes, including growth impediments, depletion of fat, muscle, and visceral mass, diminished basal metabolic rate, and decreased overall energy expenditure.[3] Moreover, acute malnutrition can variably impair organ systems and cellular immunity,[4] exacerbating its effects leading to clinical conditions such as marasmus and kwashiorkor.[5]

In Sudan, acute malnutrition stands as a significant public health challenge, particularly among children under the age of 5 years. The multifaceted causes of malnutrition encompass inadequate dietary practices, limited healthcare access services, insufficient food intake, and diseases stemming from food insecurity, further compounded by conflict.[6] Additionally, the burden is intensified by elevated rates of infectious diseases such as respiratory infections (e.g., pneumonia), skin infections (e.g., impetigo), eye infections (e.g., trachoma), oral infections (e.g., periodontal disease), intestinal diseases (e.g., microbial diarrhea), and systemic infections (e.g., brucellosis and typhoid).[7]

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Mothers wield a pivotal role in averting acute malnutrition through nurturing nutrition and timely interventions. Beyond ensuring proper nourishment, mothers cultivate a supportive milieu that fosters children's physical and mental well-being.[8] Furthermore, mothers impart vital lessons on hygiene practices, thereby contributing to malnutrition reduction. By instating and sustaining a healthful diet, mothers not only cultivate a secure atmosphere for their children but also facilitate their growth. Moreover, mothers can actively detect signs of malnutrition in their children and promptly seek treatment if needed. Despite the existing body of research on acute malnutrition prevalence and management in Sudan, a paucity of studies addresses maternal knowledge, attitudes, and practices. This study aims to bridge this gap by evaluating the knowledge, attitudes, and practices of mothers with children under the age of 5 years suffering from acute malnutrition, specifically focusing on child feeding and malnutrition prevention in Sudan.

Subjects and Methods

Study design and setting

A descriptive cross-sectional hospital-based study design was conducted at Mohammed Al-Ameen Hamid Pediatric Hospital. The hospital is situated in Omdurman, the most populous city in Khartoum state, which serves as the capital of Sudan. Established as a charitable institution in 1986, it encompasses an area of 7200 m² and falls under the administration of the Ministry of Health. As the largest public pediatric hospital in Sudan, it offers a range of specialized medical services. The study was carried out from May 2022 to October 2022.

Study population and sample

The study encompassed all mothers of children under 5 years old diagnosed with acute malnutrition and admitted to Mohammed Al-Ameen Hamid Pediatric Hospital during the designated study period. Mothers facing communication barriers due to language constraints were excluded from the study. A total of 139 eligible mothers of acutely malnourished children admitted during the study timeframe were interviewed.

Data collection methods and tools

The data collection process involved direct interviews with mothers, utilizing a structured questionnaire that was adapted from a predesigned and pretested questionnaire used in a prior study.[9] To ensure the questionnaire's content validity, it underwent revision by three expert faculty members from the Faculty of Pharmacy, University of Khartoum. The questionnaire itself comprised three sections, each consisting of close-ended questions. The initial section centered on the sociodemographic characteristics of both the mother and child. Specifically, it addressed the mother's age, educational attainment, occupation, number of children, as well as the child's age and gender. The second section delved into the mothers' knowledge, attitudes, and practices concerning topics such as antenatal care, early initiation of breastfeeding, exclusive breastfeeding, complementary feeding, and immunization.

The third and final section explored the mothers' knowledge, attitudes, and practices related to infection prevention, handwashing, the causes of malnutrition, methods to prevent malnutrition, and measures taken against malnutrition.

Participants' knowledge and attitudes were assessed using an 8-point scale, while their practices were evaluated on a 7-point scale. Correct answers were assigned one point, while incorrect responses received zero points. The cumulative scores for knowledge, attitudes, and practices were calculated for each participant, and the median score was identified as the threshold.

Based on this median score, participants were categorized into two groups. For knowledge, those who scored ≥5 were categorized as having adequate knowledge, while those with scores <5 were categorized as having inadequate knowledge. In terms of attitude, participants with scores ≥7 were deemed to have favorable attitudes, whereas those with scores <7 were considered to have unfavorable attitudes. For practice, participants scoring ≥5 were classified as having good practices, whereas those scoring <5 were categorized as having inadequate practices.

Data analysis

The data were analyzed utilizing the Statistical Package for the Social Sciences (Armonk, NY, USA: IBM Corp) version 26. Presentation of the data was carried out through tabulation. To ascertain associations between categorical variables, a Chi-square test was employed, considering $P = 0.05$ or less as statistically significant.

Ethical consideration

Ethical approval was secured from both the Ethical Committee of the Faculty of Pharmacy, University of Khartoum (FPEC-03-2022), and the Research Ethics Committee of the Ministry of Health, Khartoum State. Furthermore, permission was granted by the hospital's research department. Prior to participation, verbal informed consent was obtained from all participants. The research objectives were elucidated, and assurances of information confidentiality were provided. Participants were duly informed that their involvement was voluntary and that they retained the right to withdraw at any point without impacting their access to healthcare services.

Results

Participant demographics

As presented in Table 1, 69.78% of the surveyed mothers fell within the age range of 18–30 years. Furthermore, 45.32% had received primary education, while 45 (32.37%) were illiterate. A significant proportion of the surveyed mothers identified as homemakers, and 44.6%

Table 1: Sociodemographic characteristics of participants (*n*=139)

Characteristics	Frequency (%)
Mother age	
<18	3 (2.1)
18–30	97 (69.3)
31–40	38 (27.1)
>40	1 (0.7)
Education	
Illiterate	45 (32.1)
Primary	63 (45.0)
Secondary	25 (17.9)
Higher	6 (4.3)
Occupation	
Homemaker	114 (82.0)
Farmer	7 (5.0)
Worker	16 (11.5)
Others	2 (1.4)
Number of children	
1	19 (13.6)
2	33 (23.6)
3	25 (17.9)
>3	62 (44.3)
Child age in month	
<6	6 (4.3)
6–12	53 (37.9)
12–24	62 (44.3)
>24	18 (12.9)
Gender	
Male	69 (49.3)
Female	70 (50.0)

were mothers of three or more children. The majority of the children in the study were aged between 6 and 24 months, and the distribution of male and female children was nearly equal.

Knowledge of participants regarding antenatal care, breastfeeding, immunization, infection prevention, and malnutrition

As illustrated in Table 2, nearly all participants demonstrated awareness of the significance of antenatal care and the importance of initiating breastfeeding within the 1st h after birth. However, only 40.3% of respondents were knowledgeable about the recommended duration of exclusive breastfeeding (6 months), as well as the commencement of complementary feeding after 6 months. Additionally, a substantial 93.5% were aware of the necessity of childhood immunization for illness prevention (n = 139).

In terms of participants' understanding of infection prevention, causative factors, and measures against malnutrition, it was observed that 74.8% of the respondents recognized that comprehensive protective measures are essential to prevent infections. Moreover, 88.5% emphasized the importance of

Table 2: Knowledge of participants regarding antenatal care, early initiation of breastfeeding, exclusive breastfeeding, complementary feeding, and immunization (*n*=139)

Items	Frequency (%)
ANC	
Do you know that care for child health begins before child is born (pregnancy follow-up)?	
Yes	137 (98.6)
No idea	2 (1.4)
Initiation of breastfeeding	
When a child must be breastfed after birth?	
Within the 1st h	136 (97.8)
Within the 1st day	1 (0.7)
More than 1 day	2 (1.4)
Exclusive breastfeeding	
For how long exclusive breastfeeding must be practiced?	
<6 months	75 (54.0)
6 months	56 (40.3)
>6 months	8 (5.8)
Complementary feeding	
What is the best age to start complementary feeding?	
Before 6 months	75 (54.0)
At the end of 6th month	56 (40.3)
After 6 months	8 (5.8)
Immunization	
Why does the child need immunization?	
To prevent illness	130 (93.5)
No idea	8 (5.8)
Others	1 (0.7)
Prevention of infection	
What is the best way to prevent infection?	
Handwashing	13 (9.4)
Handwashing with soap	19 (13.7)
All the measures to be taken	104 (74.8)
No idea	3 (2.2)
Handwashing	
How you should wash your hands?	
With water only	14 (10.1)
With soap and water	123 (88.5)
Proper method	2 (1.4)
Causes of malnutrition	
What is the cause of malnutrition during childhood?	
Lack of adequate food	18 (12.9)
Recurrent infections	84 (60.4)
Others (teething, sudden weaning, a congenital defect, etc.)	29 (20.9)
No idea	8 (5.8)
Action against malnutrition	
If the child is malnourished what is to be done?	
Increase the amount of food	2 (1.4)
Local methods	22 (15.8)
Go to a health facility	107 (77.0)
No idea	8 (5.8)

ANC: Antenatal care

washing hands with soap and water. Furthermore, 60.4% of participants correctly identified recurrent infections as a contributing factor to malnutrition, and 77.0% acknowledged that malnourished children should receive medical attention at a healthcare facility.

The attitude of participants regarding antenatal care, breastfeeding, immunization, infection prevention, and malnutrition

As outlined in Table 3, nearly all participants exhibited a positive attitude toward various aspects, including antenatal care (97.8%), early initiation of breastfeeding (100%), adhering to exclusive breastfeeding for 6 months, considering age as a factor for commencing complementary feeding (94.2%), and recognizing the significance of childhood immunization (98.6%). Notably, 43.9% of the participants attributed malnutrition primarily to inadequate feeding practices, while 76.3% believed that the health facility provided adequate care for managing malnutrition.

Table 3: The attitude of participants regarding antenatal care, breastfeeding, immunization, infection prevention, causes, and action against malnutrition (*n*=139)

Items	Frequency (%)
ANC	
Do you think ANC is required for child health?	
Yes	136 (97.8)
No	3 (2.2)
Initiation of breastfeeding	
Do you think initiating early breastfeeding is a good idea?	
Yes	139 (100.0)
Exclusive breastfeeding	
Do you feel that the end of the 6th month is sufficient?	
Yes	131 (94.2)
No	9 (6.4)
Complementary feeding	
Do you think age should decide it (or other factors like child demand for food)?	
Yes	131 (94.2)
No	8 (5.7)
Immunization	
Do you think these immunizations are necessary for the baby?	
Yes	137 (98.6)
No	2 (1.4)
Handwashing	
Do you feel it is essential to wash hands in a particular way?	
Yes	139 (100.0)
Causes of malnutrition	
Do you think faulty feeding is the main cause of malnutrition?	
Yes	61 (43.9)
No	78 (56.1)
Action against malnutrition	
Do you think there is good care in health facilities?	
Yes	106 (76.3)
No	33 (23.7)

ANC: Antenatal care

Table 4: The practice of participants regarding antenatal care, early initiation of breastfeeding, exclusive breastfeeding, complementary feeding, and immunization (*n*=139)

Items	Frequency (%)
ANC	
Did you have a pregnancy follow-up for this child?	
Yes	126 (90.6)
No	13 (9.4)
Initiation of breastfeeding	
When is this baby fed after birth?	
Within the 1st h	126 (90.6)
Within the 1st day	2 (1.4)
After the 1st day	8 (5.8)
Never	3 (2.1)
Exclusive breastfeeding	
For how many months this baby was on exclusive breastfeeding?	
<6 months	74 (53.2)
At the end of 6th month	50 (36.0)
>6 months	15 (10.8)
Complementary feeding	
When was complementary feeding started for this baby?	
Before 6 months	74 (53.2)
At the end of 6th month	50 (36.0)
After 6 months	15 (10.8)
Immunization	
How many immunizations did this child receive till now?	
All for the age	100 (71.9)
Few of them	32 (23.0)
Unimmunized	7 (5.0)
Handwashing	
Do you wash your hands as required?	
Yes	137 (98.6)
No	2 (1.4)
Prevention of malnutrition	
What you had done to prevent malnutrition in this child?	
Increase the amount of food	111 (79.9)
Hygiene	4 (2.9)
Immunization	1 (0.7)
Nothing special	23 (16.5)
Action against malnutrition	
What did you do to help this child before bringing them to the hospital?	
Increase the amount of food	7 (5.0)
Local methods	35 (25.2)
Go to health facility	79 (56.8)
Nothing	18 (12.9)

ANC: Antenatal care

The practice of participants toward antenatal care, breastfeeding, immunization, prevention, and action against malnutrition

As presented in Table 4, nearly all participants adhered to antenatal care and initiated breastfeeding within the 1st h after birth. 36.0% practiced exclusive breastfeeding for 6-month duration, while 53.2% introduced complementary feeding before 6-month period. Additionally, 71.9% of the children received the full set of age-appropriate immunizations. In terms of hygiene practices, a significant majority of participants followed proper handwashing protocols. Notably, 79.9% reported increasing food intake as a preventive measure against malnutrition. Conversely, 16.5% indicated not employing any specific measures. Moreover, 56.8% sought health care at a medical facility before their hospital visit, and 25.2% utilized local methods for managing malnutrition.

Reasons for participants' improper practice regarding antenatal care, child feeding, immunization, and prevention of malnutrition

As shown in Table 5, the results highlighted that out of the 13 participants (9.4%) who did not receive antenatal care, 4 (30.8%) cited the distant location of the healthcare facility as the primary reason. Among the participants who did not initiate breastfeeding within the 1st h after birth, 10 (76.9%) attributed this delay to a perceived lack of milk. Furthermore, among the 74 participants (53.2%) who did not practice exclusive breastfeeding for the recommended 6 months, 73 (98.6%) cited cultural factors as the driving force for their decision.

Concerning the delay in introducing complementary feeding after the age of 6 months (10.7%), various reasons were identified. A significant proportion (46.6%) noted the child's inability to eat as the primary factor, while 26.6% mentioned a lack of awareness.

Remarkably, 39 children (28.1%) did not receive the complete set of recommended vaccinations. Of these, 35.9% resided far from medical facilities, and 41.0% cited the child's poor health as a barrier.

Finally, out of the 23 participants (16.5%) who reported not taking specific measures to prevent malnutrition, 9 (39.1%) attributed this to a lack of information, while another 9 (39.1%) cited resource constraints as the main impediment [Table 5].

Table 5: Reasons for participant's improper practice regarding antenatal care, child feeding, immunization, and prevention of malnutrition

Items	Frequency (%)
ANC	
If no, then why?	
Healthcare facility was far	4 (30.8)
No specific reason	9 (69.2)
Initiation of breastfeeding	
If the child did not breastfeed within the 1st day or never then why?	
Child refused	1 (7.7)
Lack of milk	10 (76.9)
Child was not with mother	2 (15.4)
Exclusive breastfeeding	
If <6 months then why?	
Cultural reason	73 (98.6)
Had to go to work	1 (5.0)
Complementary feeding	
If not after 6 months	
Not aware	4 (26.6)
The child was not able to eat	7 (46.6)
No specific reason	4 (26.6)
Immunization	
If incompletely immunized then why?	
Healthcare facility was far	14 (35.9)
Poor child's health	16 (41.0)
Lack of knowledge	8 (20.5)
Child developed fever after the last one	1 (2.6)
Prevention of malnutrition	
If you had not done anything special why?	
Lack of knowledge	9 (39.1)
Limited recourses	9 (39.1)
Poor child's health	2 (13.0)
Other responsibilities	3 (8.7)

ANC: Antenatal care

General knowledge, attitude, and practice of participants

Regarding antenatal care, child feeding, and immunization, 60% of participants demonstrated adequate knowledge, 88.5% held a favorable attitude, and 72.7% exhibited good practices. In terms of malnutrition, 56.8% of participants possessed sufficient knowledge, 87.8% maintained a positive attitude, and 55.4% displayed commendable practices [Table 6].

Associations between sociodemographic characteristics, knowledge, attitudes, and practice

As illustrated in Table 7, within the mothers' sociodemographic characteristics, a notable correlation emerged between the level of education and their practices ($P = 0.025$). Additionally, through data analysis, meaningful connections were established between mothers' knowledge and attitudes ($P = 0.007$), mothers' knowledge and practices ($P = 0.006$), and mothers' attitudes and practices ($P = 0.033$).

Discussion

In the present study, our investigation centered on the knowledge, attitudes, and practices of mothers with acutely malnourished children regarding child feeding, antenatal care, immunization, and malnutrition prevention. The study's findings revealed that nearly all mothers possessed substantial knowledge concerning antenatal care (98.6%) and demonstrated a favorable attitude (100%) toward its significance for maternal and child health. Furthermore, the majority of mothers exhibited commendable antenatal care practices (90.6%). This particular outcome surpasses the observations of analogous studies conducted in India, Pakistan, Yemen, and Somalia.[10-12] This discrepancy could be attributed to the predominant residence of surveyed mothers in suburban zones, city outskirts, or displaced camps, where

Table 6: Knowledge, attitude, and practice of participants regarding antenatal care, child feeding, immunization, and malnutrition (*n*=139)

Items	Knowledge (%)		Attitudes (%)		Practice (%)	
	Adequate	Inadequate	Favorable	Unfavorable	Good	Bad
ANC, child feeding, and immunization	60.4	39.6	88.5	11.5	72.7	27.3
Malnutrition	56.8	43.2	87.8	12.2	55.4	44.6

ANC: Antenatal care

Table 7: Associations between sociodemographic characteristics and knowledge, attitudes, and practice of participants

Demographic characteristics	Knowledge		*P*	Attitude		*P*	Practice		*P*
	Adequate	Inadequate		Favorable	Unfavorable		Good	Bad	
Mother age									
<18	3	0	0.759	3	0	0.259	1	2	0.436
18–30	75	22		74	23		57	40	
31–40	30	8		34	4		19	19	
>40	1	0		1	0		0	1	
Education									
Illiterate	30	15	0.087	35	10	0.641	17	28	0.025
Primary	53	10		51	12		39	24	
Secondary	20	5		20	5		16	9	
Higher	6	0		6	0		5	1	
Number of children									
1	14	5	0.719	15	4	0.705	10	9	0.836
2	28	5		25	8		19	14	
3	20	5		22	3		12	13	
>3	47	15		50	12		36	26	

various organizations extend maternal and child healthcare services.

Within our study, among the 13 mothers (9.4%) who had not received antenatal care, 4 (30.8%) attributed this to the considerable distance to the healthcare facility, while 9 mothers (69.2%) provided no specific reasons. To mitigate this issue, efforts could be channeled into enhancing healthcare accessibility in rural regions and augmenting mothers' awareness regarding the inherent risks associated with abstaining from antenatal care.

The United Nations International Children's Emergency Fund and WHO strongly advocate for the early initiation of breastfeeding, ideally within the 1st h after birth, as a measure to safeguard children against infections and mortality. Moreover, this prompt initiation contributes to bolstering breast milk production and mitigating postpartum bleeding.[13] In alignment with these recommendations, our study identified that nearly all mothers possessed solid knowledge about the significance of initiating breastfeeding within the 1st h after birth (97.8%). Impressively, all mothers expressed favorable attitudes (100%) toward this practice, and the majority (90.6%) promptly initiated breastfeeding within the initial hour of their child's life. The remaining mothers who did not engage in early breastfeeding cited various factors beyond their control – such as infant refusal, lack of milk, or the baby not being immediately available with the mother.

This finding harmonizes with prior investigations conducted in Eastern Sudan, the United Arab Emirates, Ethiopia, Nigeria, and India.[14-19] The commendable knowledge, attitudes, and practices concerning early breastfeeding initiation among mothers could be attributed to social and cultural influences, heightened awareness campaigns, particularly among midwives who play a pivotal role in home deliveries,[20] and the utilization of breastfeeding as a natural method of family planning in rural locales.[21]

Aiming for one of the global nutrition goals established for 2025, the recommended practice entails infants relying solely on breast milk during the initial 6 months of life.[22] Breast milk comprehensively fulfills an infant's nutritional needs during this period and substantially mitigates the likelihood of digestive complications.[23] The WHO advises initiating complementary feeding after the 6th month to accommodate the growing child's nutritional demands,[23,24] as early introduction of complementary feeding has been linked to heightened risks of stunting, wasting, and underweight.[25]

Regarding complementary feeding, 40.2% of the participants were aware that complementary feeding should commence at 6 months, while a substantial 94.2% believed that age was the sole determinant for its initiation. Contrarily, 53.2% initiated complementary feeding prior to 6 months. Distinct findings have been reported in studies conducted in India, Nepal, Iraq, Ethiopia, and Sudan,[26-29] suggesting that variations may

stem from differing cultures, traditions, study settings, and timeframes.

Within the present study, only 36% of mothers adhered to exclusive breastfeeding for 6 months. Among mothers who did not exclusively breastfeed for the recommended period, nearly half attributed this to insufficient milk supply. While this finding partially aligns with the outcomes of a systematic review and a Sudanese study,[30,31] it contrasts with research from Ethiopia,[32] proving higher than investigations in Nigeria and Sudan and lower than another Nigerian study.[33] Many participant mothers appeared unaware that breast milk adequately meets their child's needs during the initial 6 months, leading them to introduce early complementary feeding in a bid to ensure robust growth. Furthermore, certain cultural factors contributed, with some mothers perceiving breastfeeding as physically taxing and potentially detrimental to their body shape. Urgent educational initiatives are warranted to enlighten mothers about optimal breastfeeding practices and the manifold benefits it offers both mother and child.

In relation to immunization, a noteworthy 93.5% of mothers exhibited positive attitudes toward immunization, recognizing its role in preventing illness among children. Moreover, 71.9% of children had received all the recommended vaccinations. Among the reasons cited for not receiving the full spectrum of recommended immunizations, poor child health (41.0%), distance from medical facilities (35.9%), and lack of knowledge (20.5%) were predominant. This discovery resonates with a study from Saudi Arabia and is partially aligned with research from Sudan and India. The success of Sudan's vaccination programs is likely attributed to free immunization services for all children, public education campaigns, and comprehensive media initiatives.

Mothers can prevent children's infections by taking measures such as washing hands at five critical times during the day (after using the toilet, after cleaning a child's buttock, before and after preparing food, before eating, and before feeding a child).[34] 74.8% of mothers followed all measures to prevent infections and 88.5% thought that hands should be washed with soap and water.

Regarding the etiology and prevention of malnutrition, 60.4% of mothers attributed it to recurrent infections, while 12.9% associated it with insufficient food intake. Moreover, a notable 56.1% of participants did not regard faulty feeding as the primary cause of malnutrition. In terms of malnutrition prevention, the majority of mothers (77%) favored seeking health care at a medical facility for malnourished children, whereas 15.8% leaned towards utilizing local methods. Additionally, 79.9% of participant mothers acknowledged increasing food intake as a preventive measure against malnutrition, while 16.5% reported not implementing any specific measures. Notably, lack of information (39.1%) and limited resources (39.1%) were cited as primary reasons for this suboptimal practice. These findings diverge from a study conducted in India, where only 15.3% of mothers linked malnutrition to infections, 29.2% to feeding practices, and 37% did not undertake any specific actions to prevent malnutrition; interestingly, 63% of these mothers lacked a discernible reason. The dissimilarity could potentially arise from challenges related to accessing and affording healthcare services.

Regarding malnutrition more broadly, 56.8% of mothers demonstrated adequate knowledge, 87.8% exhibited favorable attitudes, and 55.4% displayed satisfactory practices. Importantly, the present study observed insignificant associations between participants' sociodemographic characteristics and their knowledge, attitudes, and practices, apart from the significant link between education and practice ($P = 0.025$). This observation diverges from studies conducted in Ethiopia and Cameroon,[35,36] where notable correlations between education and malnutrition knowledge were identified.

Moreover, the current study unveiled significant associations between knowledge and attitudes ($P = 0.007$), knowledge and practices ($P = 0.006$), as well as attitudes and practices ($P = 0.033$). These findings substantiate the notion that enhanced knowledge corresponds to improved attitudes and practices among mothers. This concurrence aligns with the results of a study in Ethiopia that reported a significant correlation between knowledge and attitude, but contrasts with findings from Nepal,[37] where the connection between knowledge and attitudes was not statistically significant. Such differences could potentially stem from distinct sociodemographic characteristics and ethnicities among the surveyed mothers.

The overall findings pertaining to child feeding and malnutrition prevention revealed that 78.4% of mothers exhibited adequate knowledge, 80.6% held favorable attitudes, and 55.4% demonstrated good practices. These results underscore the need for additional education and counseling, particularly among mothers residing in rural regions of Sudan, a vast and expansive country. Such areas often face challenges in accessing essential healthcare services due to their remote locations. Within the realm of maternal and child health services, crucial components encompass antenatal or prenatal care, childbirth assistance, postnatal care, and comprehensive well-child care. These services substantially contribute to curbing maternal and child morbidity and mortality, including malnutrition.

However, this cross-sectional study does possess notable limitations. It was conducted solely within a single hospital, and data were collected through total coverage over a brief study period, potentially restricting the generalizability of the findings. Furthermore, the potential for recall bias exists, as mothers were required to recollect information spanning up to 5 years ago.

Conclusion

The study underscores that a significant majority of mothers exhibited satisfactory knowledge and positive attitudes

concerning child feeding and malnutrition prevention, yet there is a vital need to transform this awareness into improved practices. Educational and counseling initiatives are pivotal in enhancing mothers' understanding of proper practices while rectifying any misconceptions that may jeopardize both maternal and child well-being. Additionally, the implementation of periodic immunization campaigns in rural areas is imperative. There is a pressing call for heightened efforts to promote girls' education, as this serves as an avenue to foster the well-being of future generations; investing in girls' education holds the potential for genuine impact. Moreover, it is crucial to activate the role of healthcare professionals in driving educational and counseling programs for mothers during their hospital stays. Equally vital is the recommendation for qualitative studies to delve into the root causes behind the elevated incidence of malnutrition among Sudanese children, thus facilitating the implementation of necessary measures to combat this pressing issue.

Ethical consideration

Ethical approval was secured from both the Ethical Committee of the Faculty of Pharmacy, University of Khartoum (FPEC-03-2022), and the Research Ethics Committee of the Ministry of Health, Khartoum State. Furthermore, permission was granted by the hospital's research department. Prior to participation, verbal informed consent was obtained from each participant participants. Assurances of information confidentiality were provided. Participants were duly informed that their involvement was voluntary and that they retained the right to withdraw at any point without impacting their access to healthcare services.

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Conflicts of interest

There are no conflicts of interest.

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