Factors influencing Tanzanian mothers' feeding practices for toddlers: A predictive correlational study

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Abstract

Background: Feeding practices are crucial in ensuring toddlers receive an appropriate and varied diet to support their growth and development. In Tanzania, maternal feeding practices for young children are inadequate, and there is limited research on the influencing factors.

Objective: This study aimed to examine the factors influencing Tanzanian mothers' feeding practices for toddlers, utilizing the health promotion model as the theoretical framework.

Methods: A predictive correlational design was employed, with a random sample of 399 mothers who brought their toddlers for health supervision at a tertiary care hospital in the United Republic of Tanzania. Data on personal information, depression, perceived benefits, perceived barriers, perceived self-efficacy, social support, situational influences, and maternal feeding practices were collected using self-administered questionnaires between September 2021 and November 2021. Descriptive statistics, correlations, and multiple regression analysis were employed for the analysis.

Results: All the factors examined in the study accounted for 18.9% of the variance explained in maternal feeding practices. Significantly, only two factors, perceived self-efficacy ($\beta = 0.32$, $p < 0.001$) and situational influences ($\beta = 0.24$, $p < 0.001$), could predict maternal feeding practices.

Conclusion: Perceived self-efficacy and situational influences emerged as the primary influencing factors on maternal feeding practices for toddlers. Pediatric nurses should address these modifiable factors when developing nursing interventions and strategies to promote a healthy nutritional status in toddlers.

Keywords

Background

In Tanzania, child undernutrition is one of the country's most significant human development challenges concerning policymakers due to its far-reaching adverse consequences on child survival, long-term well-being, human capital, economic productivity, and national development. A recent national nutritional survey in Tanzania revealed that 32 percent of children under five years old were stunted, with 10 percent severely stunted and 2.7 percent severely underweight (Ministry of Health Community Development Gender Elderly and Children (MoHCDGEC) [Tanzania Mainland] et al., 2018). Childhood malnutrition increases the risk of death, morbidity resulting from a weakened immune system and concurrent infections, risk of chronic diseases, impaired cognitive development, and poor school performance (Alflah & Alrashidi, 2023). Inappropriate feeding practices at the household level are among the factors contributing to malnutrition in young children (Govender et al., 2021). During the first five years of life, children rely entirely on their parents' knowledge, efforts, and practices related to food and feeding.

Parents' awareness of their child's nutritional requirements plays a crucial role in making appropriate decisions for the child (Scaglioni et al., 2018).

Feeding practices refer to the behaviors of caregivers, particularly mothers, concerning the management and provision of adequate food intake for their children. These practices are multi-dimensional, involving offering healthy and age-appropriate food, enhancing good eating habits, and promoting a pleasant eating environment (Lusmilasari et al., 2015). Tanzania Food and Nutrition Center (TFNC) (2013) recommends five food groups: 1) cereals, green bananas, roots, and tubers; 2) pulses, nuts, and animal source food; 3) fruits; 4) vegetables; and 5) sugar, honey, fats, and oils. It is crucial for children to receive a diverse range of nutritious foods and adequate food intake, as appropriate feeding practices aid toddlers in maintaining a healthy weight and steady energy levels (Young & Krebs, 2013). Moreover, the way mothers feed and educate children about eating habits can be demonstrated through the atmosphere and setting during meals. A pleasant dining experience involving close interaction between mother, child, and other family members

enhances children's proficient eating skills, fosters responsible eating behavior, and promotes psychosocial, cognitive, and language development (Daniels, 2019).

Toddlerhood marks the transition period when children begin to explore various textures, tastes, and types of foods, requiring a relatively high nutrient intake. Additionally, toddlers develop autonomy in expressing food preferences and self-feeding skills (Young & Krebs, 2013). It is crucial to ensure a suitable match between toddlers' physical and developmental maturity and age-appropriate foods, considering both adequacy and diet diversity.

During toddlerhood, it is essential to monitor children's nutritional health because malnutrition often begins in this age group. However, nutritional problems do not suddenly occur in toddlerhood; they have evolved since infancy. Therefore, to promote healthy consumption habits in toddlers, parental feeding practices play a major role in promoting growth and preventing malnutrition among young children (Daniels, 2019; Young & Krebs, 2013).

Maternal feeding practices for young children in Tanzania are inadequate. A study in Tanzania highlighted that most mothers deviated from recommended practices due to traditional beliefs. They often provided their children with unhealthy foods based on what they learned from their own parents or even from encounters with other mothers in hospital settings (Kinabo et al., 2017). The study identified prevalent practices such as the use of pre-lacteal feeding, early introduction of complementary foods, low rates of exclusive breastfeeding, and infrequent meal frequency among Tanzanian mothers. Furthermore, Tanzanian toddlers' diets tend to lack fruits and vegetables, leading to inadequate micronutrient intake of essential elements like iron, zinc, and vitamin A, falling below recommended levels and potentially resulting in undernourishment (Kinabo et al., 2019). In Dar es Salaam, only 38.4 percent of children aged 6-23 months consumed a minimally acceptable diet, and there were substantially high rates of commercially produced snack food consumption (Vitta et al., 2016). Given these inappropriate feeding practices, it became crucial to identify the factors influencing maternal feeding practices before developing interventions to promote better nutrition.

Understanding maternal characteristics, experiences, cognitive factors, and emotional aspects that shape maternal feeding practices for young children is essential for developing a comprehensive nursing intervention to enhance their proficiency in proper feeding practices. The literature review indicates several factors that influence feeding practices, such as maternal age (Belete et al., 2017), maternal education (Nankinga et al., 2019), family income (Cartmill et al., 2022), depression (Anato et al., 2020; Woldetensay et al., 2021), perceived benefits, perceived barriers, perceived self-efficacy (Palupi & Chaiyawat, 2016), social support (Ernawati et al., 2016) and situational influences (Alum, 2022; Cartmill et al., 2022), each demonstrating their influence in varied contexts. However, it is crucial to note that knowledge derived from previous studies might not seamlessly apply to the Tanzanian context. For instance, Pakistani mothers hold beliefs different from Tanzanian mothers regarding the early introduction of honey to infants (Asim et al., 2020; Kinabo et al., 2017). When food types, names, forms, and beliefs differ, generalizing and applying findings to distinct contexts becomes challenging.

Moreover, existing Tanzanian literature has primarily focused on breastfeeding practices and the nutritional status of infants, with limited studies specifically exploring feeding practices for toddlers, especially guided by a nursing theoretical model. Different influencing factors identified across various studies have not been conceptualized and explained within a unified theoretical framework.

To address the gaps in existing literature, our study employed Pender's Health Promotion Model (HPM) as the conceptual framework (Pender et al., 2006). This model consists of cognitive-perceptual variables, forming a significant part of health-promoting interventions. To the best of our knowledge, this is the first study conducted in Tanzania that utilizes the HPM to investigate the influencing factors on feeding practices for toddlers. Therefore, this study aimed to examine the factors that influence mothers' feeding practices for toddlers in the Tanzanian context. A comprehensive understanding of these influencing factors would assist pediatric nurses in developing appropriate and holistic interventions to enhance maternal feeding practices and promote optimal nutritional status for toddlers in Tanzania.

Methods

Study Design
A predictive correlational design was employed to determine the prediction capability of the study factors based on the association between each factor and the dependent variable (Sousa et al., 2007). This study was conducted at the Muhimbili National Hospital (MNH), Dar es Salaam, Tanzania.

Samples/Participants
Mothers who brought their toddlers to visit the well-baby clinic at MNH for child health supervision were recruited based on the following inclusion criteria: 1) being able to read and write Swahili, 2) being 18 years old or older, 3) having a child between 1 and 3 years of age, and 4) being a primary caregiver for the child. Eligible participants were randomly chosen on the day of their visit using computer-generated random numbers. According to hospital statistics from 2020, the number of children visiting the clinic was 109,500. The sample size in this study was calculated using a statistical formula of Yamane (1967): $n = N / (1+ N (e)2)$, where n = required sample size, N = the total population in the study, and e = 5% sampling error. Consequently, the study consisted of 399 mothers.

Instruments
A set of eight questionnaires was used in the study as follows:
1) Personal information questionnaire developed by the researchers consisted of demographic information of the mother (including year of birth, educational level, marital status, occupation, family income, religion, and number of children) and toddler (including age, sex, and birth order).
2) The Center for Epidemiologic Studies Depression Scale (CES-D), developed by Radloff (1977) and translated into Swahili by Wilson et al. (2015), is used to ask the participants to rate how often over the past week they had depressive symptoms. The scale consists of 20 items with a four-point rating scale ranging from 0 (rarely or none of the time) to 3 (most or almost of the time). The reversed score is required for positive items. The possible total score ranges from 0 to 60;

the higher score indicates more depressive symptoms. A cut-off score of 16 and greater is considered at risk for clinical depression. Cronbach's alpha was 0.93 for the Swahili version in a previous study (Wilson et al., 2015) and 0.82 for the current study.

3) Perceived Benefits of Feeding Practices Questionnaire (PBeFPQ), developed by the researchers, is used to measure the perception of mothers about the benefits of performing proper feeding practices. It contains eight items with a four-point rating scale ranging from 1 (strongly disagree) to 4 (strongly agree). A reversed score is required for negative items. The possible total score ranges from 8 to 32; the higher score indicates the higher perceived benefits. The average item-content validity (mean I-CVI) was 0.95; the universal agreement of the content validity index for scale (S-CVI/UA) was 0.75; the Cronbach's alpha was 0.76 for the current study.

4) Perceived Barriers of Feeding Practices Questionnaire (PBaFPQ), developed by the researchers, is used to measure the perception of mothers about obstacles to performing proper feeding practices. It contains 12 items with a four-point rating scale ranging from 1(strongly disagree) to 4 (strongly agree). The possible total score ranges from 12 to 48; the higher score indicates the higher perceived barriers. In the current study, the mean I-CVI was 0.93, the S-CVI/UA was 0.83, and Cronbach's alpha was 0.87.

5) Perceived Self-Efficacy in Feeding Practices Questionnaire (PSeFPQ), developed by the researchers, consists of 20 items asking how much the mothers feel confident in their ability of feeding practices. The response scale ranges from 0 (definitely cannot do) to 100 (definitely can do). To obtain a total score, the numerical ratings of each item are summed and then divided by the number of items. The possible total score ranges from 0 to 100; the higher score indicates the higher perceived self-efficacy in feeding practices. In the current study, the mean I-CVI was 0.98, the S-CVI/UA was 0.90, and Cronbach's alpha was 0.90.

6) The Multidimensional Scale of Perceived Social Support (MSPSS), developed by Zimet et al. (1988), is used to assess the perceived adequacy of social support received from family, friends, and significant others. It consists of 12 items with a seven-point rating scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The possible total score ranges from 12 to 84; the higher score indicates the higher social support. An average score ranging from 1 to 2.9 is considered low support, 3 to 5 as moderate, and 5.1 to 7 as high. Factor analysis yielded three sources of support with the original construct, and Cronbach's alpha of 0.92 for the entire scale was reported (Zimet et al., 1990). In the current study, Cronbach's alpha was 0.73. One additional question, "Who is the most supportive person for your feeding practices?" was added, and no score was given.

7) Situational Influences on Maternal Feeding Practices Questionnaire (SIMFP), developed by the researchers, consists of 8 items asking the mothers if the given facilitating situations or contexts influence their feeding practices. The response scale ranges from 1 (never/definitely not true) to 4 (always/definitely true). A reversed score is required for a negative item. The total score ranges from 8 to 32; the higher score indicates the higher facilitating situational influences. In the current study, the mean I-CVI was 0.90, S-CVI/UA was 0.75, and Cronbach's alpha was 0.72 for the entire scale.

8) Parental Feeding Behaviors Questionnaire (PFBQ), developed by Lusmilasari et al. (2015), is used to measure the feeding behaviors of parents. The 56-item PFBQ consists of three dimensions, including (1) providing balanced, healthy, and safe food, (2) enhancing good eating behavior, and (3) promoting a pleasant eating environment. The PFBQ measures the frequency of behaviors in a five-point rating scale ranging from 1 (never) to 5 (always). The possible total score ranges from 56 to 280; the higher score indicates better feeding behaviors. The I-CVI ranges from 0.83 to 1.00, and S-CVI/UA was 0.98. Cronbach's alpha was 0.94 for the entire scale, ranging from 0.86 to 0.90 for each dimension. Due to the suggestions from the translators and content validators, 34 items of the PFBQ were modified by adjusting certain words to make them sound congruent with the Swahili language. Types of food and context of feeding behaviors were also modified to fit the Tanzanian eating culture. Despite the modification, the original essence of the content and the sentence structure were kept. In the current study, the mean I-CVI was 0.91, and S-CVI/UA was 0.80; Cronbach's alpha was 0.88 for the entire scale and ranged from 0.70 to 0.88 for each dimension.

For the existing instruments (questionnaires numbered 2, 6, and 8), permission for use, translation, and modification was obtained from the original tool developers. For the newly developed instruments (questionnaires numbered 3, 4, 5, and 7) by the researchers, items in English were pooled based on the theoretical definition of each variable defined by Pender et al. (2006) and Bandura (1997) as well as the literature review of similar existing instruments. The content validity of each newly developed questionnaire was checked by five validators with long working experience in the fields of pediatrics and nutrition in Tanzania, and revisions were made till the content validity index of each questionnaire was acceptable. The back-translation process (Brislin, 1970) was applied to all questionnaires in the current study, except the CES-D, with the following steps: 1) the original English version was translated into Swahili by the first researcher; 2) a bi-lingual Tanzanian teacher back-translated the Swahili into English; 3) both English versions were compared by the research team, discussion and correction on any differences found were performed. The internal consistency reliability of all instruments was tested with 30 mothers at the same study site whose eligibilities were similar to that of the study samples.

Data Collection
Data were collected between September 2021 and November 2021. Two research assistants, pediatric nurses in the study setting, received brief training on study procedures. Eligible participants were guided to the first researcher and research assistants, who introduced the study and explained the option to participate or decline. Upon obtaining signed consent forms, the researcher and assistants conducted interviews using the personal information questionnaire. Subsequently, participants received a set of self-administered questionnaires to complete while waiting for a doctor or after receiving all healthcare services. The completion of the questionnaires typically took 50 to 60 minutes. In cases where participants had no accompanying person, the research assistants provided assistance in caring for the child while the participants completed the questionnaires.

Data Analysis

Statistical Package of the Social Science (SPSS) software program version 18.0 (SPSS, Chicago, IL, USA) was employed for data analysis. Descriptive statistics were used to present demographic characteristics and study variables. Normal distribution criteria were considered satisfied when skewness ranged between -2 to +2 and kurtosis between -7 to +7 (Hair et al., 2010). Pearson product-moment correlation was computed for normally distributed data to assess relationships among study variables, and Spearman rank correlation was used for non-normally distributed data. Given that family income was categorized into two groups (1 = sufficient and 2 = insufficient), point biserial correlation was calculated. The assumptions required for multiple regression analysis were met. Consequently, simultaneous multiple regression was conducted to investigate the predictive power of study factors and maternal feeding practices for toddlers.

Ethical Consideration

Ethical approval was obtained from the Institutional Review Board of the Faculty of Nursing, Mahidol University, Bangkok, Thailand (COA No. IRB-NS2021/627.1608). Participants were provided with an explanation regarding the study's purpose, data collection procedures, confidentiality measures, and their right to participate or decline involvement without impacting the healthcare services they would receive from the hospital. All participants who willingly joined the study were required to sign a written informed consent form.

Results

Characteristics of the Participants

The participants comprised 399 mothers with toddlers aged 1-3 years. The mean age of the mothers was 27.03 years (SD = 4.378), ranging from 19 to 42 years old. Slightly more than half of the mothers (55.2%) had completed secondary education, with the years of education ranging from 7 to 19 years and an average of 10.56 years (SD = 2.88). Nearly all mothers (97%) were married, and 76.7% were involved in business enterprises. Half of the mothers (50.4%) reported insufficient family income. The Christian-Muslim ratio was approximately 2:3. On average, mothers had 1.83 children (SD = 0.81), ranging from 1 to 4, as detailed in **Table 1**. The mean age of the toddlers was 16.81 months (SD = 4.94), with an age range of 12 to 36 months; two-thirds of them (60.9%) were female.

Table 1 Demographic characteristics of participants (*N* = 399)

Characteristics	*n*	%	Mean ± SD (range)
Age (years)			27.03 ± 4.38 (19-42)
20 or younger	13	3.3	
21 – 25 years old	133	33.3	
26 – 30 years old	169	42.3	
31 – 35 years old	67	16.8	
36 or older	17	4.3	
Education			10.56 ± 2.88 (7-19)
Primary school	127	31.8	
Secondary school	220	55.2	
Diploma	18	4.5	
Bachelor	34	8.5	
Marital status			
Married	387	97.0	
Widow/Divorced	12	3.0	
Occupation			
Entrepreneur	306	76.7	
Employee	63	15.8	
Unemployment	24	6.0	
Laborer	6	1.5	
Family income			
Sufficient with saving	33	8.3	
Sufficient	165	41.3	
Not sufficient	201	50.4	
Religion			
Muslim	236	59.1	
Christian	161	40.4	
Buddhist	2	0.5	
Number of children			1.83 ± 0.81 (1-4)
One	158	39.6	
Two	162	40.6	
Three or more	79	19.8	

Characteristics of the Study Variables

The mean depression score was 10.68±7.12, with 23% of the mothers were at risk for depression. Regarding social support, 94.5% of the mothers reported high support, while 5.5% had moderate support. Among them, 59.1% identified their husbands as the most supportive regarding feeding practices, followed by the child's grandmother (27.3%) and healthcare providers (9%). Although other variables lacked categorized levels with cut-off points, their mean scores, compared to the potential range as viewed in **Table 2**, suggested favorable perceived benefits, low perceived barriers, high perceived self-efficacy, moderate level of situational influences, and good feeding practices.

Table 2 Range, mean, standard deviation, skewness, and kurtosis of the study variables (*N*= 399)

Variables (items)	Total Scores				
	Possible Range	**Actual Range**	**Mean ± SD**	**Skewness**	**Kurtosis**
Depression (20)	0-60	0-38	10.68 ± 7.12	1.4	0.96
Perceived benefits (8)	8-32	14-27	25.47 ± 1.30	-4.00	23.92
Perceived barriers (12)	12-48	12-30	15.32 ± 4.82	1.38	1.05
Perceived self-efficacy (20)	0 - 100	66-100	88.65 ± 7.81	0.19	-1.61
Social support (12)	12-84	48-84	73.86 ± 6.23	-1.57	3.24
Family subscale	4-28	16-28	25.63 ± 2.21		
Friends subscale	4-28	7-28	22.94 ± 2.61		
Significant others subscale	4-28	9-28	25.28 ± 3.62		
Situational influences (8)	8-32	15-29	23.57 ± 2.90	-0.17	-0.44
Maternal feeding practices (56)	56-280	152-260	206.58 ± 26.80	-0.12	-0.78
Providing balanced, healthy & safe food	18-90	40-89	64.63 ± 11.64		
Enhancing good eating behaviors	27-135	67-134	99.34 ± 13.25		
Promoting a pleasant eating environment	11-55	30-53	42.61 ± 5.09		

Relationships between Independent Variables and Maternal Feeding Practices

All study factors were significantly correlated with maternal feeding practices except for maternal age and social support (**Table 3**). The results indicated that all study factors could together account for 18.9 % of the variance explained in the maternal feeding practices. However, only two of the nine factors emerged as significant predictors of maternal feeding practices, as shown in **Table 4**. Specifically, perceived self-efficacy had the strongest influence ($\beta = 0.32$, $p < 0.001$), followed by situational influences ($\beta = 0.24$, $p < 0.001$).

Table 3 Relationships between independent variables and maternal feeding practices ($N = 399$)

Variables	1	2	3	4	5	6	7	8	9	10
1. Maternal age[†]	1.00									
2. Maternal education[†]	0.31***	1.00								
3. Family income[‡]	-0.03	-0.35***	1.00							
4. Depression[†]	-0.03	0.17**	-0.40***	1.00						
5. Perceived benefits[§]	-0.00	-0.04	0.19***	-0.26***	1.00					
6. Perceived barriers[†]	-0.03	0.21***	-0.39***	0.61***	-0.46***	1.00				
7. Self-efficacy[†]	-0.07	0.21***	-0.51***	0.54***	-0.31***	0.63***	1.00			
8. Social support[†]	-0.00	-0.10*	0.14**	-0.37***	0.39***	-0.58***	-0.33***	1.00		
9. Situational influences[†]	0.01	-0.02	-0.10*	-0.16**	0.12*	-0.12*	-0.16**	0.33***	1.00	
10. Feeding practices[†]	-0.03	0.12*	-0.24***	0.24***	-0.18***	0.25***	0.34***	-0.03	0.18***	1.00

Notes: [†]Pearson correlation, [‡]point-biserial correlation, [§]Spearman rank, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 4 Results of regression analysis of the factors influencing Tanzanian mothers' feeding practices for toddlers

Study variables	B	SEB	β	t	p	95% CI
Constant	48.46	39.38	-	1.23	0.219	-28.96,125.88
Maternal age	-0.16	0.30	-0.03	-0.53	0.595	-0.74, 0.43
Maternal education	0.48	0.48	0.05	0.99	0.318	-0.47, 1.43
Family income	0.73	3.11	0.01	0.24	0.815	-5.38, 6.83
Depression	0.35	0.23	0.09	1.55	0.122	-0.10, 0.80
Perceived benefits	-0.74	1.02	-0.04	-0.73	0.468	-2.75, 1.27
Perceived barriers	0.22	0.42	0.04	0.52	0.605	-0.60, 0.10
Perceived self-efficacy	1.08	0.23	0.32	4.77	0.000	0.63, 1.53
Social support	0.29	0.26	0.07	1.07	0.286	-0.23, 0.79
Situational influences	2.20	0.47	0.24	4.70	0.000	1.28, 3.12

$R = 0.435$, $R^2 = 0.189$, Adjusted $R^2 = 0.170$, $F(9,389) = 10.07$, $p < 0.001$

Discussion

Our finding showed that both self-efficacy in feeding practices and situational influences were influencing factors of maternal feeding practices. The influence of self-efficacy in feeding practices showed its strongest predictive magnitude in the analyzed model. In Pender's HPM, perceived self-efficacy, a key element of behavior-specific cognitive and emotional factors, is significant for long-term changes in health-promoting behaviors (Pender et al., 2006). Based on the premise of self-efficacy theory (Bandura, 1997), mothers who have a high sense of self-efficacy will not easily give up prematurely when facing obstacles related to feeding practices; note that the more perceived barriers, the higher self-efficacy found in the current study ($r = 0.63$, $p < 0.001$). Toddlerhood is the period for introducing new and various foods and teaching good eating behavior; thus, mothers must be confident in such challenging practices. Two previous studies conducted with mothers of toddlers in Indonesia (Ernawati et al., 2016; Palupi & Chaiyawat, 2016) align with the current study, supporting the influence of self-efficacy on feeding practices. Our study finding was concordant with previous studies reviewed by Bahorski et al. (2019), which concluded that mothers with greater self-efficacy had more tendency to consume more fruits and vegetables, less soft drinks and sweets, and less use of food for soothing to their infants and toddlers compared to mothers with lower self-efficacy.

It is noteworthy that the average score for self-efficacy in feeding practices was approximately 89%, which could be considered high. According to Bandura (1997), the most influential source of self-efficacy is from personal experiences of success. In this study, more than half of the mothers (60.4%) had more than one child. Hence, it could be assumed that their prior experience in caring for older children might strongly contribute to their ability to perform proper feeding practices for their younger children. A scoping review conducted by Sæther et al. (2023) indicated that mastery experience was associated with cultural aspects, expectations versus reality, and the learning process. Compared to first-time mothers, those with prior experience caring for their children would likely possess more realistic expectations and knowledge regarding feeding practices. This reduced gap between expectations and reality could potentially bolster self-efficacy in feeding practices.

According to Pender's Health Promotion Model (HPM), situational influences can facilitate or inhibit health-promoting behavior (Pender et al., 2006). Our study findings supported this theoretical proposition. In our study, situational influences on feeding practices referred to mothers' perceptions and cognitions regarding existing situations and contexts that could aid their feeding practices. These included accessible food sources like markets or grocery stores, the availability of healthy food ingredients for cooking, reasonable food prices, and nearby health facilities for obtaining advice on feeding practices. According to the HPM, these facilitative situations

were seen as positive options and supportive environmental factors that could significantly impact maternal feeding practices for toddlers by enhancing their competence in performing feeding practices.

Studies focusing specifically on situational influences on maternal feeding practices in infants or toddlers are scarce. Therefore, research related to specific nutritional behaviors in different populations was used to support the findings of our study. For instance, a study in Uganda indicated that improving diversification of food and fruits in complementary feeding and meals among farming households relied on factors such as food accessibility, availability, affordability, and cooking skills that could save time and cost (Alum, 2022). Another quasi-experimental study, grounded in Pender's HPM and aimed at improving the nutritional behavior of overweight and obese Iranian women through a training intervention, revealed a significant correlation between situational influences and behavioral changes in the experimental group (Khodaveisi et al., 2017).

Additionally, a qualitative study examining feeding practices for young children in two seaside districts of Kenya, characterized by the high prevalence of child malnutrition, highlighted that distance from the seashore restricted access to less expensive fish and seafood. Moreover, the availability of seafood in markets depended on seasonal weather patterns, which impacted fishing activities (Cartmill et al., 2022). Similarly, a case-control study in south Ethiopia showed that inappropriate complementary feeding was four times more likely among children aged 6 to 23 months in areas without nearby health facilities (Berhanu et al., 2019).

Behavior-specific cognitive factors, including perceived benefits, perceived barriers, and personal factors like depression, did not significantly influence Tanzanian mothers' feeding practices for toddlers. However, these factors did correlate significantly but irrationally with maternal feeding practices. Surprisingly, the mothers displaying more depressive symptoms, perceiving fewer benefits, and encountering more barriers seemed to have better feeding practices. These findings contradicted certain previous studies. For instance, two studies in Ethiopia reported that maternal depressive symptoms were associated with improper feeding practices (Anato et al., 2020; Woldetensay et al., 2021). Palupi and Chaiyawat (2016) also found that perceived benefits and barriers could predict Indonesian mothers' feeding behaviors for their toddlers. The discrepancy in our findings calls for further investigation, focusing on more related factors and establishing causal relationships.

The findings confirm that it is discouraged to generalize results from earlier studies conducted in diverse socio-economic and cultural contexts to mothers in Dar es Salaam, Tanzania. However, it is essential to note that despite the statistically significant correlation, each factor explained only a small proportion of the total variance in maternal feeding practices. Specifically, these three factors individually accounted for only 3% to 6% of the variance explained. According to Armstrong (2019), such minimal significant correlations, as observed in this study, are not uncommon when a large sample size is included and may not hold practical value. Furthermore, when other study factors were held constant, none of them—depression, perceived benefits, or perceived barriers—individually predicted maternal feeding practices.

The current study revealed that almost all mothers received high social support from their families, with more than half noting their husbands as the most supportive individuals in feeding practices. Surprisingly, social support had no association or impact on maternal feeding practices. One possible explanation for this absence of influence could be the overwhelming high level of support received by almost all mothers (94.5%), where the minimal discrepancy in support might not adequately explain the variations in feeding practices. Additionally, Palupi and Chaiyawat (2016), in a study involving Indonesian mother-toddler pairs, encountered a similar outcome and attributed it to the tool used to measure social support, the MSPSS. They suggested that the MSPSS, designed to assess general support from various sources, might not sufficiently capture the specific aspects of support linked to feeding practices. Their reasoning appears reasonable and could potentially apply to explain the current study's findings.

Maternal age could neither significantly correlate with nor predict maternal feeding practices for toddlers. The finding was consistent with a study by Palupi and Chaiyawat (2016), who reported that the age of Indonesian mothers was unrelated to maternal feeding practices. However, the result was contrary to a previous cohort study with five low-income and middle-income countries including Brazil, Guatemala, India, the Philippines, and South Africa (Fall et al., 2015) and a study in Ethiopia (Belete et al., 2017), indicating that mothers younger than 19 years were more likely to have stunted infants and poorer feeding practices. It is worth noting that only 3.3% of mothers in the current study fell between 19 and 20 years old, possibly explaining why maternal age did not seem to impact feeding practices as seen in studies with more adolescent participants.

In Tanzania, although primary education is mandatory, prevalent child marriage and pregnancy prevent women from attending school (Right to Education Initiative, 2015). Consequently, it is assumed that our study's mothers were more educated compared to the country's general population of mothers. Education typically provides mothers with access to knowledge, resources, and necessary skills for proper child feeding. This finding is consistent with a study in Uganda, demonstrating that children born to more educated mothers (with either primary or secondary education) showed better nutritional outcomes than those born to uneducated mothers (Nankinga et al., 2019). However, the magnitude of the correlation observed was very low, and when controlling other study factors, maternal education did not influence feeding practices. A similar trend was seen with family income. Previous studies indicated that insufficient family income often acted as a barrier to accessing animal-source foods like fish (Cartmill et al., 2022) and was associated with inappropriate food choices for infants (Pradanie et al., 2020). Interestingly, mothers in our study who reported insufficient family income tended to display poorer feeding practices. However, once other factors were controlled, the influence of family income disappeared. This suggests that other study factors had stronger influences on feeding practices than maternal education and family income.

Strengths and Limitations

This study is one of the first in Tanzania to apply Pender's HPM in assessing mothers' feeding practices for toddlers, an age group that has received little attention in the literature. Notably, it included situational influences, behavior-specific cognition, and affect rarely explored in previous related studies. Moreover, simple random sampling with a relatively large sample size offered robust statistical power. However, despite these strengths, several limitations should be acknowledged. The cross-sectional nature of the study design prevented the establishment of causal relationships. Furthermore, the study's influencing factors were evaluated using newly developed questionnaires, with only content validity and reliability examined. A thorough investigation into the comprehensive psychometric properties of these measures is warranted.

Implications of the Study and Recommendations for Future Research

Two factors significantly influencing Tanzanian mothers' feeding practices for toddlers, perceived self-efficacy and situational influence, are modifiable components that nurses can integrate into nursing interventions to enhance proper feeding practices among these mothers. A robust hospital-based program employing strategies to increase mothers' self-efficacy in feeding practices for their toddlers is essential. Furthermore, with support from hospital policies, nurses should initiate proactive endeavors to raise community awareness and establish better nutritional environments for children in neighboring communities. Collaboration with community leaders, grocery owners, local farmers, and food merchants is pivotal for successfully implementing these activities. The health outcomes for children resulting from such interventions should be evaluated and used as a cornerstone for nurse advocacy, encouraging government policy decisions to implement large-scale programs that improve maternal feeding practices and shape the food environment for the well-being of children in Tanzania. Future research should investigate the causal relationships among factors outlined in Pender's HPM on maternal feeding practices for toddlers. Given that approximately 81% of the variance was explained by other variables not included in this study, exploring the influences of other relevant factors is recommended. Additionally, a qualitative study focusing on aspects of situational influences on maternal feeding practices for toddlers is suggested to gather detailed insights for comprehensive understanding when applied to the study context.

Conclusion

The study examined the factors impacting Tanzanian mothers' feeding practices for toddlers, utilizing Pender's HPM as the study framework. The results underscored the notable impact of perceived self-efficacy in feeding practices and situational influences. These modifiable factors should be harnessed by nurses when devising nursing interventions and strategies to enhance maternal feeding practices for toddlers.

Declaration of Conflicting Interest

The authors have no conflict of interest to disclose.

Authors' Contributions

All authors contributed substantially from conception to the finalization of this study. DDB contributed to the conception, design, data collection, data analysis, and the first draft of the manuscript. TP contributed to the manuscript's conception, design, data analysis, and finalization. SP and CC contributed to the conception, design, and data analysis. All authors approved the final draft of the manuscript.

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Data Availability

The data presented in this study are available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

Nothing to declare.

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