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Infant feeding practices among mothers in Nyankpala, Ghana

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ABSTRACT

Background: The prevalence of malnutrition among children in Ghana, particularly in the northern region, can be significantly attributed to infant feeding practices, which have been noted as one of the main factors affecting children's nutritional status. This study was carried out to define and describe the infant feeding practices among mothers with children aged 6 and 24 months in Nyankpala, in the Northern Region of Ghana.

Methodology: A descriptive survey was employed to examine the infant feeding practices adopted by mothers in Nyankpala. The study targeted a cohort of nursing mothers with children aged 6 and 24 months. According to the World Health Organization, for the first six months of their lives, infants should be fed only breast milk, starting within the first hour of life. After that, complementary foods should be introduced while breastfeeding continues for at least two years.

Results: The results revealed from this study meet the standard where 90% of mothers practiced exclusive breastfeeding, 71.7% started within the first hour after delivery, 85% fed on demand, and 90% breastfed for two (2) years and above. The majority, 90%, first introduced cereal-based foods such as corn porridge, millet porridge, "cerelac", and "lactogen". These practices could result from the education given to mothers during antenatal clinic visits.

Conclusion: Socio-demographic characteristics, including age, marital status, educational level, occupation, income, and household size of mothers, were the likely factors that influenced the infant feeding practices among mothers in Nyankpala. It is therefore recommended that mothers continue to adopt exclusive breastfeeding as the ideal infant feeding practice because it has many benefits for the mother, child, and health organizations. Infant feeding education must continuously be given to mothers during antenatal care and at the Child Welfare Clinic.

Keywords: infant feeding, nutritional status, malnutrition, breastfeeding, complementary feeding

INTRODUCTION

Nutrition has a significant impact on the overall health, growth, and development of people, and during the initial two years of life, physical and cognitive development takes place at an accelerated rate. Proper nutrition at this age will help to develop a healthy immunity, healthy organ development, and long-term health [1, 2]. The children in this age bracket are especially susceptible to common childhood conditions like diarrhea, respiratory infections, and growth retardation, which are simply caused by deficiencies in micronutrients and poor feeding habits [3, 4]. Proper nutrition in infancy not only helps in immune development and cognitive growth, as well as gives defense against non-communicable diseases related to nutrition in adulthood, but also protects mothers and children [5, 6].

In addition, nutrition also boosts output, improves the ability to learn, and helps in breaking the poverty and hunger cycle between generations [7, 8]. The practice of infant feeding, which includes exclusive breastfeeding, complementary and mixed feeding, is directly related to the nutritional status of children. Educating children under the age of two about the importance of proper feeding, as well as appropriate hygiene and care, can go a long way in enhancing the nutritional results of children [9, 10]. The opposite is also true because poor feeding habits predispose children to the long-term effects of malnutrition [3, 4].

The recommendations given by World Health Organization are that infants should be exclusively breastfed during the first six months of life, starting at the initial hour of life, with the

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introduction of safe, appropriate, and nutrient-rich complementary foods after that period [11, 12]. In cases of mothers with HIV, World Health Organization recommends that mothers should breastfeed for the first six months, followed by the introduction of complementary foods, with the discontinuation of breastfeeding to take place after the establishment of safe and nutritionally appropriate alternatives [11, 13].

Global data indicate that of all infants below the age of six months, only around 44 percent of infants are exclusively breastfed, despite the well-documented advantages of breastfeeding. This is an expression of the long-standing barriers to the practice, including poverty, geographical distance, maternal employment restrictions, and access to healthcare assistance [14-16]. The need to identify and minimize these barriers is crucial to enhancing the nutrition of infants and young children [6, 17]. Breastfeeding offers a lot of advantages to infants, the most common ones are decreased risk of infections, obesity, and metabolic disorders later in life [3, 6, 18]. It also helps to reduce the serum levels of cholesterol in grown-ups and has protective effects against type 2 diabetes and hypertension [1, 5].

In mothers, breastfeeding promotes a quick recovery in their postpartum weight and decreases the risk of developing type 2 diabetes, osteoporosis, and hip fractures in old age [2, 10]. Besides physical advantages, breastfeeding enhances the emotional relationship between the mother and the child, which improves their psychological well-being [19, 20]. The conditions that determine how quickly a breast is initiated and maintained should be understood to create effective support interventions [21-23].

Healthcare professionals are a significant aspect in breastfeeding support, and lactation consultant programs have shown healthy positive effects on breastfeeding results [23, 24]. Nevertheless, breastfeeding experiences may be impacted by issues such as lactation issues, perceived inadequate milk, and adverse occurrences [25-27]. Moreover, the continuation rates could be affected by the maternal usage of medication and fear of the safety of medication in the breast milk [28].

The culture, socioeconomic status, and healthcare access are various contextual influences that have a huge impact on the practice of breastfeeding within diverse populations [7, 9, 29]. Special concern should apply to vulnerable groups, such as ethnic minorities, mothers in crisis, and mothers with preterm infants [17, 27, 30]. In case maternal breastfeeding cannot take place, alternative but safe methods should be encouraged, including pasteurized donor human milk [13, 31].

New treatment methods (such as colostrum oropharyngeal immunotherapy of preterm babies) are promising to yield better results in the case of the newborns at risk [32]. Even social media platforms have become the platforms where breastfeeding experience and information are shared, which might impact maternal practice and perception [19]. The methodological series of measurements of breastfeeding outcomes needs to be approached carefully to provide reliable data collection and policy development [12, 33].

The economic and environmental impacts of using commercial milk formula uphold the necessity to encourage breastfeeding based on both public-health and sustainability [34]. The systematic review of evidence-based interventions as support to breastfeeding has already been conducted, which offers the chance to guide clinical practice and policy-making [6, 11]. Even now, international advocacy like World Breastfeeding Week 2025 is pushing to invest in the breastfeeding support fraternity [35]. Breast milk cannot sustain the growing energy and nutrient needs of the growing infant after 6 months. Here, it is necessary to introduce relevant complementary food [7, 36]. The quality, safety, and time of these complementary foods have a direct influence on the development of adolescents and their health [8, 11]. It has been proven that long-term breastfeeding after early weaning, supplemented with proper complementary feeding, will contribute to sufficient growth, cognitive growth, and the health outcomes in the long-term [1, 36].

METHODOLOGY

Study Area

The study was conducted at Nyankpala, which is about 20 km southwest of Tamale, the capital of the Northern Region, in the Tolon area. Tamale is 600 km North of Accra, at a latitude of 9.4075 °N and a longitude of 0.85333 °W. The region has only one rainy season, which runs from April/May to September/October, with July/August as the peak months. There are 95 days of extremely heavy rainfall with an average yearly rainfall of 1100 mm. Typically, the dry season lasts from November through March. While moist southwesterly winds impact the rainy season, the dry north influences northeasterly (harmattan) winds. The average temperature is between 33 °C and 39 °C during the day and between 20 °C and 22 °C at night. There are roughly 7.5 hours of sunshine each year on average. Grasses with very few shrubs primarily dominate the natural vegetation in the area. According to the District Assembly, the estimated population of Nyankpala is 20,000. This population comprises different tribes, such as Dagombas, Gonjas, Frafras, and Builsas. Dagombas, however, carry the more significant population, forming community's major group. Christianity, Islam, and traditional are the major religions in Nyankpala, with Islamic and traditional religions predominating. The main occupation in Nyankpala is farming, and the crops that are produced include rice, maize, and ground nuts, among others. Moreover, animals such as cattle, sheep, goats, and poultry are also reared. Foods such as rice, "fufu", "banku", and "ampesi" (boiled yams) are eaten by the people of Nyankpala. However, Tuo Zaafi, which is popularly known as T.Z., is the staple food eaten with "bra", "ayoyo", or "kuka" soup as main dishes [37, 38]. Annual festivals celebrated by the people of Nyankpala are numerous, but the most prevailing ones are the Damba and Bugum (fire) festivals.

Sample Size and Study Population

The study area for this study was Nyankpala, and 60 respondents were selected from a cohort of mothers with children aged 6-24 months from Nyankpala Clinic. The first interview was conducted, and data collection proceeded using a semi-structured questionnaire.

Data Collection

Interviews and observations were used to obtain both qualitative and quantitative data from the respondents. A pre-test was carried out at Cheyohi, a community near Nyankpala, on five mothers on 1 May 2023. The pre-test was done at Cheyohi because it has the same characteristics as Nyankpala.

Table 1. Socio-demographic characteristics of respondents

Variable	Frequency (N = 60)	Percentage (%)
Age		
13-19	4	6.7
20-24	16	26.7
25-29	18	30.0
30-34	14	23.3
35-39	5	8.3
40-44	1	1.7
45-49	2	3.3
Marital status		
Married	57	95.0
Not married	3	5.0
Religion		
Muslims	51	85.0
Christians	9	15.0
Ethnicity		
Dagombas	53	88.3
Akan	1	1.7
Frafras	6	10.0

During the pre-testing, some questions were found to be irrelevant and removed, while others were added. Finally, a face-to-face interview was conducted using the modified semi-structured questionnaire, divided into five sections: identification, socio-demographic characteristics of the mother, the child's information, breastfeeding practices, and complementary feeding practices. During interviews, most respondents were either breastfeeding or feeding their children solid foods. Thus, mothers were observed regarding minutes for breastfeeding at a sitting and types and quantities of food being fed to their children, among other things.

Data Analysis

The semi-structured questionnaire used to interview the respondents was coded, and the statistical package for the social sciences version 22.0 was used to analyze the data collected. The results were presented in tables as frequencies and percentages; some were illustrated on a pie chart.

RESULTS

Socio-Demographic Characteristics of Respondents

The data shown in **Table 1** shows socio-demographic characteristics of respondents. Eighteen (30%) of respondents (mothers) fell within the age range of 25-29 years, whereas the minority, 1 (1.7%) of respondents (mothers), were 40-44 years old. However, 4 (6.7%), 16 (26.7%), 14 (23.3%), 5 (8.3%), and 2 (3.3%) fell within the age ranges of 13-19, 20-24, 30-34, 35-39, and 45-49 years, respectively. The majority of respondents, 57, were married, constituting 95%, while 3 (5%) were not. Moreover, 51 (85%) were Muslims, while 9 (15%) were Christians. The majority of respondents, 53 (88.3%), were Dagombas, while the minority, 1 (1.7%), was Akan. However, 6 (10%) of the respondents were Frafras.

Figure 1 revealed that the majority, 43 (71.7%) of respondents, did not attain formal education, whereas the minority, 1 (1.7%), attained formal education up to the tertiary level. However, 4 (6.7%) attained formal education up to the primary level, 10 (16.7%) up to the junior high school level, and 2 (3.3%) up to the Senior High School level.

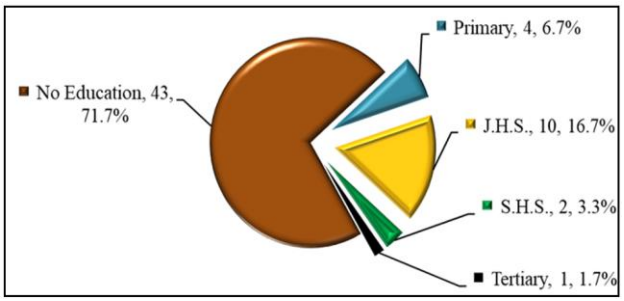

Figure 1. Educational characteristics of respondents (Field Survey, 2023)

Table 2. Economic characteristics of the respondents

Variables	Frequency (N = 60)	Percentage (%)
Occupation		
Farmer	9	15.0
Salary worker	2	3.3
Unemployed	37	61.7
Seamstress	2	3.3
Cleaner	2	3.3
Trader	8	13.3
Household size		
7-12 (average-sized)	26	43.3
Huge households (> 21)	2	3.3
1-6 (small–sized)	13	21.7
13-20 (large)	19	31.7

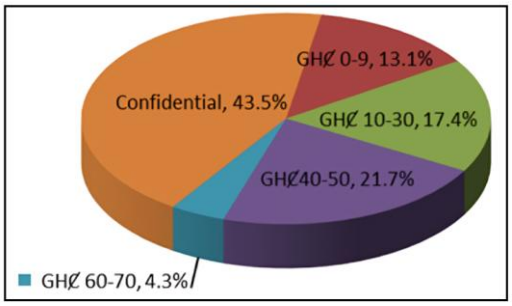

Figure 2. Income of employed mothers (per week) (Field Survey, 2023)

Economic Characteristics of the Respondents

Data gathered, as shown in **Table 2**, reveals that the majority, 37 (61.7%), of the respondents were unemployed. In contrast, a minority, 2 (3.3%), were salary workers, 2 (3.3%) were seamstresses, and 2 (3.3%) were employed as cleaners in an organization. However, 9 (15%) were farmers, and 13.3%, representing eight respondents, were into trading goods such as bread, fried fish, "kulikuli", raw groundnuts, raw rice, soybeans, sachets of drinking water, and soft drinks. Besides the primary occupation, 1 (1.7%) of the respondents who are into raw rice trading also have farming as a secondary occupation. On the household size of respondents, the majority, 26 (43.3%) of the respondents, were from 7-12 (average-sized) households, while the minority, 2 (3.3%), were from huge households (> 21). Also, 13 (21.7%) were from 1-6 (small-sized) households and 19 (31.7%) from 13-20 (large-sized) households.

Figure 2 shows that the majority, 10 (43.5%), of the employed respondents refused to disclose their income, while the minority, 1 (4.3%), earned between GH₵ 60-70. However, 3

Table 3. Characteristics of the children

Variable	Frequency (N = 60)	Percentage (%)
Gender		
Male	30	50.0
Female	30	50.0
Age (in months)		
6-12	32	53.3
13-18	13	21.7
19-24	15	25.0

Table 4. Breastfeeding practices (N = 60)

Variable	F	P (%)
Initiation of breastfeeding		
Initiated less than 1 hour	43	71.7
Initiated after 2 Days	1	1.7
Initiated after 1 month	1	1.7
Initiated after 1 hour	11	18.3
Initiated after 1 day	4	6.7
Duration of breastfeeding		
Breastfeed for 24 months or above	54	90.0
Breastfeed below 24 months	6	10.0
Frequency of breastfeeding (daily)		
12 times and above	31	51.7
1-3 times	1	1.7
4-5 times	6	10.0
6-9 times	6	10.0
10-12 times	16	26.7
When does mother breastfeed?		
When a child shows signs of hunger	51	85.0
When the child's stomach becomes flat	1	1.7
When the child shows signs of hunger, and when the child urinates	1	1.7
When the child shows signs of hunger, and when the child's stomach becomes flat	1	1.7
When the mother is less busy	4	6.7
When the mother is less busy and when the child shows signs of hunger	2	3.3
Minutes spent on breastfeeding		
6-10 minutes	28	46.7
11-20 minutes	2	3.3
21-25 minutes	26	43.3
26-40 minutes	4	6.7

Note. F: Frequency & P: Percentage

(13.1%), 7 (17.4%), and 5 (21.7%) earned between GH₵ 0-9, GH₵ 10-30, and GH₵ 40-50 per week, respectively.

Characteristics of the Children

From **Table 3**, the study revealed that 30 (50%) were males and 30 (50%) were females. Moreover, 53.3% of the children under study were 6-12 months old, while 13 (21.7%) were 13-18 months old. However, 15 (25%) were 19-24 months old.

Breastfeeding Practices

Table 4 reveals that all mothers (100%) in Nyankpala were breastfeeding their children. The study shows that 43 (71.7%) initiated breastfeeding less than 1 hour after delivery, whereas 1 (1.7%) and 1 (1.7%) initiated breastfeeding after 2 days and 1 month, respectively. However, 11 (18.3%) and 4 (6.7%) initiated breastfeeding after 1 hour and one day, respectively. Findings on breastfeeding duration revealed that the majority, 54 (90%) of mothers, said they would breastfeed their children for 24 months or above, while the minority, 6 (10%), said they would wean their child below 24 months. On how often mothers breastfeed within a day, most 31 (51.7%) said they breastfeed more than 12 times, whereas the least 1 (1.7%) breastfeed 1-3 times a day. But 6 (10%), 6 (10%), and 16 (26.7%) breastfed 4-5 times, 6-9 times, and 10-12 times a day, respectively. Also, 51 (85%) mothers breastfeed "when a child shows signs of hunger", while 1 (1.7%) breastfeeds "when the child's stomach becomes flat", 1 (1.7%) breastfeed "when the child shows signs of hunger and when the child urinates", and 1 (1.7%) breastfeed "when the child shows signs of hunger and when child's stomach becomes flat". But 4 (6.7%) breastfeed "when the mother is less busy", and 2 (3.3%) breastfeed "when the mother is less busy and when the child shows signs of hunger". Data gathered from the study on how long mothers breastfeed at a sitting revealed that most 28 (46.7%) mothers breastfeed for 6-10 minutes, whereas at least 2 (3.3%) mothers breastfeed for 11-20 minutes. Besides, 26 (43.3%) breastfed for 1-5 minutes, and 4 (6.7%) breastfed for 21-40 minutes.

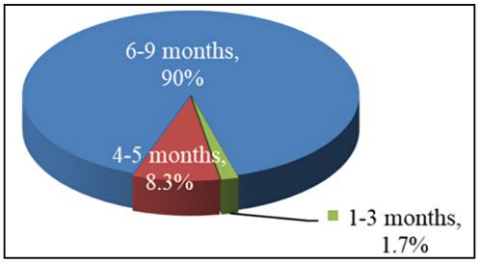

Figure 3. Age at which water was first given (Field Survey, 2023)

Data presented in **Figure 3** revealed that 54 (90%) of mothers first gave water at 6-9 months, while 1 (1.7%) first gave water when the child was 1-3 months. However, 5 (8.3%) first gave water at age 4-5 months.

Complementary Feeding Practices

The study's findings from **Table 5** revealed that the majority, 44 (88%) of mothers, started complementary feeding when their children were 6-9 months old, while the minority, 1 (2%), started complementary feeding at age 1-3 months. However, 5 (10%) started at 4-5 months. For mothers who had not yet started complementary feeding, the majority, 7 (70%), said they would begin when their children were nine months or older, while the minority, 3 (30%), said they would begin when the child was nine months old. Reasons given by mothers on why they started complementary feeding at a certain age include the following: the majority, 24 (48%), said "breast milk was not enough to satisfy child", while the minority, 1 (2%), said "child continually refused breast milk", 1 (2%) said "child bites a nipple when breastfeeding", and 1 (2%) also said at the same time that "child continually rejects breast milk and breast milk was not enough to satisfy child". However, 6 (12%) said "child was grown-up", 2 (4%) said "child cries when mother or someone is eating", and 15 (30%) said "nurses' advice". Besides, mothers who had not started complementary feeding also gave these reasons: 7 (70%) said "the child is still young", 1 (10%) said "the breast milk still flows", and 2 (20%) said "the child continually refuses food". From the 50 (100%) mothers who have started complementary feeding, the study revealed that majority, 39 (78%) of mothers practicing complementary feeding, do not have any food that is forbidden to feed their children, while 5, being the minority, said they have specific foods that are forbidden to feed their children, which include foods containing pepper 2 (4%), cow milk 2 (4%), and Tuo Zaafi 1 (2%). Also, on why food types are forbidden to feed a child, mothers have the following to say: "the child will reject breast milk when fed with cow milk" 3 (6%), and "the child will be

Table 5. Complementary feeding practices-1

Variable	F	P (%)
When complementary feeding started	(N=50)	
6-9 months	44	88
1-3 months	1	2
4-5 months	5	10
Yet to start complementary feeding	(N=10)	
Will start when the child is 9 months or older	7	70
Will start when the child is 9 months old	3	30
Reasons for starting complementary feeding	(N=50)	
Breast milk was not enough to satisfy the child	24	48
Child continually refused breast milk	1	2
Child bites a nipple when breastfeeding	1	2
Child continually rejects breast milk, and breast milk is not enough to satisfy the child	1	2
Child had grown up	6	12
Child cries when mother or someone is eating	2	4
Nurses' advice	15	30
Reasons for not starting complementary feeding	(N=10)	
The child is still young	7	70
The breast milk still flows	1	10
The child continually refuses food	2	20
Forbidden complementary food	(N=44)	
No forbidden food	39	78
Foods contain pepper	2	4
Cow milk	2	4
Tuo Zaafi	1	2
Reasons for forbidden complementary food	(N=6)	
The child will reject breast milk when fed with cow milk	3	6
The child will be infected with diarrhoea when fed with foods containing pepper and Tuo Zaafi	3	6

Note. F: Frequency & P: Percentage

Table 6. Complementary feeding practices-2

Variable	F	P (%)
Who feeds the child?	(N=50)	
Mother	24	48
Mother and grandmother	3	6
Mother and elder siblings	1	2
Mother and child	19	38
Mother and neighbor	1	2
Mother and mother-in-law	1	2
Mother, grandmother, and child	1	2
Number of times of feeding	(N=50)	
4 times	14	28
Once a day	3	6
2-3 times	26	52
5 times	7	14
When mothers feed	(N=50)	
When a child complains or shows signs of hunger	30	60
When a mother is less busy	1	2
Before the mother eats	2	4
When a mother is eating	12	24
When a child complains/shows signs of hunger and when a mother is eating	5	10
Food acquisition	(N=50)	
Home prepared	42	84
Bought	1	2
Home-prepared and bought	7	14
Reasons for buying food	(N=8)	
Do not have time to prepare food at home	7	87.5
Buying food is less expensive	1	12.5

Note. F: Frequency & P: Percentage

infected by diarrhoea when fed with foods containing pepper and Tuo Zaafi" 3 (6%).

Regarding whom feeds the child normally, from **Table 6**, mothers said the following: the majority, 24 (48%), said, "mother feeds child by herself". However, the minority, four (4) mothers representing 2% each said, "mother and elder siblings of child do the feeding", "mother and a neighbour", "mother and mother-in-law", and "mother, grandmother, and sometimes child feeds him or herself". However, 3 (6%) mothers said, "mother and grandmother", and 19 (38%) said "mother and child". Furthermore, mothers were interviewed about how often they feed their children within 24 hours. The majority, 26 (52%), said "2-3 times", but the minority, 3 (6%), said "once a day". Still, 14 mothers, representing 28%, said "4 times", and 7 (14%) said "5 times". Data gathered and presented in tables on when mothers normally feed their children revealed that the majority of mothers, 30 (60%), feed when "the child complains or shows signs of hunger". On the other hand, the minority, 1 (2%), feed "when the mother is less busy". However, 2 (4%) feed "before the mother eats", "when the mother is eating", 12 (24%), and "when a child complains or shows signs of hunger and when the mother is eating" 5 (10%). On how mothers acquire food to feed their children, the majority, 42 (84%), said "home prepared", while the minority, 1 (2%), stated that it is "bought". However, 7 (14%) said both "home prepared and bought". Moreover, the eight (8) mothers who bought them were further interviewed on why they buy instead of preparing. The following reasons were given: the majority, 7 (87.5%), said they "do not have time to prepare food at home", while a minority, 1 (12.5%), said they buy because "buying food is less expensive".

DISCUSSION

Breastfeeding Practices

According to the definition of the World Health Organization, breastfeeding is characterized by offering an infant or a young child a drink directly from a human breast, not by a bottle or another container [11]. Moreover, the new global guideline on infant and young child feeding was developed by World Health Organization, which recommends the infants to be solely breasted during the first six months of life, which should begin within the first hour after birth and proceed on demand, day and night [6, 11, 12].

The findings achieved on this research support such recommendations. One hundred percent of the mothers took part and exclusively breastfed their children, who were directly fed through the breasts and not through a bottle. Most of them (54 mothers of 90% of the mothers in the sample) said that they began to give water to their babies six to nine months of age, meaning that most of them used exclusive breastfeeding. This is a 90 percent mostly exclusive breastfeeding prevalence compared to the 46.7 percent prevalence of exclusive breastfeeding in another previous study carried out in Nyankpala [37], which indicates that the breastfeeding practice has indeed improved. Such an improvement can be explained by better maternal education and awareness gained in the framework of an antenatal care session [21, 22].

On the other hand, 31 mothers (51) breastfed their infants due to the hunger signals, which shows compliance with on-demand feeding behaviors. In the same way, 43 mothers (71.7%) had started breastfeeding in the first hour after delivery, which is in the range of the target by World Health Organization of initiating breastfeeding early [2, 10].

The reports of [11] state that child survival as well as nutrition are better results of breastfeeding, whether in two years or more [1, 36]. The stated correlation can be observed in our research, where 54 mothers (90%) were planning to continue breastfeeding after 24 months or more, which should have a positive effect on child nutrition in Nyankpala [5, 6].

The time and frequency of breastfeeding differ based on the needs of the infant, but the existing literature suggests that the infant should feed eight to twelve times within 24 hours, and each time the infant should spend around ten to twenty minutes feeding [24-26]. Regular feeding induces milk yield, prevents neonatal jaundice, and helps optimally gain weight [6, 18].

The results of this research suggest that 31 mothers (51.7%) successfully breastfeed 12 times or more than 12 times per day, but most of them could not accomplish the timeframe designated for each feeding session. More precisely, 28 mothers (46.7%) breastfeed up to 6-10 minutes, and 26 mothers (43.3%) breastfeed up to 1-5 minutes each session. These times are lower than the recommended intervals [24, 26], but still, numerous feeds within a day allow an infant to meet his or her nutrient needs by the total amount of milk taken with each feed [11, 36].

Complementary Feeding Practices

Complementary feeding refers to the act of feeding solid food and liquids used to supplement the nutritional needs of an infant in case they cannot be met by customary breast milk [7, 11]. Otherwise stated, complementary feeding provides the extra nutrients needed to develop and grow, which breast milk does not deliver after six months of age [8, 36]. Most recent reviews insist that the shift to complementary feeding at the age of about six months is critical in terms of avoiding nutritional deficiencies and ensuring successful development [7, 9, 29]. The evidence on this has been provided earlier, and even more recently supported by studies [4, 7], which have shown that breast milk meets nutritional needs within the first six months; after that, complementary foods are needed to prevent the deficits in energy and essential nutrients. This statement follows the findings of this study because the majority of mothers, 24 (48%), said they had already started complementary feeding. After all, “breast milk was not enough to satisfy a child”.

Furthermore, approximately half a year later, by the time the infants reach around six months of age, the majority of them are developmentally prepared to consume other foods, which is partially supported by the recent global findings [11, 36]. Therefore, safe and nutritionally appropriate complementary foods are to be introduced after six months [7, 11]. Complementary foods brought in earlier than this critical period may bring little advantage and cause hazards, including choking, allergy, and replacement of breast milk [3, 4], whereas delayed introduction could end up missing a window of crucial development [8, 11]. It was discovered that the minority (1 mother), 2 percent of the total mothers who had initiated complementary feeding earlier than the predicted age of 3 months (they were very premature), while 1 mother (2%) of the 10 mothers had not yet started the practice (it is delayed). In addition to this deviation, most of them began complementary feeding at six months of age, which is consistent with the recommendation of [11]. This percentage (78% is much higher than the 46.7% reported in [37] and is in line with the recent progress in feeding practices [7, 9]. This beneficial shift can be explained by the education mothers obtain during the antenatal visits of the clinic [21, 22], since 30 percent of respondents claimed that women at the Nyankpala Clinic were instructed to start using complementary foods at six months.

Recent evidence and consensus treatment [11] suggests that puréed meats, poultry, beans, and iron-enriched cereals, and iron-rich foods should be among the first complementary foods to be introduced, with one new single-ingredient food being introduced at a time. Moreover, babies are to be given foods of the four main food categories, including protein foods, vegetables and fruits, dairy, and grains, to make several exposures and adoptions of healthy foods [7, 29]. In this research, most of them (45 mothers, 90%) started with cereal-based foods, which included corn porridge and millet porridge, and the infant formulas, which included Cerelac and Lactogen. On the contrary, 4 mothers (8% of all) introduced cocoa drink (tea) first, which also contradicts the recent data that claim that ‘tea and coffee should not be consumed by small children since substances in the latter disrupt iron absorption [3, 7]. In terms of feeding pattern, most respondents (38 mothers, 76%) used cup with the spoon instead of using a bottle, which validates the suggestion of responsive and safe feeding utensils [11, 24] and, perhaps, alleviate the diarrhea prevalence within Nyankpala, because a bottle is associated with spreading the pathogen [3, 4].

Issues of responsibility in feeding are still an important aspect. Mothers who do not include complementary food in the diet provide supplementary food to their children in the form of approximately 48% (24 individuals) of mothers, and with the help of the child’s grandmother, elder brother, sister, neighbor, and mother-in-law, and, rarely, the child feeds himself. Previous studies and the recent mixed methods research offer, in unison, that successful complementary feeding depends not only on the nutritional value, but on the identity of the feeder and the feeding method. Since a significant percentage of mothers supervising complementary feeding do so without the previously mentioned assistance, it is fairly assumed that they can provide the appropriate level of care and ensure that the required energy intake of the child is maximized. The practices can also strengthen the mother-child relationship [10, 19].

World Health Organization suggests a maximum frequency of one to two to three meals per day, with the recommended nutrition of complementary foods being added to the daily meals of children aged 6-12 years: 23 times per day in children with the age of 68 months, 34 times per day in children aged 9-11 months, and 34 times per day in children aged 12-24 months [11, 36]. In the current case, the general feeding frequency of mothers fits into these recommendations, but there is some abidance according to them in age variables: mothers failed to provide them with the established age range, and fruit snacks, most often given by 21 mothers, were not administered every day, contrary to a recommendation [7, 29]. In addition, the findings have shown that 60 percent (30 mothers) of them feed on demand every time the child requires some food, and 84 percent (42 mothers) of them prepare meals instead of buying packaged food. Home preparation facilitates good hygiene and sanitation, which has the potential to reduce food contamination and childhood diarrhea [3, 7].

Factors Affecting Infant Feeding Practices

The socioeconomic and demographic factors that have a tremendous impact on infant feeding practices are maternal age, educational attainment, and breastfeeding behavior [2,

10, 21]. It has been found through empirical means that greater maternal education status and socioeconomic status have a positive correlation with exclusive breastfeeding and the early initiation of complementary foods [7, 9]. As an example, a more recent study carried out in Ethiopia has shown that infants with mothers who had obtained secondary or higher education had a much higher risk of getting sufficient complementary feeding compared to infants whose mothers had not [4, 7].

In this research, most of the mothers, 56 individuals (93.3%) who were above the age of adolescence (13-19 years old), were classified as mature mothers. This demographic aspect could be one of the possible reasons that 71.7 percent (43 mothers) of them began breastfeeding in the first hour after childbirth, and 90 percent (54 mothers) wanted to breastfeed up to a minimum of 24 months [2, 10]. Moreover, 88.3% (53 mothers) continued to solely breastfeed their babies during the next six months, which supports the existence of the already known tendency in older mothers shifting towards compliance with recommended practices of breastfeeding [9, 21].

Another factor of introduction of solid food also seems to be maternal age; in the current research, mothers introducing solid food at the very time when their infants were 6 months old (40% [20 mothers]) showed this trend which is also supported by the literature that older mothers are more likely to adhere to feeding recommendations [7, 10].

Unlike previous outcomes which suggested a direct relationship between an increased maternal level of education and positive feeding behaviors, this study found that most mothers 43 (71.7) individuals, had failed to achieve some level of formal education, but had encouragingly good results of initiating breastfeeding and timely introduction of supplementary feeding. The implications of these findings are that this relationship could be mediated by other contextual determinants, including antenatal education, community programs, those prevailing cultural norms [17, 22, 23].

The marital status also has its role: recent evidence shows that married women tend to initiate and maintain exclusive breastfeeding [2, 16]. In the current research, 95% (57 of respondents) were married; such women were the ones who began and continued to practice exclusive breastfeeding for six months, which is in line with this trend [20, 21].

With regard to occupation and leisure time, most mothers (37 people, 61.7 percent) were categoric to housewife (unemployed), implying that they had more time to meet the infant's feeding needs: through breastfeeding, complementary feeding, and childcare; something that might make them comply with the recommended feeding schedule [14, 15].

Mother's earnings also have an impact: recent studies in sub-Saharan Africa have shown that children in wealthy households and their mothers with high levels of education are more prone to reach minimum dietary diversity and acceptable dietary patterns [7, 9]. In this study, 43.5% (10 employed respondents) refused to give out their income; 21.7% (5 respondents) reported income of GH₵ 40-50 per week, and the rest earned less; therefore, most mothers had low income which could affect the introduction of complementary food in the required timeliness and sufficiency [17, 34].

Family size also has the same impact on feeding habits. In this research, 43.3 percent (26 respondents) were based on households between 7-12 people, which is a medium scale. The latest data show that the size of the household can affect feeding and distribution of food [7, 16].

CONCLUSION

This study examined infant feeding practices among mothers in Nyankpala, Northern Ghana, focusing on breastfeeding and complementary feeding behaviors. The findings indicate that the majority of mothers in Nyankpala demonstrated good adherence to recommended infant feeding guidelines, with high rates of exclusive breastfeeding for six months, early initiation within one hour of birth, and on-demand feeding practices. Most mothers also showed appropriate timing in introducing complementary foods, primarily cereal-based options, at around six months of age. The study revealed that socio-demographic factors, including maternal age, marital status, educational attainment, occupation, income levels, and household size, played significant roles in shaping feeding practices. Despite the encouraging results, some areas require attention, including ensuring consistent fruit provision in children's diets, maintaining regular child welfare clinic attendance, and addressing instances of premature or delayed introduction of complementary foods. The positive outcomes observed may be attributed to health education provided during antenatal care visits, highlighting the critical role of healthcare facilities in promoting optimal infant nutrition. These findings underscore the importance of continued support through antenatal and child welfare clinic programs to sustain and improve infant feeding practices in the community.

Recommendations

Recommendations for mothers

During the interview, the child's information was taken from the child's record card (weighing card), and it was realized that some mothers do not often take their children to the child welfare clinic to monitor their growth and development. Mothers should make it a point to take their children to the child welfare clinic regularly to know the progress in the growth and development of their children so that when there is any deficiency, necessary interventions can be taken.

Moreover, it was realized that most mothers do not give fruit to their children, and even those who do, do not do so regularly. Feeding your child fruits makes them strong and healthy. Therefore, mothers should habitually include fruits in their children's diets as snacks and give them regularly.

Mothers should guide, encourage, and motivate their children to eat, especially those normally allowed to feed themselves.

Furthermore, mothers should continue to adopt breastfeeding, particularly exclusive breastfeeding, as the ideal infant feeding practice because of its numerous advantages to both the mother and child.

Mothers should opt for backyard farming, which will help them save money on buying basic cooking ingredients.

Recommendations for health organizations

1. Encourage mothers who attend A.N.C. and C.W.C. to observe cleanliness during the preparation and feeding of children.
2. Infant feeding education must continuously be given to mothers during A.N.C. and C.W.C.
3. Embark on outreaches to fish out deviating infant feeding practices and to provide education.

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AI statement: The authors stated that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and AI-based tools have been used during the writing or editing of this manuscript.

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