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MATERNAL NUTRITIONAL KNOWLEDGE AND DETERMINANTS OF THE CHILD NUTRITIONAL STATUS IN THE NORTHERN REGION OF BANGLADESH



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ABSTRACT

This present study investigates the factors that affect child nutrition and the status of maternal Knowledge in the northern region of Bangladesh. For this purpose, this study employs a cross-sectional data survey of two divisions in the northern region of Bangladesh, namely Rangpur and Rajshahi, from which three districts were chosen from each division using a simple random sampling process. This survey collected data from 527 respondents with face-to-face direct interview method. The questionnaire is in the native language for their understanding. This study applies Weight for Age, Height for Age, Weight for Height, and Weight for Height for the nutritional status of children. This study uses bivariate logistic analysis for factor analysis and descriptive analysis for mothers' nutritional Knowledge. The result shows that sanitation, mothers' Employment, maternal nutritional Knowledge, wealth index, maternal educational status, and antenatal care are the key significant determinants of child nutritional status. In addition, this study also reveals that only 30% of the total respondents were aware of the child's nutritional status while feeding their children, that is 158 out of 537 mothers. The findings of this study indicate that improvement in the rate of a child's dietary diversity, women's dietary diversity, and also self-esteem leads to an improvement in the child's nutritional status in a significant manner. It also indicates that moving towards an upward ceiling for cases including compulsory higher education for women, spreading awareness about child nutritional issues, and prohibiting child marriage and early premature pregnancy may enhance sustaining lives for them.

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INTRODUCTION

Mothers are the primary caregivers for their children, and the quality of care they provide is heavily reliant on their understanding of nutrition and health-related behaviors. Early childhood malnutrition has a complicated, multivariate, and contextual etiology. The direct cause of childhood malnutrition is a lack of protein and energy; however, behind these deficiencies lurk many other factors that influence newborn feeding behaviors and, consequently, their nutritional status and health. The study of nutrition focuses on how food affects the body. The components of food that are good for our bodies include vitamins, protein, minerals, fats, and more. The total promotion of children's growth and development is called child nutrition. Children of today will be tomorrow's adults. We all hope these young adults will blossom into flowers in the future. Child malnutrition is the most important factor contributing to child morbidity and mortality, among other factors. According to UNICEF, inadequate dietary intake, infectious disease, or a combination of both is called malnutrition. Stunting, wasting, and underweight is the three common indicators of malnutrition. Based on the global nutrition report 2020 and World Bank Group 2021 information 2000, the country had 51% of children stunted, 12.5% wasted, and 42.4% underweight. In 2005, stunting 45.9%, 11.8% were wasted, and 37.3% were underweight. However, stunting and

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underweight fell slightly in 2011, 41.3% and 36.7%, respectively. The prevalence of wasting had increased by 15.7% in that year. However, a declining trend was found in 2014, where 36.2%, 14.4%, and 32.8% child were stunted, wasted, and underweight, respectively. Lastly 2018, 30.8% of children were found stunted, 8.4% were wasted, and 22.6% were underweight. In the first decade of this century, all three indicators of malnutrition have shown fluctuation (sometimes fall, sometimes rise). Still, a declining trend was found with less fluctuation in the last decade. Bangladesh has the biggest malnutrition problem in the world. Poverty, family instability, poor environmental sanitation, faulty weaning practice, illiteracy, family food insecurity, etc., are the main cause of this problem. Being underweight, malnutrition, Anaemia or Iron deficiency, dental issues, etc., are widespread problems for a developing country like Bangladesh. Good nutrition is essential for every child to achieve physical and developmental potential. In urban areas with working mothers, the children are more affected by malnutrition problems than others. Malnutrition makes children more vulnerable to morbidity and mortality. Similarly, the effects of malnutrition are; poorer educational attainment, delayed mental development, and lower intellectual and physical abilities in adult life. Child malnutrition has been linked with demographic and environmental aspects, socio-economic aspects, parental characteristics, household possession, and geographical location. While there are various theories, facts, and arguments about child malnutrition but some basic factors that are completely consistent with malnutrition, like mothers' age, education, socio-economic status, household size, hygiene, sanitation, BMI, access to control over resources, exposure to media, empowerment, fathers' education, occupation, child age, birth order, feeding practice, sex, mothers' Knowledge, religion, region of residence, etc. If the mother does not have enough knowledge about nutrition and does not know how to take care of her children, then there is a lot of chance of facing malnutrition by the children, especially the infant. Poor nutritional status was higher in families with low socio-economic status, less maternal educational level, and not having exclusive breastfeeding. If the children of a country don't have good health conditions, the country's future will be dark. That's why every developing country tries hard to use the population as human capital. According to Bangladesh Demographic and Health Survey (BDHS), child mortality differs from region to region. If we want to minimize the problem of malnutrition in our country, we need proper nutritional Knowledge and behavior toward children. Women's nutritional Knowledge and child malnutrition are the usual phenomena for the people of Bangladesh. These two factors are interrelated and cannot be isolated from each other. These two phenomena can be analyzed systematically. Now, it's time to cover the above aspects and emphasize the present context of Bangladesh. This study tries to identify the significant factors that affect the child's nutritional status in accordance with the maternal Knowledge of child nutrition in the northern region of Bangladesh. This study also aims at identifying the present status of the mother's nutritional Knowledge for rearing children in the northern region of Bangladesh. This study uses a bivariate regression model to identify the factors affecting the child's nutritional Knowledge. The next sections of this study are organized as a literature review, which describes the prior research on this subject, and the third component, materials, and methods, discusses the analytical techniques used to achieve the study's goals. The study's results are revealed in the fourth and last section, which also discusses the findings. The study's conclusion section follows, summarizing the entire report and describing the potential for further research.

LITERATURE REVIEW

Özdoğan et al. (2012) conducted a study on mothers' nutrition knowledge with children aged between 0-24 months. In this study, it was observed that nutritional Knowledge declined with the increasing number of children. Mothers' educational status is a factor that influences the child's nutritional status and life expectancy. Female literacy is a non-health factor influencing child survival and better nourishment. Mothers included in the study had a good level of nutritional Knowledge. The knowledge scores increase in similarity with the educational level, which reveals the significance of education. Debela et al. (2017) have accomplished a study on maternal nutrition knowledge and child nutritional outcomes in urban Kenya. These findings imply that building broader awareness of the health risks of unsuitable dietary practices among mothers and caretakers is important for improving the nutrition and health of children and adolescents. The result shows that maternal nutrition knowledge – measured through an aggregate knowledge score – is positively associated with child stunting (HAZ), even after controlling for other influencing factors such as household living standards and general maternal education. However, disaggregation by type of Knowledge reveals essential differences. Maternal Knowledge about food ingredients has a weak positive association with child HAZ. For maternal Knowledge about specific dietary recommendations, no significant association is detected. The strongest positive association with child HAZ is found for maternal Knowledge about the health consequences of not following recommended nutritional practices. These findings have direct relevance for nutrition and health policies, especially for designing the contents of educational campaigns and training programs. Schooling as inputs to child nutrition. Many find that mothers lack formal education also. Akeredolu et al. (2014) have accomplished a study on mothers' nutritional Knowledge, infant feeding practice, and nutritional status of children in Lagos state, Nigeria. The result indicated that the mothers' nutritional Knowledge, as revealed by the test score, was moderately good. It is recommended that the period of maternity leave should be increased. Women of childbearing age should be knowledgeable by trained nutritionists on the types of locally accessible foods that help growth in children. The study provides the level of breastfeeding, mothers' nutrition knowledge, complementary feeding practices, and the nutritional status of children (0-24 months) in Lagos state. Shrestha et al. (2021) conducted a study investigating household food security and its influence on the nutritional status of children under five. It has been found from the survey that food insecurity and malnutrition among under-five-year-old children were high in the study areas; more than half of the households were facing food insecurity, and nearly one-third of children were suffering from malnutrition. The prevalence of malnutrition among under-five-year-old children was associated with exclusive breastfeeding, initiation time of complimentary food, and household food security status.

Lestari and Setyawan (2021) carried out a study that aimed to determine factors associated with the nutritional status of children under five years using holistic-comprehensive approaches. The authors revealed that poor nutritional

quality was higher in families with low socio-economic status, less maternal education, and no exclusive breastfeeding. This approach also appraised bio-psychosocial aspects of nutritional issues and could help physicians to determine all factors related to the nutritional status of children under five years old. Siregar (2020) conveyed a study to analyze the nexus between maternal characteristics and parenting factors for children and how these were related to malnutrition in children under five in the Deli Serdang Regency. The result revealed a relationship between maternal characteristics (education, income, Knowledge) and parenting factors (the practice of feeding, health practices) with the incidence of child malnutrition in those under five. The study showed that education, income, low Knowledge, poor diet, and health patterns were the primary causes of child malnutrition among those under five. Mondal and Paul (2020) conducted a study to know the current scenario of malnourished children through 3 indicators- stunting, underweight, and wasting across Indian states.

However, the children whose mothers were fully exposed to mass media like newspapers/radio/television had a lower prevalence of undernutrition, and the children belonging to the poorest household were twice times undernourished than those from the richest. Similarly, anemic children were 1.4 times more likely to be malnourished than non-anemic. Here also estimated that male children were more malnourished than females. The children suffering from diarrhea were more malnourished than non-diarrheal. Likewise, mothers who have completed more than four ANC visits in the hospital their children were less undernourished. A study was conducted by Kehinde and Favour (2020) to evaluate the state of household food insecurity, dietary diversity of households, nutritional status of households, and, similarly, the relationship between food insecurity and nutritional indices of households in that region. From the result, it had been claimed that a large percentage of households suffered from food insecurity with moderate hunger and low diet diversity.

Furthermore, stunting was the most dominant form of malnutrition among children. Here, Food insecurity was inversely and significantly associated with income and formal education. Also, food insecurity was correlated to nutritional status, household diet diversity, stunting, and wasting.

Tesfa et al. (2022) assessed a study on nutritional Knowledge, practice, and its related factors of pregnant women in Addis Ababa, Ethiopia, where they conducted their study on 363 women and used multivariate logistic regression. They showed that maternal Knowledge was 73.9% and dietary practice was 63.9%. They also identified family size, monthly income, pregnancy interval, ANC visit and BMI, husband's occupational status, and educational level as the significant factors affecting women's nutritional Knowledge. Wahid et al. (2021) tried to identify the factors affecting the child's nutritional status in Bangladesh. They used data from Bangladesh Household Expenditure Survey and conducted a study on 10780 students. They applied the Blinder Oaxaca decomposition approach to identify the factors and found that household diets and environmental factors were significant. Berhanu et al. (2023) conducted a study on the determinants of the child nutritional status of primary school students in Ethiopia. They surveyed a cross-sectional survey of 494 primary students and applied ordinary logistic regression analysis. The result showed that 27.94% of the primary students were undernourished consists of 7.29% were severely, and 20.65 were moderate. Mother's educational status was positively correlated with nutritional status, whereas large family size was detected as a negative influence on the child's nutritional status.

Habiba et al. (2020) researched to determine the food and nutrition status among children in four selected slum areas of Khulna City. Household food security is categorized into mildly, moderately, and severely food insecure. The study found that approximately 34.5% of children were food secure, nearly 24.4% were found mildly food insecure, about 28.9% as moderately food insecure, and the rest were severely food insecure. The prevalence of wasting was 37.7%, whereas that of stunting and underweight was 28.9% and 40.7%. Girl children suffered from malnutrition, stunting, and wasting more than boys. Children's food security and nutrition status were stimulated by various socio-economic factors such as income level, expenditure on food, and parents' employment status. The morbidity status of the slum children was less, but the children had been suffering from various diseases. The above studies are concerned with the Western and Indian contexts. Still, this study was conducted in the southern region of Bangladesh, where the most vulnerable group was women, and this study also emphasized the socio-economic conditions.

However, Several cross-sectional studies have been done in recent years, including Haq et al. (2021); Mengesha et al. (2021); Birhan and Belay (2021); Yisak et al. (2021); Berhanu et al. (2023) and Tesfa et al. (2022). None of them consider the district or rural level. In addition, in Bangladesh, rare studies have been found on the nutritional status, although the malnutrition problem is increasing daily. Moreover, the literature mentioned above did not reveal the details on the maternal nutritional status of the study areas. In this case, this study tries to cover up the gaps by conducting the study in the northern region of Bangladesh, which is also known for its higher poverty level in Bangladesh.

MATERIALS AND METHODS

Conceptual Framework

The conceptual framework establishes how factors affect a child's nutrition. Maternal factors such as age, education, time allocation, age of first marriage, and age of first baby bore effect and women's empowerment and caregiver's status, affecting the child's nutritional status (Figure 1). Similarly, socio-economic status also influences the mothers' nutritional Knowledge, determining the child's health status level. Conversely, general awareness of hygiene, such as wash status, affects the nutritional quality of the mother, which again influences the child's nutritional status.

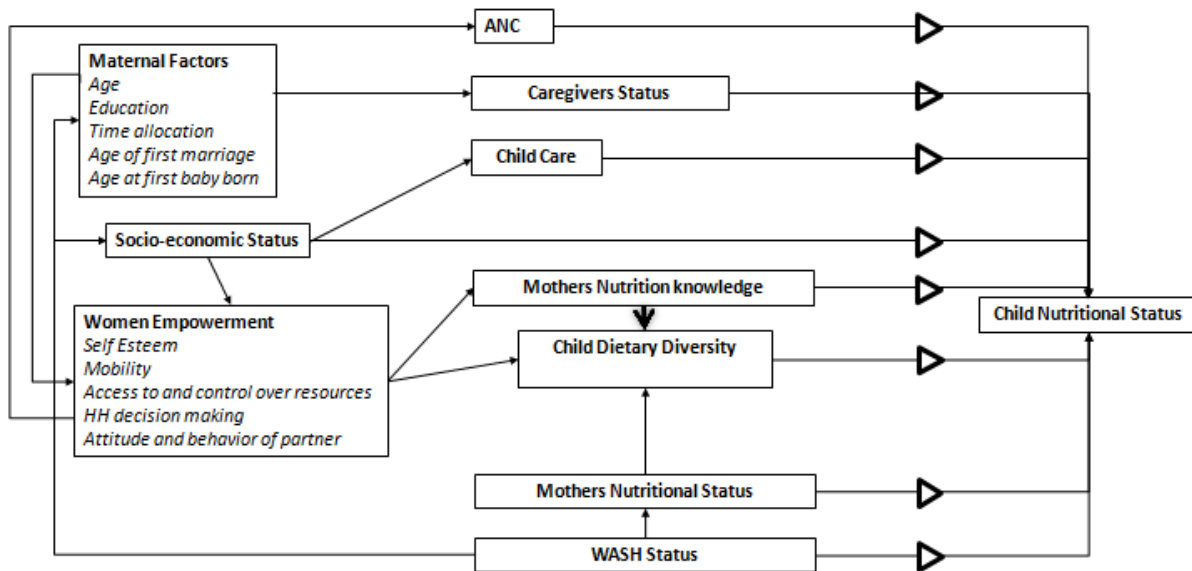


Figure 1. Conceptual framework of the study

Selection of the study area

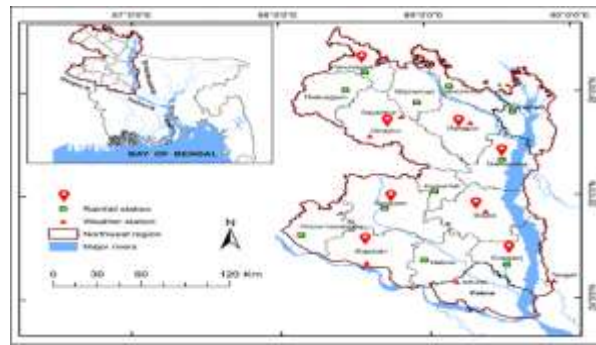


Figure 2. Selection of the study area

We have selected eight districts of the northwest region (Naogaon et al.) for this study.

Sampling Technique

Due to time and resource constraints, it was impossible to conduct a women empowerment and child nutritional status-related survey covering all households. Thus, in selecting samples for a study, two things need to be considered. The sample size should be as large as possible for adequate degrees of freedom in the statistical analysis. In other words, the administration of field research, processing, and data analysis should be manageable within the limits imposed by physical, human, and financial resources. A reasonable size of the sample to achieve the study's objectives was considered. A simple random sampling technique was used to obtain the sample size. The sample size was divided into two groups. One was taken from Rangpur district, and another from Rajshahi district. 291 samples were randomly collected from the Rajshahi district, whereas 246 were collected from the Rangpur district. This aggregate collection was also subdivided according to districts which are as follows:

Table 1. Distribution of sample

Division	District	Selected sample	Percentage of the total sample
Rajshahi	Naogaon	43	9%
	Rajshahi	89	17%
	Sirajganj	74	14%
	Bogura	85	16%
Rangpur	Rangpur	72	13%
	Dinajpur	59	11%
	Gaibandha	60	11%
	Panchagarh	55	10%
Total		537	100%

Data Collection Procedure

This study aims to find out the factors which affect children's nutritional status, the degree of women's empowerment, and its association with women from the northwest region of Bangladesh. To achieve the goal, data is being collected from mothers with children between 6 months to 5 years old. The data were collected from the female household members (generally the wives of the household heads). The interviews were conducted one by one and face-to-face with the respondents. Anthropometric measurements of the child and mother were recorded simultaneously. We have used tools and equipment like Questionnaire, Weight measurement machine, Height measurement wooden scale, steel tape, MUAC tape, Apron, One-time face masks, Hand gloves, Hand sanitizer, Liquid disinfectants, paper, pen, pencil, scale, and more. We maintained some criteria while collecting data which are as follows:

- Only the mothers are interviewed as Biological children, not the foster children.
- Single tone outcome child.
- The women did not allow measuring their height, weight, and MUAC.
- Child aged between 6-59 months.
- We did not consider the families who lost their jobs during COVID-19 and were affected directly, as this year would be an abnormal year in their life.
- Did not consider currently pregnant women.

Data Processing

After completing the data collection process, the data cleaning was started immediately. This cleaning process is slightly longer as the rest of the analysis mainly depends on the cleaned and adequately processed data. Most of the mistakes were made because of typing errors, information gaps, and incorrect formatting. All the data were corrected one by one. Afterward, all the data were stored in a separate EXCEL file, and made some copies so that those could be the backup. All the data were kept in a password-protected computer, which ensures the data's strong security.

Analytical Techniques

To achieve the study's objectives and get a meaningful result, collected data were analyzed carefully. Descriptive statistic was used to analyze the socio-economic characteristics of the respondents. Different regression models were used to determine the relationship between women's empowerment and child nutritional status and identify factors affecting women's empowerment.

Variable Specification

Once the data cleaning and processing were done, variable specification and preparation were started, one of the most important parts of the research. Different types of composite variables were prepared which have relevance to this study, such as:

- Household Food Variety (HFV)
- Women's Dietary Diversity (WDD)
- Child Dietary Diversity (CDD)
- Women Empowerment Index

Child Nutritional Status/ Anthropometry

Among the several child anthropometries, we used weight-for-height, height-for-age, weight-for-age, Mid Upper Arm Circumference (MUAC). To collect all the required data, we used available WHO standard tools. Weight was measured in Kg, and height and MUAC were in cm. As we needed to standardize the analysis with WHO, we took the help of WHO Anthro software version 3.2.2, available on the WHO website. The advantage of this software is that it automatically counts the child's age at the interview date. So, the result is always accurate.

On top of that, we changed the country of that software to Bangladesh to get accurate reference data, as the database depends on the geographic location. The Z score is the most common way to calculate the distance between the observed value and the value of the reference population. In other words, the Z score measures the dispersion of the data. We can calculate the Z score by the following formulas. Hence, we used software so we didn't need to calculate all the Z scores manually.

Equation1: Z scores calculation

$$Z \text{ Score} = \frac{(\text{Observed value} - \text{Expected value of Reference Population})}{\text{Standard Deviation}}$$

$$\text{Standard Deviation} = \frac{(\text{50th percentile} - \text{5th percentile})}{1.82}$$

Malnutrition status can be categorized into different types considering different standards.

Table 1. Categorization of Z-Score

Underweight	Weight for Age < -2 standard deviations (SD) of the WHO Child Growth Standards median
Stunting	Height for Age < -2 SD of the WHO Child Growth Standards median
Wasting	Weight for height < -2 SD of the WHO Child Growth Standards median
Overweight	Weight for height > +2 SD of the WHO Child Growth Standards median

Calculation procedure of Women's Dietary Diversity (WDD)

To calculate Women's Dietary Diversity (WDD), we have used mothers' 24-hour food recall data. The condition like, if a mother consumes a specific food of any group, we marked that 1 and 0 otherwise. We have avoided a score of more than 1 to avoid overestimating dietary diversity. So, the score range will be 0 to 9 as there is a total of 9 food groups, and the cut-off for this score is as follows:

Table 3. Measurement of Dietary Diversity

Low Dietary Diversity	<= 4
Medium Dietary Diversity	5 to 6
High Dietary Diversity	>= 7

Calculation procedure of Child Dietary Diversity (WDD)

To calculate Child Dietary Diversity (WDD), we have used the child's 24-hour food recall data. The condition like, if a child consumes a specific food of any group, we marked that 1 and 0 otherwise. We have avoided a score of more than 1 to avoid overestimating dietary diversity. So, the score range will be 0 to 7 as there is a total of 7 food groups, and the cut-off for this score is as follows:

Table 4. Measurement of Dietary Diversity

Low Dietary Diversity	<4
Minimum Dietary Diversity	4
High Dietary Diversity	>4

Women Empowerment Index (WEI)

We have also estimated dimension-wise empowerment by using the same factor analysis method. The grouped variables loaded in this analysis in one factor named a dimension. We then use these dimensions' variables in factor analysis and predict the score index. After predicting the value, we formed a binary following the similar method mentioned earlier. We repeated this for all dimensions and got all the dimension-wise women empowerment status which is binary.

Mother's Nutrition Knowledge, Attitude, and Practice

Three indexes were developed initially and then combined into one index named mother's knowledge attitude and practice (KAP) to assess the mother's nutrition knowledge attitude and practice. Three separate indexes are the mother's knowledge index, the mother's attitude index, and the mother's practice index. All the variables have binary responses and assigned values of 1 for "yes" and 0 for "no." All the scores were summed up for each category and then categorized into three groups; poor, fair, and reasonable. The poor category is defined as the 0 % to 50 % range; the appropriate category lies in the 51 % to 75 % range, and the rest, 76 % to 100 %, ranges defined as good (Sangra & Nowreen, 2019). For calculating the KAP, all three individual index score has been merged into one index and then categorized into the three groups mentioned above.

Bivariate Association

The bivariate association is generally developed for identifying the normal relationship between two variables, say, x and y, and it was applied in this study due to its simplicity in nature (Babbie, 2009). If the relationship is perfect, then the relation is shown in a linear function as:

$$y = a + bx$$

Here, y is the dependent variable, and x is independent with a slope intercept of b and acts as a constant. For this analysis, this study used Pearson correlation coefficients that can be measured as below:

$$r = \frac{\sum xy}{\sqrt{\sum x^2 + \sum y^2}}$$

Where $\sum x$ is the sum of x scores, $\sum y$ is the sum of y scores, $\sum xy$ is the sum of the products of scores, $\sum x^2$ is the sum of squared x scores, and $\sum y^2$ is the sum of squared y scores, Its value ranges from -1, which means a perfect negative linear relationship, to +1, which means a perfect positive linear relationship. On the contrary, a 0 value means no relationship existed between the two variables.

RESULTS

Child care & Feeding Practice

Regarding child care and feeding, the study found that around three-fourths of the mothers bought food for the baby and played different activities while feeding the child, and the baby was fed meals and snacks 4-5 times a day. Half of the mothers consulted with a doctor about child care and feeding. Around 66% of the mothers got angry when their children did not want to eat food.

Table 5. Child care and feeding practices of the respondents

Care and feeding practice	No	Yes	Total
Buy food yourself from the market for baby	125 (23.28)	412 (76.72)	537 (100)
You/ Care Giver Play Different Activities while feeding the child	137 (25.51)	400 (74.49)	537 (100)
Baby-fed meals and snacks 4-5 times a day	122 (22.72)	415 (77.28)	537 (100)
Have any sessions with a doctor/health about child feeding	271 (50.47)	266 (49.53)	537 (100)
Get angry with the child when food is refused	183 (34.08)	354 (65.92)	537 (100)

Source: Field Survey 2020; Figures within the parentheses indicate percentages of the number of the respondents

Mothers' nutrition knowledge is important for a child's growth. The following table 6 shows mothers' nutrition knowledge. About 62% of the respondents agreed positively that they try to take at least five colors of food every day, 41% agreed that they add sugar to child milk, 73% stated yes that they change the food menu frequently for their child, 41% agreed that think that a baby can be healthy even if s/he is not fat. Nearly 97% agree that feeding colostrums to your baby is important. 88% said that it is right to introduce semi-solid foods into a child's diet. 87% asserted that they give a child who suffers from diarrhea. About 66% agreed that they know what food children consume daily. Nearly 73% said yes that their children consume fast food. Almost 50% agreed that they regularly visit doctors for medication. These questions and their corresponding replies imply that mothers who had a significantly higher level of nutritional Knowledge fed their children more with vegetable tables, fruit, legumes, and less sugared drinks such as pops, juice, and fast foods than the mothers who had a significantly lower level of nutritional Knowledge. Also, mothers with higher nutritional knowledge levels avoided giving foods that contained artificial to their children and believed in more Knowledge about nutrition-health. Mothers' nutrition knowledge level affects children's eating habits, mother knowledge, attitude, and practice.

Table 6. Mothers' Knowledge, attitude, and practice

Knowledge, attitude, and practice	Yes (%)
Try to take at least five colors of food every day	334 (62)
Add sugar to the child's milk	221 (41)
Change the food menu frequently for your child	389 (73)
Think that a baby can be healthy even if s/he is not fat	221 (41)
Think that feeding colostrums to your baby is important	523 (97)
At what age is it right to introduce semi-solid foods into a child's diet	474 (88)
What should one give a child who suffers from diarrhea	466 (87)
Types of food children should consume every day	354 (66)
Regularly should fast foods be consumed	73 (14)
Do you/your caregiver have any sessions with a doctor/health worker to have enough Knowledge about the baby's care/ food	267 (50)

Source: Field Survey 2020; Figures within the parentheses indicate percentages of the number of respondents.

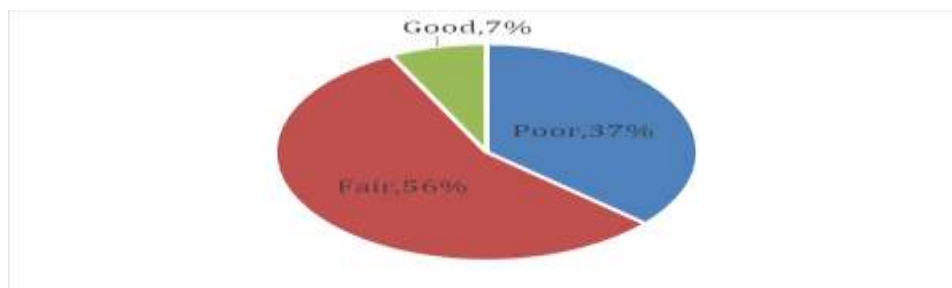


Figure 3. Mothers' nutrition knowledge

Nearly about 7% of the mothers had good nutrition knowledge. On the other hand, 56% and 37% had fair and poor nutritional Knowledge, respectively (Figure 3). This may be due to the need for proper communication with the health facility providers engaged in the locality and the lack of adequate awareness spread through mass communication. Nearly 58% of the caregivers have no institutional education, whereas 7% for incomplete primary education, 11 % for complete primary education, 11% for incomplete secondary education, and 14% for secondary complete or higher are identified (Figure 4).

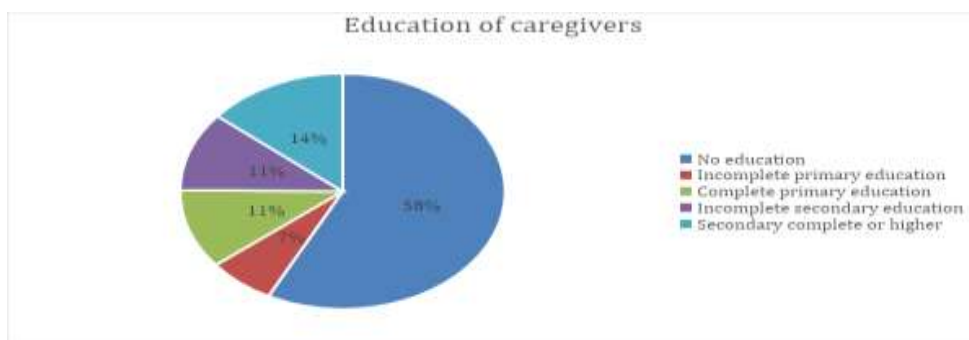


Figure 4. Education of caregivers

Table 7. Caregivers' qualification

Caregivers' qualification	Yes (% of the total sample)
caregivers have Knowledge about preparing baby's meal	255 (48)
know about child nutrition	158 (30)
know about dietary diversity	160 (30)
capable of following your instructions properly in lieu stead of you	293 (55)

Source: Field Survey 2020; Figures within the parentheses indicate percentages of the number of respondents.

Table 7 shows that several questions were asked, and the respondents answered those questions. From 537 respondents, 255 respondents answered "Yes" to the question "Do you think that caregivers have Knowledge know about preparing the baby's meal? This indicates that 48% are aware and have Knowledge about preparing the baby's meal which is nutritious to be healthy. 158 respondents answered "Yes" when asked whether the caregiver knew about child nutrition, and 160 respondents answered "Yes" to this question, "Does she know about dietary diversity? Lastly, 55% of the respondents answered "Yes" when we asked whether the caregiver can follow your instructions properly instead of the mother, indicating that most of the caregivers are playing a better role as a supplementary to the child's mother. The study also found that more than half of the children get childcare support from their family families Caregivers' qualifications.

Table 8. Bivariate association

Variables	LAZ	WAZ	WHZ	Women Empowerment	Self Esteem	Access to and control over resources	Attitude and Behavior of Husband	Decisions related to household	Mobility	CDD	WDD
Sanitation	4.27 ^{NS}	38.25 ^{***}	11.07 ^{**}	2.08 ^{NS}	3.01*	4.49 ^{**}	0.026 ^{NS}	3.37*	1.98 ^{NS}		
Mother's Employment	4.60 ^{NS}	6.1*	11.42 ^{**}	2.58 ^{NS}	26.22 ^{***}	44.76 ^{***}	0.108 ^{NS}	5.66 ^{**}	2.94*	1.6 ^{NS}	1.3 ^{NS}
Education	14.62 ^{NS}	33.72 ^{**}	38.95 ^{***}	15.74 ^{***}	74.74 ^{***}	66.2 ^{***}	61.16 ^{***}	50.39 ^{***}	21.03 ^{***}	75.3 ^{***}	48.75 ^{***}
WDD	1.63 ^{NS}	8.24 ^{NS}	8.47 ^{NS}	1.83 ^{NS}	0.581 ^{NS}	96.53 ^{***}	2.83*	11.31 ^{***}	3.64*		
CDD	10.14 ^{NS}	4.12 ^{NS}	13.75 ^{NS}	6.18 ^{**}	3.65 ^{NS}	37.21 ^{***}	22.57 ^{***}	6.84 ^{**}	7.68 ^{**}		
ANC	6.4 ^{NS}	23.52 ^{***}	7.82 ^{NS}	9.28 ^{***}	47.47 ^{***}	36.53 ^{***}	20.71 ^{***}	64.49 ^{***}	14.52 ^{***}	19.56 ^{***}	17.59 ^{***}
Nutritional Knowledge	3.96 ^{NS}	0.91 ^{NS}	27.08 ^{***}	12.35 ^{***}	47.51 ^{***}	77.78 ^{***}	59.51 ^{***}	75.26 ^{***}	17.44 ^{***}	64.94 ^{***}	7.8 ^{***}
Wealth Index	11.85 ^{NS}	51.29 ^{***}	43.47 ^{***}	15.63 ^{***}	59.01 ^{***}	92.42 ^{***}	55.61 ^{***}	62.61 ^{***}	21.41 ^{***}	71.93 ^{***}	3.66 ^{**}
Stunting				3.69 ^{NS}	1.35 ^{NS}	7.09*	5.21 ^{NS}	3.54 ^{NS}	3.11 ^{NS}		
Wasting				11.54 ^{**}	9.1 ^{NS}	15.05 ^{***}	5.64 ^{NS}	6.82 ^{NS}	12.55 ^{**}		
Underweight				8.37 ^{**}	4.29 ^{NS}	18.8 ^{***}	3.55 ^{NS}	1.57 ^{NS}	8.57 ^{**}		

NS refers to Not Significant; *, **, *** stands for significant at p<0.1, p<0.05 and p<0.01 respectively

Table 8 shows the bivariate association between categorical outcome variables and explanatory variables with different significant levels. Sanitation is significantly associated with WAZ, WHZ, self-esteem, access to and control over resources, and decisions related to the household. Mother's Employment is highly significant with self-esteem and access to and control over resources. This is similar to that finding by Nankinga et al. (2019). The education and wealth index is significant with all variables except LAZ. This finding is also consistent with those of Sherman and Muehlhoff (2007), Miller and Rodgers (2009), and Makoka and Masibo (2015), who found that maternal education had a highly positive effect on child nutrition. Women's dietary and child dietary diversity are significantly associated with access to and control over resources, attitude and behavior of husband; decisions related to household and mobility variables, while child dietary diversity is also significant with women's empowerment. Antenatal care is significantly associated with all variables except LAZ and WHZ. Nutritional Knowledge is also significantly associated with all variables except LAZ and WAZ.

DISCUSSIONS

In this study, Fair maternal nutritional Knowledge was about 56% (Figure 4) in the study areas, whereas poor Knowledge was 37%, and very sound Knowledge was identified as only 7%. These findings were similar to those of Tesfa et al. (2022), Mahmoud and Ghaly (2019), Koppmair et al. (2017), and Masuku and Lan (2014) where all of them found that about half

the sampled mothers had general or fair Knowledge about maternal and child nutrition and about 40% had very poor Knowledge about the nutritional issues. These results also show the lower condition, and the percentage is higher than 61.4% (Demissie et al., 2020), 63.9% (Nana & Zema, 2018), and 81.6% (Misgna et al., 2016). 80.6% (Thomas et al., 2015). This finding is higher than about 40% (Owais et al., 2019), Hoddinott et al. (2018), and 47.5% (Abdirahman, 2019). On the contrary, This deviation may occur due to the existence of the lower living standard, low family income, lack of proper policy-making based on vulnerable groups at the national level, management protocol of child and maternal nutritional condition, and lack of spreading information among the local or root level citizens. This study also found that maternal Employment, maternal nutritional Knowledge, antenatal cares, maternal education, and wealth index were the key significant indicators for the child's nutritional status in the study areas. These results were also consistent with the findings of Nguyen et al. (2017), Fakir and Khan (2015), Owais et al. (2019), Choudhury (2011), Negash et al. (2015), Anwar et al. (2013), Nankinga et al. (2019), Berhanu et al. (2023), Wahid et al. (2021) and Mengesha et al. (2021). Several studies also observe women's employment status as one of the influential ingredients affecting child nutrition, such as Appoh and Krekling (2005), Saaka (2014), Negash et al. (2015), Nankinga et al. (2019) and Fadare et al. (2019). There is a low significant relationship between stunting and access to and control over resources while wasting and underweight is highly significant with access to and control over resources. Therefore, to ensure better child nutritional status, policymakers can improve the healthcare factors that determine the nutritional status, such as the mother's education level, sanitation facility, wealth index, and mothers' employment status. For this, mass media communication can play a vital role. However, this study did not consider the environmental attributes and communicable diseases in the analysis, which are also important factors for determining the child's nutritional status.

CONCLUSIONS

According to this study, maternal Knowledge is strongly related to the dietary diversity of mothers, children, and self-esteem. However, it is also noted that the mother's educational level, employment situation, level of nutritional understanding, and wealth index are important factors in determining the children's nutritional status. The survey also showed that maternal average nutritional awareness is low. The outcomes of this study add to the notion that maternal nutrition education is critical in the fight against childhood malnutrition. It also demonstrates that, while female schooling is vital for both mother and child health, formal education with explicit dietary Knowledge may be effective. Maternal nutritional Knowledge and child nutritional status can be improved by facilitating with the help of village maternal clinical and village nutritional nurses. Children may suffer from severe malnutrition as a result of mothers' lack of basic understanding about nutrition and infant nourishment. The causes of malnutrition, particularly in children, include inadequate maternal understanding about feeding low-quality foods, the timing of changes in children's eating habits, health care, sanitation, and differences between eating prepared food from the market and eating homemade cuisine. Some important gaps in our understanding of the relationship between parental mental health and children's nutritional status and well-being remain unexplored in this study. Multiple income levels, geographic regions, or the entire country can be analyzed more deeply. More research may be done to compare the nutritional status of children in different regions, between urban and rural residents, between different socio-economic groups (for example, working women and stay-at-home mothers), and between different socio-economic groups.

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