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## FACTORS INFLUENCING RURAL WOMEN'S NUTRITIONAL KNOWLEDGE IN DINAJPUR DISTRICT

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### ABSTRACT

Exploring the rural women's extent of nutritional knowledge and finding out the influences of their selected socio-economic characteristics on their nutritional knowledge, were the aim of this study. Data were collected using a pre-tested interview schedule from randomly selected 164 rural women of Birganj Upazila under Dinajpur district. Eighteen questions on different aspects of nutritional knowledge were incorporated following 'Bloom's Taxonomy'. Correct responses to various questions were scored according to their difficulty. Findings revealed that the highest proportion (51.22 percent) of rural women had moderate nutritional knowledge. Among nine selected characteristics, seven, namely, farm size, annual income, access to different facilities, extension media contact, and nutritional awareness had significant positive relationships, and two, namely, shocks faced and training need on nutritious food had significant negative relationships with nutritional knowledge according to correlation analysis. According to multiple regression analysis, 49.5 percent of the variance in nutritional knowledge could be explained by all the independent variables and training need on nutritious food, extension media contact, annual income, and nutritional awareness were the most significant factors. However, training need on nutritious food had the highest contribution (27.0 percent) in explaining the nutritional knowledge of rural women.

### 1. Introduction

Nutrition is essential for maintaining a healthy and active lifestyle. Food is the primary source of nutrients for human beings. Adequate sustenance and proper nutrition are associated with sound health. Good nutrition requires the consumption of a diversity of foods in appropriate quantities. Improved health has provided the basis for improvements in economic growth, generating a virtuous cycle; good health promotes economic growth, and economic growth enables further improvements in health. Thus, nutritional knowledge is not only crucial for human health but also for economic development (Sarmin & Hasan, 2020).

Nutritional knowledge, broadly defined, refers to knowledge of the concepts and processes related to nutrition and health, including diet and health, diet and disease, and dietary guidelines and recommendations (Loretta et al., 2014). Nutrition is defined as the processes by which animals or plants take in and utilize food substances. Essential nutrients include protein, carbohydrates, fat, vitamins, minerals, and electrolytes. Normally, 85 percent of daily energy use is from fat and carbohydrates and 15 percent from protein. In humans, nutrition is mainly achieved through the

process of putting foods into our mouths, chewing, and swallowing them. The required amounts of the essential nutrients differ by age and the state of the body, for example, physical activity, diseases present (e.g., prostate cancer, breast cancer, or weakened bones – known as osteoporosis), medications, pregnancy, and lactation (Denno, 2022).

Bangladesh has experienced a substantial transformation in the demographic, health, and nutritional status of the population since achieving independence in 1971 (Biswas et al., 2017). From a nation of 75 million people struggling to be emancipated from the clutches of subjugation, food insecurity, and profoundly high rates of malnutrition among children and women, the country is now a nation of 165 million people self-sufficient in the staple rice, fish, and vegetables (Chowhan, 2020). Malnutrition rates among children and women have decreased significantly over the last two decades (NIPORT & ICF, 2019). Micronutrient deficiencies are still present in substantially reduced proportions (Ahmed et al., 2016). In Bangladesh, 90.0 percent of rural women are literate, and 43.0 percent of households earn less than monthly 16 thousand local currencies equivalent to around 200 USD. Every four out of five women are housewives, they work at home and the rest of them work outside. The overall dietary condition of women is improving in developing countries like Bangladesh, but it is still not sufficient for many rural women (Sheema et al., 2016).

Bangladesh still faces a significant number of challenges related to food and nutritional security. Furthermore, increasing population and urbanization continue to put pressure on the food and agricultural system to keep up with demand. Women's overall status in Bangladesh passes through the generations due to their poor access to food, health services, and education. Much of the focus within this pathway is on women because of their role in giving birth and breastfeeding children and caring for them daily (Roy et al., 2019). Women's educational attainment has innumerable positive effects on the quality of care they receive during pregnancy and postpartum and on the quality of care, they give their children from the duration of breastfeeding to seeking healthcare during illnesses. Within the household, women traditionally bear the primary responsibility for preparing meals and caring for children and other family members, although men are assuming more responsibilities for these roles in many societies (van de Vijver, 2007).

Women play the most important roles in maintaining and managing household-level nutritional security as they are solely in charge of selecting daily meals, cooking, feeding family members, and hygiene management. They have both productive and reproductive roles; where at the same time have the responsibility of childbearing, caring, and developing. In doing so, women in Bangladesh, as well as throughout the world, are the key factor in the development of the future generation and a healthy nation (Ghosh et al., 2021). Thus, their knowledge of selecting food items and ingredients for the meal, preparation of food and cooking, food preservation, feeding, and common hygiene are very important determinants of developing a healthy child and the overall health status of the family members (Sultana, 2017). In Bangladesh, a proficient number of research-based information is available on various nutritional issues, but the status of systematic knowledge of rural women's household-level nutrition is not available. Therefore, the present study was undertaken to examine the nutritional knowledge of rural women under government extension services with the following specific objectives:

- i. To determine rural women's extent of knowledge of common nutritional issues; and
- ii. To determine the influence of selected socio-economic characteristics of rural women on their nutritional knowledge.

## 2. Materials and methods

### 2.1 Locale, population, and sampling

A research design is a plan for answering a research question, a plan for testing the hypothesis. The design researchers choose depends on the research question and hypothesis, and ultimately, their goal for the research. Thus, a research design is a systematic plan to study a scientific problem (Hasan et al., 2018). This study consists of qualitative and quantitative research approaches to get a comprehensive view of the nutritional knowledge of rural women. The study was conducted in Birganj Upazila under the Dinajpur district. Three unions of this Upazila namely Bhognagar, Nijpara, and Sujalpur were selected purposively for this study. A total of 1641 rural women under the Common Interest Groups (CIGs) functioning in the study areas were the population of the study. Ten percent of the population accounting for 164 rural women were selected for data collection using simple random sampling method.

### 2.2 Instrument and data collection

A structured interview schedule was prepared for the collection of data. The interview schedule was pre-tested with 11 rural women. Necessary corrections and alterations were done to finalize the interview schedule for data collection. Data were collected from 05 July to 05 August 2022.

### 2.3 Variables and their measurement

Rural women's nutritional knowledge was considered as the dependent variable of this study. To measure the respondent's nutritional knowledge, 'Bloom's taxonomy of the cognitive domain' was considered (Bloom, 1956). There were three questions from each level, and thus a total of 18 questions were prepared in the interview schedule. Each respondent was asked all the questions and different scores such as 4, 3, and 2 were assigned against different levels of the question. By answering a question correctly, an individual could obtain a full score, the partial score was given to a partially correct answer while for a wrong answer, she obtains a zero score. Thus, the nutritional knowledge score of a respondent could range from 0 to 54, where 0 indicates no knowledge and 54 indicates very high knowledge. Moreover, nine personal and socio-economic characteristics of the respondents namely: age, educational qualification, farm size, annual income, access to facilities, shocks faced, training need on nutritious food, and extension media contact were selected as independent variables of the study to understand the factors relating to the nutritional knowledge of rural women. Standard and conventional procedures were maintained to measure these independent variables.

### 2.4 Data processing and analysis

The collected data were coded, combined, tabulated, and interpreted. Different descriptive statistics like frequency, percentage, mean, standard deviation, and rank order were used to categorize and describe variables. Karl Pearson's Product Moment Correlation coefficient ( $r$ ) (Pearson, 1895) was used to test the relationships between the dependent and independent variables. However, correlation analysis only depicts the direction of the relationship among variables and cannot quantify their effects to explain the multidimensional nature of knowledge. Thus, regression analysis (enter and stepwise method) was used to examine how explanatory variables affected rural women's nutritional knowledge. It helped to reveal the highest coefficient of determination ( $R^2$ ), that is, the amount of change of the dependent variable by the independent variables.

### 3. Results

#### 3.1 Nutritional knowledge of rural women

The nutritional knowledge score of the women ranged from 6 to 48 with a mean of 33.07 and a standard deviation of 6.71. The categorical distribution of the nutritional knowledge of the women is presented in Table 1. The highest proportion (51.22 percent) of the women had moderate knowledge, while 31.71 percent of the women had inadequate and 17.07 percent had adequate knowledge of different nutritional issues, respectively.

**Table 1. Distribution of rural women according to their nutritional knowledge**

Range		Categories	Respondents		Mean	SD
Possible	Observed		Frequency	Percent		
0-54	6-48	Inadequate knowledge (up to 18)	52	31.71	33.07	6.71
		Moderate knowledge (19 to 36)	84	51.22		
		Adequate knowledge (above 36)	28	17.07		
		Total =	164	100.0		

#### 3.2 Selected characteristics of rural women

There were various characteristics of rural women that might influence their nutritional knowledge. In the present study, nine characteristics were selected, which included their age, educational qualification, farm size, annual income, access to different facilities, shocks faced, training need on nutritious food, extension media contact, and nutritional awareness. The descriptive statistics of the selected characteristics are presented in Table 2.

**Table 2. Descriptive statistics of the selected characteristics**

Characteristics	Description/Unit	Range		Mean	Std. Dev.
		Possible	Observed		
Age	Measured in years	-	22-56	41.60	7.48
Educational qualification	Years of education completed	-	0.5-16	6.73	3.79
Farm size	Total household cultivated land in decimal	-	3-661	171.56	156.74
Annual income	Total annual income ('000' BDT.)	-	85-850	288.06	161.17
Access to different facilities	Access to different facilities measured in score	0-9	3-9	6.79	1.45
Shocks faced	Extent of shocks faced measured in score	0-6	0-5	1.99	0.88
Training need on nutritious food	Extent of need of training in different nutritional issues measured in score	0-16	2-16	7.91	3.51
Extension media contact	Extent of contact with different extension sources measured in score	0-42	6-26	16.77	4.69
Nutritional awareness	Extent of awareness in different nutritional issues measured in score	0-40	11-39	28.04	5.04

### 3.3 Factors influencing rural women's nutritional knowledge

Three steps were followed to determine the influence of the selected characteristics of the rural women on their nutritional knowledge: first, the correlation analysis; second, the multiple linear regression; and finally, the stepwise multiple regression. The steps are given in the following subsections:

#### 3.3.1 Correlation between the selected characteristics of the rural women and their nutritional knowledge

The correlation coefficient ( $r$ ) was estimated to test the null hypothesis regarding the relationship between the dependent and independent variables. The computed values of the correlation coefficient ( $r$ ) were compared against the relevant table values. The Pearson's coefficient of correlation between the selected characteristics of the rural women and their nutritional knowledge has been presented in Table 3.

**Table 3. Relationships between the dependent and independent variables**

Dependent variable	Independent variable	Correlation coefficient ( $r$ )
Nutritional knowledge of rural women	Age	0.062
	Educational qualification	0.115
	Farm size	0.222**
	Annual income	0.358**
	Access to different facilities	0.168*
	Shocks faced	-0.297**
	Training need on nutritious food	-0.520**
	Extension media contact	0.407**
	Nutritional awareness	0.386**

'\*' indicates significant at 5 percent level of significance, and '\*\*' indicates significant at 1 percent level of significance

The results shown in Table 3 depict that among nine selected personal and socioeconomic characteristics, five, namely, farm size, annual income, access to different facilities, extension media contact, and nutritional awareness had significant positive relationships with the nutritional knowledge of women. While shocks faced and training need on nutritious food had significant negative relationships with the dependent variable. These seven significant variables are later entered into the multiple regression analysis to find out their respective contribution to the nutritional knowledge of rural women.

#### 3.3.2 Multiple linear regression for the contribution of the selected characteristics of the rural women on their nutritional knowledge

The multiple regression analysis was run to determine the influence of different explanatory variables on the nutritional knowledge of rural women. Out of the nine independent variables, seven variables that showed a significant relationship with the dependent variable were included in the analysis due to their significant values in the correlation analysis. Table 4 represents the overall summary of the model of the multiple linear regression analysis.

**Table 4. Model summary of multiple regression analysis**

Multiple R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. error of the Estimate	F statistics	d.f.
0.704	0.495	0.473	4.87061	21.862***	6

Significant: \*\*\*  $p < 0.005$

The findings of Table 4 represent that the multiple correlation coefficient between all the predictor variables and nutritional knowledge was 0.704. Moreover, the coefficient of determination ( $R^2$ ) indicates that the total of 49.5 percent of the variance in nutritional knowledge of rural women could be explained by all the independent variables included in the study. However, the modified version of  $R^2$  (adjusted  $R^2$ ) which calculates the  $R^2$  using only the significant independent variables that affect the dependent variable, pointed out that 47.3 percent variance in the dependent variable resulted from the significant independent variables. In addition, the regression model is significant at one percent level of significance ( $F$  statistics = 21.862). Thus, this model is fit to predict the contribution of the concerned independent variables. The different independent variables had their own units of measurement which did not permit the comparison of the unstandardized regression coefficient values (Hasan et al., 2019). So, the standardized regression coefficient values were also computed to avoid the problems of different units of measurement and the results are presented in Table 5.

**Table 5. Contributing variables to explain the nutritional knowledge of the rural women**

Variables entered	Unstandardized coefficient (B)	Standardized coefficient ( $\beta$ )	t-value
(Constant)	26.106		7.436
Farm size	-0.007	-0.163	-1.473
Annual income	0.012	0.292	2.617**
Access to different facilities	-0.276	-0.060	-0.936
Shocks faced	-0.668	-0.088	-1.376
Training need on nutritious food	-0.779	-0.407	-6.480***
Extension media contact	0.485	0.339	5.094***
Nutritional awareness	0.211	0.159	2.380*

\* = Significant at 5 percent level of significance, and \*\*\* = Significant at 0.1 percent level of significance

It becomes very clear from the findings presented in Table 5 that the observed  $t$ -value for the regression coefficient was significant for four independent variables, namely, annual income, training need on nutritious food, extension media contact, and nutritional awareness. The four significant variables of regression analysis are included in stepwise multiple regression analysis to determine the unique contribution of these variables to the dependent variable.

### 3.3.3 Stepwise multiple regression for determining the unique contribution of the selected characteristics of the rural women on their nutritional knowledge

The four significant variables of the multiple regression model were included in the stepwise regression analysis and their results are presented in Table 6. Specifically, the forward selection method for stepwise regression analysis was used as the forward selection begins with no variables selected (the null model). In the first step, it adds the most significant variable. At each subsequent step, it adds the most significant variable of those not in the model, until there are no variables that meet the criterion.



**Table 6. Summary of stepwise multiple regression analysis showing contributing variables to the nutritional knowledge of the rural women (n=164)**

y (Nutritional knowledge of rural women)						
Variables entered	Unstandardized coefficient (B)	Standardized partial ( $\beta$ ) coefficient	Value of 't'	Adjusted R <sup>2</sup>	Variation explained in %	F value
Constant	24.488		9.455***			
Training need on nutritious food	-0.852	-0.446	-7.415***	0.266	27.0	59.993***
Extension media contact	0.424	0.297	4.616***	0.419	15.6	59.854***
Annual income	0.007	0.162	2.668**	0.443	2.7	44.198***
Nutritional awareness	0.224	0.168	2.604**	0.462	2.2	36.041****

\* = Significant at 5 percent level of significance, \*\*\* = Significant at 0.1 percent level of significance

The results of Table 6 indicate that training need on nutritious food had the highest contribution (27.0 percent) to the nutritional knowledge of rural women. The rest of the 3 variables *viz.*, extension media contact, annual income, and nutritional awareness had 15.6 percent, 2.7 percent, and 2.2 percent contributions in predicting the nutritional knowledge of the rural women, respectively.

#### 4. Discussions

Knowledge of nutrition is essential for assessing the nutritional status of an individual, group, or community (Shrivastava et al., 2014). It is essential for women to have adequate nutrition and nutritional knowledge not only because it enables them to become valuable members of their households and communities but also because of the direct influence that maternal nutrition and nutritional knowledge have on the health and growth of the generation that comes after them. In the present study, the majority of the women had inadequate to moderate knowledge of different nutritional issues which is in the agreement with the findings of Morales et al. (2021). This scenario represents the urgency of taking adequate initiatives to uplift the nutritional knowledge of these women and concerned authorities need to address this issue as women's knowledge is very crucial not only for themselves but also for their children and other household members.

The findings presented in Table 2 indicate that the age of the rural women ranged from 22 to 56 years with a mean value of 41.60 and a standard deviation of 7.48. This indicates that most of the rural women might belong to the middle-aged category. Middle-aged individuals are prone to adopt innovation, are comparatively energetic, and can take risks in their decision. So, they might be keen to gather knowledge on different nutritional issues. On the other hand, education helps individuals to broaden their thinking and expand their horizons of knowledge. The mean education level of the women was 6.73 and the standard deviation was 3.79 indicating that the majority of them might have completed schooling at the primary to secondary level. The mean farm size is 171.56 decimals with a standard deviation of 156.74 indicating most of them belonged to marginal to small-size farm categories. The average annual household income of the women was BDT 288.06 thousand. On average the women had high access to different facilities and faced little shocks in life. However, they had medium training needed on different nutritional issues. The extent of information access from different extension sources ranged from 6 to 26 with a mean value of 16.77, and a standard deviation

of 4.69, indicating medium contact with different extension media. The average awareness of the women regarding different nutritional issues was 28.04 with a standard deviation of 5.04 indicating a medium level of awareness.

Out of nine, four factors were found influential in describing the nutritional knowledge of rural women, namely: training need on nutritional issues, extension media contact, annual income, and nutritional awareness. Both correlation and regression analyses confirmed that there was a significant negative contribution of the training need on nutritional issues to the nutritional knowledge of rural women. Similar results were also argued by Rai et al. (2017), Kumari and Puttaraj (2004), and Gupta et al. (2011). In this study, it solely contributed around 27.0 percent to rural women's nutritional knowledge which is noteworthy. Rural women who have low nutritional knowledge might face different hitches regarding nutritional issues and might seek training on the same to cope with the disadvantageous situation as well as boost nutritional strength for ensuring the sound health of the family members (Pervez et al. 2015; Katenga-Kaunda et al., 2021). Thus, for rural women to ensure their family's health in a sound manner, it is deemed necessary to formulate concrete, well-organized, and efficient training on different nutritional issues to build up their nutritional knowledge (Dupuis et al., 2022).

It became transparent from the correlation analysis and the regression that there was a significant positive contribution of the extension media contact to the nutritional knowledge of rural women. This result is in line with the findings of Sukandar et al. (2015), Singh et al. (2015), and Suchitra and Kumar (2018). It contributed around 15.6 percent to predicting rural women's nutritional knowledge. Adequate extension contact might help rural women to get information to build their knowledge base on different farming issues and nutrition-related information is not an exception (Nandi & Gowdru, 2018). Thus, it is beyond any argument that extension organizations should consider rural women as integral stakeholders of their developmental activities so that rural women can contribute to different issues in their household cohort.

Annual income contributed positively and significantly to the nutritional knowledge of rural women. Similar results were also noted by Chong et al. (2019), and Johnson et al. (2018). It contributed around 2.7 percent to explaining the nutritional knowledge of rural women. Rural women with high income might help them have access to different information sources and this might help them to gain knowledge on different nutritional issues. The extension organizations should make available different extension media to the rural women so that they get easy access to nutrition-related information (Pervez et al. 2018).

Nutritional awareness has a positive significant contribution to the nutritional knowledge of rural women. Similar results were also noted by Suchitra and Kumar (2018), and Surabhil and Panda (2020). Awareness might help to boost the ability to understand and utilize advanced information. In general, aware people tend to be more responsive in receiving instructions and doing new tasks and easily adopt new technologies as well, which increases their ability to gain knowledge.

## **5. Conclusions**

The results of the study revealed that the overwhelming majority of rural women possessed inadequate to moderate knowledge of various nutritional issues. Therefore, it is strongly recommended that diverse technical support and comprehensive agricultural extension programs, such as demonstrations, training programs, and group discussions be implemented by different agricultural extension organizations in order to increase women's knowledge of nutritional issues which will in

turn improve their own nutritional status and enable them to take care of the nutritional status of their respective households. Different arrangements should also be made by the relevant authorities to increase the educational level of women to increase the efficacy of various printed materials regarding nutritional issues, such as books, booklets, leaflets, posters, newspapers, etc. Moreover, training need on different nutritious food and extension media contact were the two highest contributing factors in predicting women's nutritional knowledge. Thus, to improve women's knowledge regarding food consumption behavior towards a more nutrition-conscious level, these two factors should be considered by the concerned GOs, NGOs, and development partners. For this, appropriate nutritional extension programs, nutritional campaigns on a balanced diet, food quality, hazardous food, etc. should be initiated where a fair number of functional information sources or change agents might be incorporated. Moreover, relevant training programs should be incorporated with these extension endeavors, and they should be implemented extensively for women who are directly or indirectly involved in public extension services. Annual income and awareness of nutritional issues were also significant contributing factors in predicting nutritional knowledge. The provision of different alternative income-generating activities like small-scale vegetable cultivation, livestock rearing, sewing, etc. should be introduced to rural women. To uplift rural women's nutritional awareness to the highest level, some necessary steps such as selection of aged participants, decreasing family members, and providing more opportunities to attend training programs, etc. are needed to be taken by both public and private extension service providers. Therefore, it might be rational to conclude that addressing the factors that contribute to rural women's nutritional knowledge, would help the situation as a whole.

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### Conflict of interests

The authors declare no conflict of interest.

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