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Factors influencing dietary diversity among women in two upazilla of Chattogram, Bangladesh: A cross-sectional study

Tapash Kumar Bhowmik[1*], Minhajur Rahman[2], Md. Abul Kashem[1], Sujan Rudra[3], Pratik Mazumder[1], Mehebub Hossain[1], Tahmina Jahin[1], Shrabonti Mozumder[1]

[1] Department of Botany, Faculty of Biological Sciences, Plant Tissue Culture and Biotechnology Laboratory, University of Chittagong, Chattogram, Bangladesh

[2] Department of Botany, Faculty of Biological Sciences, Ecology and Phytochemistry Laboratory, University of Chittagong, Chattogram, Bangladesh

[3] Department of Statistics, University of Chittagong, Chattogram, Bangladesh

Corresponding Author: Tapash Kumar Bhowmik

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Abstract

This cross-sectional study aimed to assess the variability in consumption patterns across various food groups among women and to identify socio-demographic factors associated with achieving recommended levels of dietary diversity. Using a 24-hour dietary recall method, the analysis revealed differing consumption levels among food groups. Among the participants, 99.75% primarily consumed grains, white roots, tubers, and plantains, 77.28% reported consuming pulses (beans, peas), while 80.74% consumed oils, lipids, and nuts/seeds. Consumption of dairy, milk, and milk products was reported by 56.27% of women, meat, poultry, and fish by 69.14%, and eggs by 46.2% of respondents. In the vegetable category, 69.14% consumed dark green leafy vegetables (DGLV), 47.16% other vitamin A-rich fruits and vegetables, and 83.46% other types of vegetables. Additionally, 56.05% of women included other fruits in their diets.

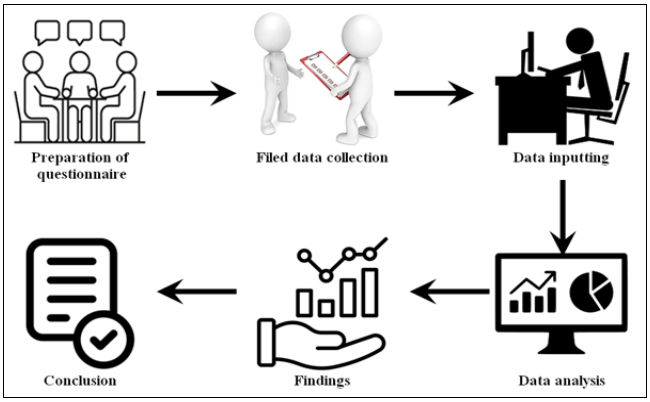
No significant age-related differences were observed in achieving recommended dietary diversity levels ($p = 0.668$). However, women aged 25 to 35 exhibited the highest percentage (28.6%) of meeting minimal nutritional diversity. Marital status ($p = 0.037$), educational attainment ($p = 0.014$), pregnancy status ($p = 0.021$), and annual income ($p = 0.041$) demonstrated statistically significant associations with dietary diversity. Notably, unmarried individuals displayed an adjusted odds ratio (AOR) of 1.385 (95% CI: 0.346-5.544, p=0.044) compared to ever-married counterparts. Those with primary school education exhibited a higher AOR (2.065; 95% CI: 1.054-4.044; p=0.035) than those without formal education (AOR: 1.000; 95% CI: 1.351-3.262; p=0.042). Pregnant women demonstrated a lower AOR (0.345; 95% CI, 0.134 to 0.89) than non-pregnant women (p=0.028). Furthermore, participants with a "40 and above" income displayed a greater AOR of 1.185 (95% CI: 0.632 - 2.221, p=0.047) for meeting recommended dietary variety.

Keywords: Cross-sectional study, consumption patterns, socio-demographic factors, adjusted odds ratio, dietary diversity

Introduction

Graphical abstract

For women's health and well-being to improve, especially in low-income nations like Bangladesh, better nutrition and dietary diversity are essential. For women of reproductive age, minimum nutritional For women's health and well-being to improve, especially in low-income nations like Bangladesh, better nutrition and dietary diversity are essential. For women of reproductive age, minimum nutritional.



Introduction

For women's health and well-being to improve, especially in low-income nations like Bangladesh, better nutrition and dietary diversity are essential. For women of reproductive age, minimum nutritional diversity defined as consuming various foods from several food groups has been identified as a critical indication of dietary quality and nutrient sufficiency [1]. The lives of millions of women are still affected by malnutrition and food insecurity in Bangladesh, making it difficult to achieve enough dietary diversity [2].

The limited diversity of dietary practices among Bangladeshi women results from several socio-demographic, economic, cultural, and environmental influences. Low household income, a lack of access to nutrient-dense foods, a lack of information about good eating habits, and low educational attainment have all been linked in studies to low dietary diversity [3]. Further limiting women's dietary options and harming their nutritional status are cultural norms, including food taboos and prohibitions [4].

Effective treatments are further hampered by the absence of a community-based risk assessment to pinpoint and address the factors causing a lack of dietary diversification. To identify and prioritize health concerns within a particular

population, community-based risk assessment is a method that incorporates active community participation, data collecting, and analysis. Its use to comprehend the factors that affect Bangladeshi women's minimum dietary diversity can offer insightful information for creating targeted interventions and policies to enhance nutritional outcomes [5].

Additionally, it has been determined that one of the main obstacles to achieving dietary variation in Bangladesh is household food insecurity, characterized by restricted or unclear access to appropriate and nutritious food [6]. Due to budgetary restrictions and a lack of different food options, women who live in food-insecure households are more likely to have an insufficiently diverse diet. Moreover, poor hygiene standards and insufficient sanitation can result in foodborne illnesses and have a detrimental effect on dietary diversification [7].

There is a need for an empirical study that thoroughly examines the multiple elements determining the minimum dietary diversity among women, even if prior research in Bangladesh has looked at some aspects of dietary diversity and its causes. By investigating the socioeconomic, cultural, and environmental factors affecting dietary diversity and using a community-based risk assessment technique to pinpoint the primary risk factors particular to local contexts, this study seeks to close this gap.

This study's findings can help inform evidence-based policies and interventions to increase women's dietary diversity in Bangladesh and improve their nutritional status. Policymakers, health practitioners, and community leaders may empower women and enhance their dietary practices by identifying the root causes and using a community-based strategy.

Methodology

1. **Study Design:** This study used a cross-sectional design to investigate the variables linked to the bare minimum of dietary diversity among women.

2. **Participants:** The study's participants comprised women from different Sitakunda and Mirsarai upazila unions of Chattogram district, Bangladesh. The sample size was established using a power calculation to provide appropriate statistical power to identify connections between relevant variables. Participants were chosen from the community using an organized sampling technique.

3. **Data collection:** Structured questionnaires were used to gather information on sociodemographic factors and dietary diversity. Age group, marital status, education level, pregnancy status, milker status, culinary habits, number of children, and yearly income were among the socio-demographic factors. A validated dietary variety questionnaire that tracked the consumption of several food groups was used to evaluate dietary diversity.

4. **Statistical analysis:** Descriptive statistics were utilized to summarize the participants' socio-demographic details and the distribution of dietary diversity. Chi-square tests investigated the relationships between minimum nutritional diversity and socio-demographic factors. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated using a logistic regression analysis to identify independent variables related to fulfilling the minimal dietary diversity criteria. The significance threshold was set at 0.05.

Results

Women in the study reported (Fig. 1) eating grains, white roots, tubers, and plantains (99.75%) primarily, indicating a reliance on these staples based on a 24-hour dietary recall. Women (77.28%) reported eating pulses (beans, peas), while the majority of women (80.74%) reported consuming oils, lipids, and nuts/seeds. 56.27 percent of participants reported regularly consuming dairy, milk, and milk products, whereas 69.14 percent reported regularly consuming meat, poultry, and fish. 46.2% of females surveyed reported regularly eating eggs. Of those who ate vegetables, 69.14% ate DGLV, 47.16% ate other vitamin A-rich fruits and vegetables, and 83.46% ate some other type of vegetable. Fifthly, other fruits were consumed by 56.05% of the women. In light of these results, it is clear that the study group would benefit from higher consumption of protein-rich foods, dairy products, and a wide range of fruits and vegetables.

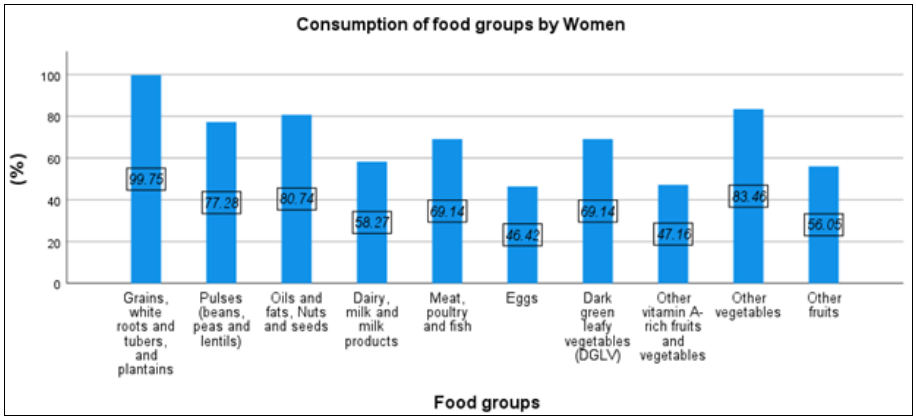


Fig 1: Consumption of food by study women 24-hour dietary recall

Variable levels of consumption for various food groups are shown by the analysis of the minimum dietary variety among women (**Fig. 2**). Only 19.5% of women do not fulfill the requirements for including grains, white roots and tubers, and plantains in their diet, compared to 80.2% of women who do. Similar to grains, more women (64.2%) ingest pulses like beans, peas, and lentils than others (13.1%). 68.9% of women consume oils and fats, nuts, and

seeds, whereas 11.9% do not. 54.6% of women consume dairy, milk, and milk products, compared to 3.7% of those who do not satisfy the requirements. 60.2% of women consume meat, poultry, and fish, compared to 42.7% of women who consume eggs. In contrast to other fruits and vegetables high in vitamin A, which are consumed by just 45.9% of women, 60% consume dark green leafy vegetables (DGLV). Other fruits are consumed by 54.6% of women, while 71.4% of women include other vegetables. These results underline the necessity of promoting a more varied diet, assuring increased consumption of food groups like dairy, meat, eggs, and dark green leafy vegetables to boost dietary diversity overall and enhance the nutritional well-being of women.

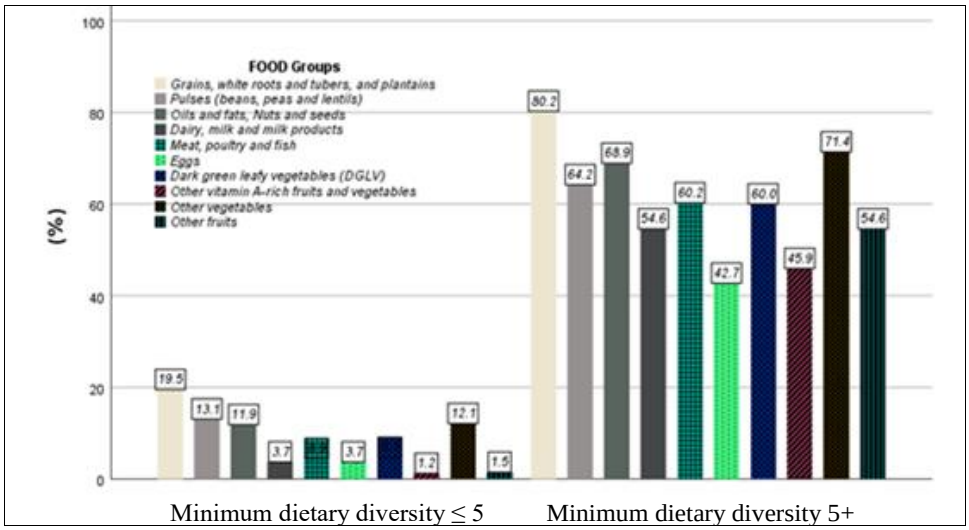


Fig 2: Consumption levels of minimum dietary diversity of women

Demographic data from this study highlights the significance of determining the bare minimum of dietary diversity for women in this community (Table 1). 52.3 percent of the women in the poll were classified as illiterate, suggesting that this may be a barrier to learning about nutrition and healthy eating habits. Furthermore, 93.3% of women did not report being pregnant, indicating that treatments focusing on dietary diversification throughout pregnancy may be fruitful to address possible nutrient shortages. The research also shows that a large percentage of women (85.7%) were inactive in milking operations, which may limit their exposure to nutritious options like dairy products. In addition, a sizable proportion (89.4%) reported cooking at home, suggesting an opening for interventions aiming at boosting dietary diversity *via* changes in cooking habits.

Table 1: Socio-demographic factors of MDD-W with minimum ≤ 5 and 5 + scores

		Minimum dietary diversity			
Variables	**Categories**	**≤ 5 N (%)**	**5 + N (%)**	**Total N (%)**	**P-value**
Age group	Below 20	2(0.5 %)	16(4 %)	18(4.4 %)	0.668
	20 - 25	14(3.5 %)	64(15.8 %)	78(19.3 %)	
	25 - 35	33(8.1 %)	116(28.6 %)	149(36.8 %)	
	35 and Above	31(7.7 %)	129(31.9 %)	160(39.5 %)	
Marital status	Married	77(19 %)	310(76.5 %)	387(95.6 %)	0.037*
	Divorce and others	3(0.7 %)	15(3.7 %)	18(4.4 %)	
Education	Illiterate	50(12.3 %)	162(40 %)	212(52.3 %)	0.014*
	Primary	15(3.7 %)	90(22.2 %)	105(25.9 %)	
	Secondary and above	15(3.7 %)	73(18 %)	88(21.7 %)	
Pregnancy	No	70(17.3 %)	308(76 %)	378(93.3 %)	0.021*
	Yes	10(2.5 %)	17(4.2 %)	27(6.7 %)	
Milker	No	67(16.5 %)	280(69.1 %)	347(85.7 %)	0.582
	Yes	13(3.2 %)	45(11.1 %)	58(14.3 %)	
Cooking in own house	No	8(2 %)	35(8.6 %)	43(10.6 %)	0.841
	Yes	72(17.8 %)	290(71.6 %)	362(89.4 %)	
Number of children	No	2(0.5 %)	9(2.2 %)	11(2.7 %)	0.683
	1	11(2.7 %)	28(6.9 %)	39(9.6 %)	
	2	20(4.9 %)	96(23.7 %)	116(28.6 %)	
	3 - 4	36(8.9 %)	150(37 %)	186(45.9 %)	
	5 and Up	11(2.7 %)	42(10.4 %)	53(13.1 %)	
Yearly income ('000)	less than 10	37(9.2 %)	146(36.3 %)	183(45.5 %)	0.041*
	10 - 30	11(2.7 %)	48(11.9 %)	59(14.7 %)	
	30 - 40	11(2.7 %)	35(8.7 %)	46(11.4 %)	
	40 and above	20(5 %)	94(23.4 %)	114(28.4 %)	

Note * indicates: significance at a 5% level using the Chi-square test

Using the data provided, it looked at how different factors affected women's ability to meet the minimum requirements for dietary diversification. No significant difference was seen in achieving the recommended level of dietary diversity between age groups (p = 0.668). However, women between the age of 25 and 35 had the highest percentage of women satisfying the minimal dietary diversity, at 28.6%.

Dietary diversity was significantly associated with marital status (p = 0.037). Women who were married were more likely to have a varied diet than those who were not married (3.7% vs. 76.5%). Minimum dietary diversity was also found to be statistically associated with educational attainment (p = 0.014). Higher rates of meeting dietary diversity were seen among women with some level of education, especially among those with at least a primary level education (22.2%) and those with some level of education beyond that (18%). Minimum dietary diversification was significantly associated with pregnancy status (p = 0.021). A smaller percentage of pregnant women (4.2% vs. 76%) met the minimal dietary diversification threshold (Score 5+). Minimum dietary diversity was significantly associated with annual income (p = 0.041). Twenty-three percent more middle- and upper-class women than poorer women reported meeting dietary diversity. Minimum dietary diversity was not significantly associated with other characteristics (p > 0.05), including milker status or home cooking.

The logistic regression analysis (Table 2) links various variables to the probability that participants will meet the study's minimal dietary diversity requirement (≤5/5+ food groups). There is a statistically significant correlation between marital status and risk, with those who were unmarried having an adjusted odds ratio (AOR) of 1.385 (95% confidence interval [CI]: 0.346-5.544, p =0.044) higher than those who have ever been married. Similarly, the AOR for meeting minimum dietary diversity is higher for those with at least a basic school education (2.065; 95% CI: 1.054–4.044; p =0.035) compared to those with no formal education (1.000; 95% CI: 1.351–3.262; p =0.042). A statistically significant correlation exists between pregnancy status and AOR, with pregnant women having a lower AOR (0.345; 95% CI, 0.134 to 0.89) than non-pregnant women (p =0.028). In terms of annual income, those in the "40 and above" bracket had a greater AOR of 1.185 (95% C.I. 0.632 - 2.221, p =0.047) when it came to meeting the recommended minimum of dietary variety. Statistically significant odds ratios for achieving adequate dietary diversity show that marital status, education level, pregnancy status, and annual income are all critical factors. Better nutritional outcomes and increased dietary diversity within the study population may be achieved if these considerations are considered when creating treatments and programs.

Table 2: Factors associated with the minimum dietary diversity (≤5/5+ food groups).

		Adjusted OR	95% C.I. OR	Sig.	Unadjusted OR	95% C.I. OR	Sig.
Age group	Below 20	1.000		0.41			0.677
	20 - 25	0.514	(0.095, 2.784)	0.44	0.571	(0.118, 2.773)	0.487
	25 - 35	0.316	(0.058, 1.708)	0.181	0.439	(0.096, 2.009)	0.289
	35 and Above	0.404	(0.073, 2.222)	0.297	0.520	(0.114, 2.382)	0.400
Marital status	Married	1.000	---	---	---	---	---
	Divorce and others	1.385	(0.346, 5.544)	0.044*	1.242	(0.351, 4.398)	0.046*
Education	Illiterate	1.000	---	0.042*	---	---	0.042*
	Primary	2.065	(1.054, 4.044)	0.035*	1.666	(1.351, 3.262)	0.033*
	Secondary and above	1.655	(0.831, 3.297)	0.152	1.233	(0.565, 2.688)	0.599
Pregnancy	No	1.000	---	---	---	---	---
	Yes	0.345	(0.134, 0.89)	0.028*	0.386	(0.17, 0.88)	0.024*
Milker	No	1.000	---	---	---	---	---
	Yes	0.783	(0.382, 1.605)	0.505	0.828	(0.423, 1.622)	0.583
Cooking in own house	No	1.000	---	---	---	---	---
	Yes	0.833	(0.343, 2.022)	0.687	0.921	(0.409, 2.07)	0.841
Number of children	No	1.000	---	0.678	---	---	0.690
	1	0.702	(0.112, 4.406)	0.706	0.566	(0.105, 3.046)	0.507
	2	1.421	(0.224, 9.01)	0.709	1.067	(0.214, 5.316)	0.937
	3-4	1.294	(0.201, 8.316)	0.786	0.926	(0.192, 4.472)	0.924
	Five and Up	1.396	(0.197, 9.876)	0.738	0.848	(0.16, 4.506)	0.847
Yearly income (Thousand BD Taka)	less than 10	1.000	---	0.73	---	---	0.820
	20 - 30	1.16	(0.534, 2.522)	0.707	1.106	(0.523, 2.336)	0.792
	30 - 40	0.740	(0.332, 1.649)	0.461	0.806	(0.374, 1.737)	0.583
	40 and above	1.185	(0.632, 2.221)	0.047*	1.191	(0.652, 2.176)	0.050*
	Constant	8.101	---	0.076	---	---	---

Discussion

The current study offers insightful information about the elements contributing to the least amount of dietary diversity among women. The results emphasize the significance of several demographic factors in determining women's eating habits and capacity to satisfy the advised minimum dietary diversity criteria. The level of education attained, marital status, pregnancy status, and annual income all appeared as essential indicators.

It was discovered that women's dietary diversity was significantly influenced by their level of education. Women who had completed elementary school or more frequently met the minimum standards for nutritional variety. This result aligns with an earlier study [8-9], which found a favorable correlation between education and dietary

diversification. People who have received an education are better informed and more conscious of nutrition, which empowers them to make wise decisions and diversify their meals.

Marital status also impacted the variety of diets among women; married women were more likely to follow the minimum requirements than single ones. Marriage's social and financial support may help people make better dietary decisions and have easier access to various foods. Marriage frequently results in joint meal-planning and cooking responsibilities, which can support a more varied diet [10].

The state of being pregnant has been found to have a considerable impact on women's dietary diversity. Compared to non-pregnant women, pregnant women were less likely to fulfill the minimal dietary diversification requirement. This finding highlights the necessity for tailored interventions and nutritional assistance throughout pregnancy to maintain adequate nutrient intake and promote dietary diversity for optimal maternal and fetal health [11-12].

Another significant element affecting dietary diversity was annual income. Women earning more money were likelier to adhere to the minimal dietary variety standards. Lower-income people face challenges, including availability and pricing due to socioeconomic inequality, which can restrict access to nutritious foods [13]. Enhancing dietary diversity and boosting nutritional outcomes for all requires addressing income inequality and improving food accessibility.

Regarding women's dietary diversity, the research on food consumption patterns identified some areas of concern. Other food groups, such as dairy, meat, eggs, and dark green leafy vegetables, had lower consumption rates, while some, such as grains, white roots, tubers, and plantains, were commonly consumed. These points point to the necessity of initiatives that encourage greater intake of these food groups to boost dietary variety and nutritional sufficiency [14-15].

The results of this study provide insight into the elements that contribute to the least amount of dietary diversity among women. Significant factors were income, marital status, pregnancy status, and educational attainment. These findings significantly impact public health initiatives, and regulations focused on enhancing women's nutritional security and increasing dietary diversity. To ensure everyone has access to a wide variety of nutritious foods, efforts should improve nutrition education, offer targeted support during pregnancy, and tackle socioeconomic inequities.

Conclusion

In summary, this study clarifies the variables affecting the minimum dietary diversity among women. Education level, marital status, whether or not a woman is pregnant, and annual income were reliable dietary diversity indicators. Women who met the minimum dietary diversity needs were more likely to be married, have children, not be pregnant, and have higher annual salaries. To increase dietary diversity and nutritional outcomes for women, addressing socioeconomic gaps, promoting nutrition education, and offering targeted assistance during pregnancy is crucial. To increase dietary diversity and ensure optimal nutrient intake, interventions should concentrate on increasing the consumption of food groups such as dairy, meat, eggs, and dark green leafy vegetables. Public health initiatives can help improve women's overall nutritional well-being and lessen inequities in dietary diversity by targeting these variables.

The study's findings underscore the complexity of the factors driving dietary diversity and the demand for comprehensive strategies to encourage women to adopt healthy eating habits. The following studies and interventions should further explore the interaction of socio-demographic variables, availability of nutrient-dense foods, and awareness of balanced diets to create practical plans for enhancing dietary diversity and ensuring women's optimal nutritional status.

Ethical Considerations

The relevant institutional ethics committee examined and approved the study procedure. All participants provided their informed consent, and confidentiality and anonymity were maintained while the data was being gathered.

Limitations

This study had several drawbacks. First, the cross-sectional architecture restricts proving that one variable causes another. Second, because the study was conducted in a particular neighborhood, the results may need to be more generalizable to other populations. Additionally, self-reported data that could be biased by recollection was used to measure dietary diversity. Future research should consider longitudinal designs and a more comprehensive range of people to improve the generalizability of the results.

Conflict of interest

The authors declare that there are no conflicts of interest.

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