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PATTERNS AND DETERMINANTS OF HOUSEHOLD DIETARY DIVERSITY OF EXTREMELY POOR PEOPLE IN THE RURAL AREA OF BANGLADESH

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Consumption Pattern, Dietary Diversity, Dietary Patterns, Dietary Diversity Determinants, Extremely Poor People, Food Intakes, Household Dietary Diversity Score, Household Food Security, Nutrition Awareness.

ABSTRACT

This study examined household dietary diversity (DD) patterns and determinants among extremely poor people in rural areas of Bangladesh. Secondary data from the Pathways to Prosperity for Extremely Poor People (PPEPP) project of Palli Karma-Sahayak Foundation (PKSF) was used, collected from 6,215 households across Barisal, Dhaka, Khulna, and Rangpur divisions of Bangladesh. The dietary diversity score was assessed by tallying the different food groups consumed within the last 24 hours. The study found that the average Household Dietary Diversity Score (HDDS) was 5.35, with 5% of households having a low HDDS, 76% fall in the medium category, and 18% having a high HDDS. Vegetables were consumed by 90% of households, while the meat was not included in the meals of over 91% of households. Additionally, 50% of households consumed fish, while only 11% were able to include milk in their meals. Furthermore, 13% of households did not consume any oil or fat-related foods. Almost 80% of respondents in the study live in extreme poverty and there is a link between food insecurity and low dietary diversity among them. The study also found that diversifying income-generating activities (IGAs) and increasing nutrition awareness could improve household dietary diversity. Our findings suggest that improving financial capabilities can lead to a better allocation of resources towards non-cereal food items, eventually changing the dietary diversity pattern of extremely poor households.

INTRODUCTION

Dietary diversity refers to the consumption of a variety of foods from different food groups regularly. A diverse diet is important for maintaining good health and ensuring adequate intake of essential nutrients. Nutritional deficiencies can lead to a range of health problems, such as stunted growth, weakened immune systems, and increased risk of chronic diseases.

In Bangladesh, the prevalence of malnutrition is among the highest in the world. Over 9.5 million children, equivalent to 54% of pre-school-age children, suffer from stunting, while 56% are underweight, and more than 17% experience wasting (Hasan, Mamun, Williams, & Magalhães, 2018). According to the national public health data, 31% of children under the age of 5 in Bangladesh suffer from stunting, 22% are underweight, and 8% are experiencing wasting (National Institute of Population Research and Training (NIPORT), 2019). The lack of proper nutrition during infancy significantly elevates the chances of mortality and morbidity (Tickell , et al., 2020). Additionally, undernutrition causes decreased growth, limited learning capacity, inadequate cognitive and motor development, and subpar work performance, resulting in unfavorable economic outcomes in the future (Jahan, et al., 2019). As outlined in the UNICEF framework, the nutritional status of children primarily hinges on household feeding and food consumption behavior and practices, the incidence and type of illness, and the overall childcare practices (Islam et al., 2016).

Dietary diversity is particularly important for households, as it can help ensure that all family members receive the nutrients they need for good health. As a vital determinant of nutritional status, dietary intake is significantly associated with energy consumption and micronutrient absorption. As a result, it plays an important role in promoting growth and development, particularly in young children. A lack of dietary diversity can also contribute to food insecurity, as households may rely on a limited number of staple foods that may not provide all the necessary nutrients. By prioritizing dietary diversity, households can improve their overall nutritional well-being and reduce the risk of diet-related health problems. Therefore, increased variety in the types of foods is associated with enhanced nutrient consumption and results in improved nutritional status.

Although several studies have investigated factors related to dietary diversity, household dietary patterns, and food consumption, only a limited number of studies have focused on national-level data. This study used secondary data from the PPEPP project which is designed only for extremely poor people to exit them from extreme poverty. The project is being implemented by Palli Karma-Sahayk Foundation (PKSF) and jointly funded by the Foreign, Commonwealth & Development Office (FCDO) and the European Union (EU). The project is covering almost 215,000 extremely poor households from 145 unions of 12 districts of 4 divisions of Bangladesh. Most of the unions are poverty pockets and extreme poverty is high in these areas. This initiative seeks to bring an end to poverty among targeted households living in economically and climatically vulnerable regions of Bangladesh. The program's target areas include the North-Western River Basin Area, the North-Eastern Haor area, the South-Western Saline-prone Coastal area, and regions inhabited by ethnic minorities. According to the PPEPP project (n.d), the goal is to implement sustainable solutions that will permanently eradicate poverty and improve the living conditions of households in these targeted areas. The project focuses on three key areas: livelihood, nutrition, and community mobilization, with additional attention paid to disability inclusion, disaster, and climate change, and women's empowerment for gender equality. Due to the absence of data based on evidence at a national level regarding extremely poor household dietary diversity in rural Bangladesh, the main goal of this study is to detect the trends and factors that influence the dietary diversity of the extremely impoverished families living in rural areas of Bangladesh. The outcomes of this study could aid policymakers in creating effective intervention approaches targeted toward this population living in rural Bangladesh.

MATERIALS AND METHODS

Study design and sampling

As the study used a secondary dataset, the detailed study design and sampling techniques will be found in the baseline report of the PPEPP project. As it was the baseline study of the project they used 'treatment' and 'control' to select the sample HHs. A total of 6,215 sample HHs data were collected from both the treatment and control areas. We utilized the entire dataset to derive the desired outcomes.

Ethical Consideration

The dataset used for this study is properly approved by the owner i.e., by Palli Karma-Sahayak Foundation (PKSF).

Selection of variables

The baseline survey of the PPEPP project contains several modules related to socioeconomic and demographic characteristics, loan and savings information, nutrition, community mobilization, Disaster preparedness, climate resilience, Women Empowerment and Gender Equality, and Disability Inclusion. For this paper, we have taken household members' related information, employment, income, expenditure, and assets-related data from the socio-economic and demographic module, household dietary diversity and household food insecurity access scale (HFIAS), and infant and young child feeding (IYCF) related data from the Nutrition module. The variables selected here were not random or arbitrary, rather it was guided by the FAO guideline (Swindale & Bilinsky, 2005) for HDDS and the most recent studies related to this field (Ali, et al., 2022).

To gather data on household food consumption over the previous 24 hours, a standard tablet or mobile-based questionnaire was utilized. The questionnaire collected data on individual food groups, which included cereals, white roots and tubers, vitamin A-rich vegetables & tubers, dark green leafy vegetables, other vegetables, vitamin A-rich fruits, other fruits, organ meat, fresh meat, eggs, fish and seafood, legumes/nuts/seeds, milk and dairy products, oils/fats, sweets, and spices/condiments. These sixteen food items were then categorized into twelve groups, namely cereals, roots and tubers, vegetables, fruits, meat/poultry/offal, eggs, fish and seafood, pulses/legumes/nuts, milk and milk products, oils/fats, sugar/honey, and miscellaneous drinks and spices/condiments.

The Household Dietary Diversity Score (HDDS) was utilized to evaluate the range of food varieties consumed by the participants. The HDDS was categorized into three categories based on the number of food groups ingested. These categories included low, medium, and high, with a score of less than or equal to 3 being considered low, 3.3 to 6 being deemed medium, and a score greater than 6 being classified as high dietary diversity. Furthermore, the level of food insecurity in each household was determined by utilizing the Household Food Insecurity Access Scale (HFIAS) and adhering to the Food and Nutrition Technical Assistance (FANTA) guidelines (Coates, Swindale, & Bilinsky, 2007). The HFIAS is a measure that continuously assesses a household's level of food insecurity and is classified based on the severity of food insecurity. According to the FANTA guidelines, households were classified as either food secure, mildly food insecure, moderately food insecure, or severely food insecure (Coates, Swindale, & Bilinsky, 2007).

Statistical analysis

Description statistics were utilized to depict the variables, and statistical analyses were carried out using STATA V.17. A multiple regression model was employed to identify potential factors that may impact the dietary diversity of the households.

RESULTS

The study is carried out on 6,215 households, of which 89% of the respondents are female and 11% are male. Among the sample, the respondents were selected from various categories: 9% of the households are headed by females, 6% of the households have persons with disabilities (PWD), 16% of the households consist of members with child labor or elderly single person and 2% of the households are Dalit.

This study covers respondents from rural regions and therefore the housing structure differs from the urban settings. Most of the houses (94%) have mud floors and only 6% of the households have concrete flooring. Three quarter (72%) of the households have walls made of tin and 15% have walls made of mud. Almost all (95%) of the households use tin for roofing. More than 80% of the household members personally own their household land.

Most of the households (93%) have electricity where the source is connected to the national power grid. Almost half (48%) of the households use crop residue, grass, straw, and shrubs as the energy source for cooking and 38% of the households use wood. Only 17% of households have solar panels.

Table 1: Summary of the key demographic, socio-economic, and other characteristics of the sample respondents

Gender of Respondents	
Female	89%
Male	11%
Women headed	9%
HH having PWD	6%
Dalit HH	2%
Child labor/elderly single person HH/ethnic	16%

Non-intersectional	57%
Overlapped	19%
Average household size	4
Housing Condition	
Floor Material	
Mud/Sand	94%
Cement/stone/concrete/pucca	6%
Roof Material	
Tin	95%
Others	5%
Wall material	
Mud	15%
Tin	74%
Brick	5%
Others	6%
Electricity Access	
Connected with the national grid	93%
No electricity	7%
Land ownership	
Personal	82%
Rented	1%
Other people's land	17%
Percent of households whose per capita income is below $1.90[1]	56.3%
Poverty incidence (national lower poverty line)	71.3%
Poverty incidence (national upper poverty line)	83.5%
Employment Status of HHs	
Self-employment in farm	10%
Self-employment in off-farm	2.63%
Day labor	53.73%
Small business	7.41%
Low-wage jobs like a night guard	6.25%
Fishermen	3.43%
Van/rickshaw/auto driver	6.71%
Housemaid	1.46%
Others (beggars, barbers, cobblers, cleaners, etc.)	8.38%
Employment Mode	
Permanent	34.1%
Temporary	47.2%
Seasonal	16.4%
Occasional	2.3%
Average per capita monthly consumption (BDT)	2,263
Land Holdings	
Average land ownership (in decimal)	9.01
Land <2 decimal	39%
Land >=2 and <5 decimal	26%
Land >=5 and <10 decimal	17%
Land>=10 decimal	18%
Exposure to climate shocks	72.6%
Received COVID-19 support	21%
Expenditure	
Average monthly food expenditure of HHs (BDT)	6,592
Average monthly non-food expenditure of HHs (BDT)	2,387
Average per capita monthly income (BDT)	2,225
Stunting among children u5 years	49%

[1] The international poverty line is USD 1.90 (PPP dollar). Considering PPP USD 1 = BDT 32.1 (2022), we found BDT 61 per person per day, which is BDT 1,830 per person per month. Therefore, BDT 1,830 was considered as the international poverty line to calculate incidence of poverty in this paper.

Wasting among children u5 years	17%
Dietary Diversity	
Household Dietary Diversity Score (HDDS) (10 food groups, without cereals and spices)	3.39
Household Dietary Diversity Score (12 food groups)	5.35
Food Security Status	
Food Secure	73.8%
Mildly Food Insecure	10.9%
Moderately Food Insecure	10%
Severely Food Insecure	5.3%
Income Generating Activities	
Homestead gardening	9.54%
Agriculture (vegetable/crop production/cultivation)	4.14%
Fish production	1.14%
Livestock (chicken/pigeon/duck/goat/sheep)	33.13%
Beef Fattening	18.25%
Off-farm activities	6.4%

As per the official national poverty line of Bangladesh, more than 71% of respondent households are extremely poor and as per the official upper poverty line, only 16.5% of households are either moderate or non-poor. The income per capita is significantly lower than the national average of TK 3,940 as per HIES 2016 (Bangladesh Bureau of Statistics, 2016). Day laborers appeared as the dominant category (53.7%) among all occupational categories. Other than day labor, other major categories include self-employment on the farm (10%), small business (7.4%), van/rickshaw pulling (6.7%), and low-wage jobs like night guard (6.3%). Roughly 66% of households have only one earning member in the family, while the remaining households have more than one earning member in the family.

The average household monthly expenditure (TK 8,981) is much lower than the HIES 2016 average of rural households (TK 13,868). The mean value of physical assets is BDT 2,37,251 which includes land, housing, livestock, and equipment used in agriculture, business, and houses. On the other hand, the financial asset includes various forms of savings like cash at hand, savings in current/savings accounts, bonds, DPS, FDR, etc. The mean financial asset value is BDT 4,767. Around 14% of households grow vegetables, and 51% of households are involved in livestock rearing such as poultry, pigeon, duck, cattle, sheep, goat, etc. Among the respondents around 21% received COVID-19 support.

The average household dietary diversity score (HDDS) is 5.35 (out of 12) where the minimum is 0 and the maximum is 12 (standard deviation 1.39). On the other hand, the HDDS is 3.39 without cereals and spices. More than 6% of the household's HDDS is low (0-3.0), around 76% of households' HDDS is medium (3.01-6), and the rest 18% of households' HDDS is high (6+). Around 90% of households consumed vegetables, whereas more than 91% HHs are unable to keep meat in their meal. Of the households, more than 50% consumed fish, and only 11% consumed milk in their meal. On the other hand, 13% of households still do not consume any oil or fat-related food. Only 30% reported that they consumed any kind of fruit within the last 24 hours. Besides, animal protein was consumed in meals by 62% of the respondents.

A multiple regression model has been used to identify some potential factors affecting the dietary diversity of the households (Table 2). Households having membership in Prosperity Village Committee (PVC[2]), having under five children, living standard, and self-employed are highly associated with the HDDS.

Table 2: Determinants of HDDS (OLS-based estimates)

	Coeff	**Se**
Member of PVC (Yes=1)	0.282***	0.046
Children under five years of age	0.308***	0.042
Poverty Gap	-0.018***	0.001
Living standard: Poor=1	-2.965***	0.499
Log of monthly per capita income	0.103***	0.027
The household has income from day labor	0.103**	0.046
The household has income from self-employment	0.520***	0.054
The household is affected by climate shock in the last 3 years	0.188***	0.048

[2] Prosperity Village Committee (PVC) is the place where 30-40 members of the project gather weekly for different sessions on nutrition, primary healthcare, and other social common issues. Every week Technical officers conduct sessions on different issues to make members aware on livelihoods, nutrition and social mobilizations.

Age of household head	0.002	0.002
Education of household head (years of schooling)	0.021***	0.007
Women headed household	-0.254***	0.060
HH having child labor	-0.093	0.121
Single member and elderly HH	-0.368***	0.118
HHs having PWD	0.119*	0.070
Dalit HH	-0.151	0.133
Constant	5.638***	0.264
Model's statistics	N=6215; R^2=0.09	
Note: 0.01-*; 0.05=**; 0.1-***		

DISCUSSION

The aim of this study was to evaluate dietary diversity of extremely poor rural households in Bangladesh and to identify the factors that influence it. Secondary data from the PPEPP baseline survey was utilized, and the study found that the average household dietary diversity score (HDDS), excluding cereals and spices, was 3.39, indicating almost low dietary diversity for most participant households. However, when all twelve food groups were taken into account, the mean score was 5.35, suggesting that the households had medium dietary diversity. Food items accounted for approximately 73% of total household expenditure, which is consistent with the findings of a recent study conducted in rural Bangladesh (Raihan, et al., 2020). The study also found that per capita expenditure or the amount of homestead and cultivable land did not significantly influence the degree of dietary diversity. However, membership in a PPEPP Village Committee (PVC), having children under the age of five, poverty gap, income from self-employment, and the education level of the families were all significant factors in determining HDDS. Regression analysis indicated that households with PVC membership had higher HDDS. Additionally, an increase in per capita monthly income resulted in a 10% increase in HDDS, holding other factors constant. The study also found that the HDDS increased as the number of children under the age of five in the household increased.

In the rural areas of Bangladesh, where households are living in extreme poverty, food consumption patterns are influenced by a variety of factors, including region, religion, and personal food preferences (Hasan, Mamun, Williams, & Magalhães, 2018). Recent studies have suggested that consuming at least four out of the twelve food groups on average leads to an ideal level of dietary diversity, in terms of both macronutrients and micronutrients (National Institute of Population Research and Training (NIPORT), 2019). Therefore, we can say that the study population had a moderately diverse diet consisting of over five food groups, enriched in both macro and micronutrients. However, given the higher food expenditure, it would be reasonable to expect a more diverse food menu.

The findings of this study suggest that food insecurity, whether severe or moderate, is significantly associated with a decrease in dietary diversity among rural households in Bangladesh. This is in line with prior research demonstrating a strong link between a household's level of food security and the diversity of its diet (Jahan, et al., 2019). The diversity of a household's diet is an important measure of its food security status as it reflects the amount of energy available to the household (Jahan, et al., 2019). The cost of cereals, fruits, vegetables, dairy items, meat, and oils has been linked to changes in dietary diversity in earlier studies (Raihan, et al., 2020). Specifically, there is a correlation between spending on non-cereal food products in Bangladesh and the price of cereal staples. When the cost of essential cereals like rice decreases, it corresponds to an increase in the variety of non-cereal food items consumed (Raihan, et al., 2020). However, inconsistencies in the results may be attributed to the susceptibility of the sample population, which had limited access to cultivable or homestead land. Only a small percentage of households had a homestead vegetable garden, which is not sufficient to influence dietary variety. The study found that PVC members exhibited a higher degree of dietary variety than non-members, indicating the importance of education on food diversity and its impact on children and women of reproductive age. It is important to note that the findings of the study only apply to marginalize subgroups and may not reflect the underlying variables among the general population of Bangladesh. Food prices were not included as a variable in the baseline survey and this may be due to the lack of reliable data. Therefore, further qualitative research is needed to better understand the fundamental connections between socioeconomic indicators, such as income and expenditure of household, with dietary diversity, as well as the autonomous function of dietary variety in the context of growth and development.

STRENGTHS AND LIMITATIONS

The study has several strengths, including large sample size, careful selection of participants covering four different divisions, and rigorous statistical analyses. Nevertheless, there is a possibility of recall bias associated with dietary diversity, since information on the food intake in the previous 24 hours was collected through maternal responses.

CONCLUSION

In households living in extreme poverty, food insecurity severity is closely related to a lower level of dietary diversity, with a significant portion of household expenditure allocated toward food products. However, despite these financial constraints, the majority of families still manage to maintain a moderate level of dietary diversity. To improve the Household Dietary Diversity Score (HDDS), it is essential to promote awareness and knowledge of nutritious food groups. According to the study conducted on surveyed households, a higher income, food security, education, member of PVCs, and under-five children in the family were significantly associated with higher dietary diversity. Furthermore, it is also evident that greater expenditure on non-cereal food products is significantly associated with higher food diversity. Therefore, it is critical to enhancing food security for highly vulnerable people in rural Bangladesh to increase dietary diversity. One effective approach to achieving this objective is to diversify income-generating activities, providing households with additional sources of income to spend on non-cereal food products, ultimately leading to increased household dietary diversity.

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