Determinants of Household Dietary Diversity in Bangladesh

By Fahima Sumaiya Laskar & Muntaha Rakib
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Abstract- Dietary diversity is considered crucial for household welfare and also for carrying out other development activities. The emerging interest in household dietary diversity against dietary quantity presents an opportunity to estimate household food security. Based on secondary data, probit regression model was used to estimate the determinants of household dietary diversity in Bangladesh. The result suggests that household size, literacy of household head, total amount of land, married household head, total amount of remittance received and income of household head were major determinants in attainment of high dietary diversity. Government policies and intervention programs targeting the above variables may improve household dietary diversity which in turn may improve household food security.

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I. Introduction

Dietary diversity refers to an increase in the variety of foods across and within different food groups (WHO/FAO, 1996) capable of ensuring sufficient intake of essential nutrients that can promote good health Ruel, (2002). Dietary diversity is essential for household welfare as well as for other development activities. Households often face different challenges related to food insecurity including poor health and a decline in productivity due to insufficient access to food. As we know that different foods contain different nutrients either macro-nutrients or micro-nutrients. No single food can contain all nutrients, Labadarios et al., (2011) noted that the more food groups included in daily diet the greater the likelihood of meeting nutrient requirements. Kennedy et al., (2009) argued that, a diet which is sufficiently diverse may represent nutrient adequacy. Thus, dietary diversity can be viewed as a proxy measure of food security Hoddinott, (2002).

Understanding household dietary diversity can be used as an alternative easy pathway to estimate household food security Thorne-Lyman et al., (2009); Vakili et al., (2013). Lack of dietary diversity is a great challenge for rural communities in developing countries. Their diets are by default defined on starchy staples with inadequate animal products, fresh fruits and vegetables. In countries where resources are very inadequate, lack of access to adequate and diversified diet has been recognized as one of the most severe problems among poor populations and it gives rise to various forms of nutritional problems. A non-diversified diet can have negative consequences on individuals’ health, well-being and development, mainly by reducing physical capacities.

Bangladesh is a developing country of South Asia. Bangladesh has made a steady progress in the expansion of food production but due to the rising population pressure, there has been an extensive utilization of land to meet the growing demand for food. Despite the increasing amount of food production and its availability, there have been reports that food availability still remains very low and food insecurity still exist mainly because of the lack of purchasing power and thus of access to food especially for the ultra-poor community. Bangladesh has the lowest availability of calories per capita in South Asia. A nationwide representative survey (State of Food Security and Nutrition in Bangladesh, 2011) estimates that approximately 45 percent of households in Bangladesh suffer from some form of food insecurity. This survey also highlights that the prevalence of inadequate maternal dietary diversity is nearly 62 percent whereas that of chronic malnutrition among children is 45 percent.

This study may provide much needed baseline information on the household dietary diversity and may contribute to the existing literature in helping to implement proper policies to improve household food security. As household food security is subject to change, it is important to explore its determinants to predict future shocks and also to understand how the household responds to food insecurity.

It is important to distinguish between dietary diversity and dietary quality. Dietary diversity reflects the number of food items or food groups consumed Ruel, (2003). Dietary quality is commonly perceived as a reflection of nutrient adequacy, proportionality and moderation of food intake (Food and Agriculture Organization of the United Nations/World Health Organization, 1998). Dietary diversity can be considered a component of dietary quality. As rightly suggested by Rashid et al., (2006) a large number of studies seem to be focusing on determinants of dietary quantity at the expense of dietary quality and diversity. Therefore, it naturally arises the necessity to focus also on

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Determinants of dietary diversity are often mentioned in the context of rural communities. Dietary diversity is defined as the number of different foods or food groups consumed over a given reference period. This can include a variety of factors, such as the availability of specific types of food, the cost of food, and the cultural preferences of the population. Dietary diversity is important because it can impact the nutritional status of the population, with higher diversity generally associated with better nutritional outcomes.

The lack of access to food, particularly in rural areas, is a major factor affecting dietary diversity. Rural people are often more reliant on food purchased from the market, whereas urban people are more likely to produce their own food. This can lead to a lack of diversity in the food available, as urban people are more likely to have access to a wider range of food items.

In developing countries, the lack of access to food is a significant issue. This can be due to a variety of factors, such as poverty, lack of infrastructure, and environmental factors. These factors can all impact the ability of rural people to access food, leading to a lack of dietary diversity.

There are two ways to measure dietary diversity. One is a food variety score (FVS) and another is dietary diversity score (DDS). FVS is measured as the mean number of food items consumed over a given period of time, whereas DDS is calculated as the mean number of food groups consumed over the same period. These scores can be used to assess the nutritional adequacy of the diet and can help identify areas where improvements are needed.

In conclusion, dietary diversity is an important factor in determining the nutritional status of a population. It is essential to ensure that everyone has access to a diverse and nutritious diet, particularly in rural areas where access to food can be limited. This can be achieved through a combination of policies aimed at reducing poverty and improving infrastructure, as well as promoting healthy eating habits through education and outreach programs.

Given the importance of dietary diversity and its possible link to food security, this section highlights the need for further research in this area. Future studies could explore the impact of different determinants of dietary diversity, such as poverty, climate change, and regional policies, on food security outcomes. This would help to identify areas where interventions are needed to improve dietary diversity and food security.
methodologies. Kidane (2004) conducted a research with primary data techniques to analyze determinants of household dietary diversity as a proxy measure of food security in Ethiopia. The study found out that educational accomplishment of even primary level can significantly affect household’s food security status. Rose et al., (1998) explored determinants of household food security in United States of America (USA). According to results of the analysis, there is an inverse relationship exists between schooling and food insecurity.

Size of the household, age, sex and employment status are the other major variables that can affect food security status of the family. Amaza (2006) analyzed some of these factors affecting food security at household level in Nigeria. Logistic regression results showed that chances of household’s food insecurity status increase as the number of dependent family member’s increases overtime. Feleke, (2005) also found a similar result while conducting a research in Southern Ethiopia. Land ownership, relative wealth, women’s literacy, access to media and women’s freedom to access the market all significantly reduced the risk of food insecurity Harris-Fry, (2015). This study also showed that households with vegetable gardens, rich households and literate women were significantly more likely to have better dietary diversity scores. Age of household head, income of household head and the level of education of households’ head were found to significantly influence household food security in Bangladesh Ali, (2015).

Remittances had continuously been remained one of the vital sources of income and external finances for many poor people across developing countries and a promising source of economic growth Jebran et al., (2016). Remittances received from abroad were found more likely to increase household dietary diversity Abdullah et al., (2017). Social safety nets can also affect food security status of a family. Putnam (1995) studied that casual safety nets can take various forms such as staple sharing, credits, group membership, the receipt of remittances, house sharing, and lending of farms and animals. Income plays a key role in a household’s accessibility to food. It enables households to modernize their production by giving them an opportunity to buy the necessary inputs and reduce the risk of food shortage during periods of unexpected crop failures through purchases. It was expected the total annual income of the household and food security would be positively related Mulukan, (2005), Ruel, (2002); Rashid et al., (2006).

Literatures suggests that there is a growing interest in understanding households and individual dietary diversity mainly because of its relevance in meeting nutrient requirements Labadarios et al., (2011) and nutrient adequacy Kennedy et al., (2009). Moreover, positive association of dietary diversity with four pillars of food security and its simplicity in measurement is another reason for its rapid growing interest.

III. Data and Methodology

a) Data Source

The study is based on secondary data from Bangladesh Integrated Household Survey (BIHS), 2011-2012 conducted by International Food Policy Research Institute (IFPRI) under the program of Bangladesh Policy Research and Strategy Support Program (PRSSP).

b) Variable Description

In order to assess the relationship between household dietary diversity and related factors at the household level in Bangladesh, in this paper household dietary diversity scores used as a dependent variable and is calculated by summing the number of food groups consumed in a household in the last 7 days. In a regression model, the DDS can contribute to a significantly better fit with the measure of dietary diversity than FVS.

There are many factors that can influence household dietary diversity. Among these, gender of the household head (male = 1), age of the household head measured in years, total income of the household, farming (=1), rural area of residence (=1), literacy of household head (=1), married head, access to safety nets, access to remittance, affected by shocks, total area of plot size in Decimals.

IV. Econometric Analysis

Models for explaining a binary dependent variable include the linear probability model (LPM), probit and logit models, Maddala, (1992); Greene, (2003), Gujarati, (2004) and Woolridge, (2015). However, since the dependent variable is dichotomous, the use of LPM is not appropriate because the predicted value can fall outside the relevant probability range of 0 and 1. Besides, it is also reported to have non-normal and non-constant error terms and posing constant effect of the explanatory variable. To overcome these problems, logit or probit models have been recommended. These models have been argued to have similar estimates, Maddala, (1992); Greene, (2003); Gujarati, (2004); Hill et al. (2008), Woolridge, (2015).

The concept of Dietary Diversity Score (DDS) in diet quality assessment has been tried in a number of places among some population groups, Mathews, Yudkin & Neil, (1999). At the household level, DDS is often used as a proxy for determining food access while at the individual level as a reflection of dietary quality, Vakili et al., (2013). In examining the socioeconomic determinants of dietary diversity, a probit regression model is used in this study. The median DDS among the twelve food groups was calculated and used as a standard for the samples. Households whose DDS were

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh Integrated Household Survey (BIHS), 2011-2012</td>
<td>Secondary data</td>
</tr>
</tbody>
</table>
below the median score were classified as “low dietary diversity” and those with DDS above and equal to the median as “high dietary diversity.” HDD and LDD are shown in Table 1.

Therefore, the dependent Variable (Dietary Diversity) is a binary variable represented by 1 if high dietary diversity or 0 if otherwise.

V. Results and Discussion

For this study, the twelve food groups, recommended by Food and Agriculture Organization of the United Nations (FAO, 2008), were used to assess household dietary diversity scores (DDS).

Figure 1: Categories of food groups

Figure 1 represents a summary of consumption pattern of twelve food groups. The distribution indicates that the following food groups were mostly consumed: grain (100%), potatoes (96%), oils (98.99%), and fish (92.2%). The following food groups were also consumed but not mostly: meats (19.33%), dairy (34.31%) and beans (48.78%). The observed distribution suggests that on average households’ diets are mainly dominated by food groups grains, potatoes, oil and fish at the expense of meats, dairy products, and beans.

a) Household Dietary Diversity Scores

For this study, “Yes” and “No” categories were used in the secondary dataset to measure DDS. Yes, was given a score of one (1) to each food group if the household consumed at least one food item from a particular food group for the past 7-days prior to the survey. No, was given a zero (0) score for a particular food group if the household did not consume any food item from that food group. Finally, the scores were counted from each food group and summed up and DDS were calculated based on the FAO guidelines for measuring household and individual dietary diversity. Summary of results are presented in Table 1. As shown in the table, only 0.22% households had eaten only one food group whereas, 1.92% households had eaten all twelve food groups within the given period.

Table 1: Dietary Diversity Scores

<table>
<thead>
<tr>
<th>Dietary Diversity Scores</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.22</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
</tr>
<tr>
<td>3</td>
<td>0.09</td>
</tr>
<tr>
<td>4</td>
<td>1.18</td>
</tr>
<tr>
<td>5</td>
<td>5.66</td>
</tr>
<tr>
<td>6</td>
<td>11.64</td>
</tr>
<tr>
<td>7</td>
<td>17.68</td>
</tr>
<tr>
<td>8</td>
<td>20.85</td>
</tr>
<tr>
<td>9</td>
<td>19.02</td>
</tr>
<tr>
<td>10</td>
<td>14.39</td>
</tr>
</tbody>
</table>
The average DDS was found to be 8(±1.78) different food groups eaten with 21% of households. The median dietary diversity score 8 was considered as the standard base. Therefore, table 2 shows the percentage of the households who attained high dietary diversity that means their DDS is greater than the median DDS of the households, and vice versa.

### Table 2: High and Low Dietary Diversity Scores

<table>
<thead>
<tr>
<th>DDS</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = LDD</td>
<td>36.52</td>
</tr>
<tr>
<td>1 = HDD</td>
<td>63.48</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note: LDD = Low Dietary Diversity  
HDD = High Dietary Diversity

### Table 3: Description of Continuous Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH Size</td>
<td>4.20</td>
<td>1.63</td>
</tr>
<tr>
<td>Age</td>
<td>44.17</td>
<td>13.98</td>
</tr>
<tr>
<td>Plot Size (decimal)</td>
<td>91.31</td>
<td>145.42</td>
</tr>
<tr>
<td>Monthly Total Income</td>
<td>6230</td>
<td>9559</td>
</tr>
<tr>
<td>Monthly Remittance Received</td>
<td>1473</td>
<td>5570</td>
</tr>
<tr>
<td>Number of observation</td>
<td>6,503</td>
<td></td>
</tr>
</tbody>
</table>


### Table 4: Description of Categorical Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male head of HH</td>
<td>82</td>
</tr>
<tr>
<td>Literacy of HH Head</td>
<td>47</td>
</tr>
<tr>
<td>Rural area of residence</td>
<td>80</td>
</tr>
<tr>
<td>Access to safety net</td>
<td>46</td>
</tr>
<tr>
<td>HH affected by shocks</td>
<td>46</td>
</tr>
<tr>
<td>Married Head</td>
<td>91</td>
</tr>
<tr>
<td>Farming occupation</td>
<td>42</td>
</tr>
<tr>
<td>Received remittance</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: IFPRI Bangladesh Integrated Household Survey, 2011–12

### Table 5: Determinants of dietary diversity from probit regression

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Marginal Effect at Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male HH Head</td>
<td>0.011 (0.023)</td>
</tr>
<tr>
<td>HH Size</td>
<td>0.040*** (0.004)</td>
</tr>
<tr>
<td>Age of HH</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Probit regression results are used to estimate the determinants of household dietary diversity. Estimated results are presented in Table 5.
The marginal effect of probit model suggests that larger households are more likely to attain high dietary diversity than smaller households. Since a household member may have access to food from a variety of sources (home production, purchased outside the house, received in exchange for labor, etc.), a larger household size may simply be a replication of the greater variety in food consumption patterns as a result of having more people living in the household. The area of residence implies less likelihood of high dietary diversity if the household resides in rural area. This is not surprising because rural households have limited access to diverse food items as compared to urban households especially in a developing country like Bangladesh. However, an increase in total amount of land measured in plot size is more likely to ensure high quality and diversified diet. That implies, land ownership is likely to be positively associated with high household dietary diversity both through an income or wealth effect, as well as by making available a larger stock of productive assets, Sraboni et al., (2014).

Consistent with the existing literature on household food security and dietary diversity, the literacy of the household head has the likelihood of a positive and significant relationship with high dietary diversity. However, the category farm occupation is likely to be insignificant with high dietary diversity. Household receives remittance are more likely to purchase a variety of foods and enjoy diversified diet than those who doesn’t receive.

Households having access to safety net programs are less likely to achieve high dietary diversity probably because the poorer households are more likely to be a part of safety net program. However, affected by shocks is likely to be an insignificant indicator of the same which is followed by male head and their age. It was predictable that married heads operate functional homes and family might be more likely to have access to diversified food and therefore there are more probability to have high dietary diversity than those who are unmarried. Higher income households are more likely to have access to a variety of diets which proves that in Bangladesh, like elsewhere, income is a key determinant of dietary diversity.

**VI. Conclusion and Policy Recommendation**

The paper estimated the determinants of household dietary diversity in Bangladesh. The study found household size, literacy of the household head, total income of household, access to safety net programs, total amount of land owned by a household, rural residents, household received remittance, married heads are some of the influencing factors of high dietary diversity. With reference to dietary diversity status of households in Bangladesh, the paper suggests a low-quality diet mainly defined by starchy staples (grains, potatoes and fish) at the expense of protein sources (meats and dairy products). The econometric results indicate that 36.52% of households are likely to be food insecure in terms of dietary diversity score.

Results highlight positive likelihood of literacy with respect to high dietary diversity. So programs to increase literacy should be promoted. Community based health and nutrition education should also be strengthened. Access to safety net programs are less likely to have diversified and high-quality diet. So,
targeted safety net programs for the poor should be continued and made more effective. The rural households, as estimated by the model, are less likely to access diverse food items due to low income, inadequate market infrastructure etc. and more likely to have diverse types of food having more financial supports such as remittances. Supports should be expanded for income generating activities for the rural poor as well as for adequate market infra-structure, strategic policy targeting, research and investment which might play a significant role towards improving household dietary diversity and household food security in Bangladesh. The increasing use of household dietary diversity as a proxy measure of household food security calls for further in depth-analysis and qualitative assessment which is beyond the scope of this study. However, this paper has prepared a ground on which further analysis can be done in the context of Bangladesh.

References Références Referencias


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