

Socioeconomic Determinants of Dietary Diversity among Rural Households in Jaunpur District of Uttar Pradesh, India

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Abstract--- *Inadequate nutritional consumption is one of the decisive factors for weak immunity, a higher probability of various diseases and infections, weak mental and physical growth, and less working capability. The present study was conducted to assess the dietary diversity pattern and its correlates in a rural setting of Jaunpur, Uttar Pradesh, India. A cross-sectional household survey was conducted during August-November 2017, among 316 households. Women from these households were interviewed to know the variety of foods consumed in the past 24 hours. Descriptive statistics and ordinal logistic regression analysis have been used to meet the objective of the study. Results portray that, about 14 percent of the households were in the category of low dietary diversity, and 58 percent were under medium dietary diversity. A higher proportion of SCs and poor households were more prone to have low dietary diversity. Landless households or less than one bigha of agricultural land and household without livestock or less number of livestock were more prone to low dietary diversity. Results of ordered logistic regression analysis confirm that caste, working status of heads, family type, socioeconomic status of the household, agricultural land, and livestock showed a significant association with the dietary diversity pattern of households. There is a necessity for the informed rural population on the importance of a diverse diet to improve nutrient consumption and to achieve food and nutrition security. National or regional level surveys will be helpful to understand the food related challenges in India.*

Keywords--- Households, Dietary Diversity, Dietary Diversity Score and Food Security

1. INTRODUCTION

After economic reforms and economic liberalization in the early nineties, India has progressed considerably in several health outcomes. However, the state of food and nutrition security still requires concerted efforts, which cuts across various geographical regions and social groups. Despite India's notable advancement during the MDG era, more sustained efforts are expected to expedite performance which concerning mainly food and nutrition security [1]. Malnutrition in any form is an obstacle to human and national development [2]. That is why the Sustainable Development Goal (SDG2) has been throw the light on aspiration to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture'. Inadequate nutritional consumption is one of the decisive factors for weak immunity, a higher probability of various diseases and infections, weak mental and physical growth, and less working capability. Food security has achieved if adequate food (quantity, quality, safety, socio-cultural acceptability) is available accessible and satisfactorily utilized by all individuals at all times to live a healthy and happy life [3]. The other previous studies in India has shown a conclusive association between food and nutrition security and dietary diversity and this could be improved by higher dietary diversity of the households [4, 5 & 6].

Dietary diversity is a qualitative measure of food consumption, which indicates household access to a variety of foods and is a proxy for nutrient adequacy of the individual's diet. It is described as the number of different food or food groups consumed over a given reference period" [7]. Several studies endorse that the level of nutrition among households and its members prominent with a diverse variety of food [8, 9]. The Household Dietary Diversity Score (HDDS) is intended to reflect the household's financial capacity to access the variety of foods. Studies have also concluded the relationship between increasing dietary diversity patterns with the socioeconomic status and household food security [10]. One of the major nutritional problems in the diets of developing countries is the lack of dietary diversity [11]. Several studies have reported that low dietary diversity is correlated with an increased likelihood of child stunting and the double burden of

malnutrition. Diverse diets reduced the risk of nutritional deficiency and non-communicable diseases (NCDs) [12 & 13]. It is also associated with cardiovascular risk, dyslipidemia, and a higher probability of metabolic syndrome [14, 15, 16, & 17].

Food and nutrition security, food diversity and malnutrition in all ages is a global concern; however, rural areas are at higher risk and the severity of these issues is very high among rural households [18]. Therefore, this study assesses the Household Dietary Diversity pattern in Jaunpur District of Uttar Pradesh in India. An effort has also been made to examine the factors associated with household dietary diversity pattern in the survey area.

2. DATA AND METHODOLOGY

2.1 Study area and collection of data

The present study was part of a Ph.D. program and for the collection of data, a cross-sectional survey was carried out in nine villages of Jaunpur from August to November 2017. By using quantitative techniques, the information has been collected on the household and its members' current demographic and socioeconomic characteristics. Using the coefficient of variance formula, the sample size was finalized as 316 households. The respondents were women who were responsible for the cooking of food in the household. A structured and interviewer-administered questionnaire was used in assessing the socioeconomic and demographic characteristics of the households and Household Dietary Diversity (HDD).

2.2 Household dietary diversity (HDD)

Household dietary diversity (HDD) is a qualitative measure of food consumption that reflects the financial ability of a household to access a variety of foods. HDDS reveals food access or a household's overall ability to acquire sufficient food to meet members' energy and nutritional requirements. Increased dietary diversity is associated with a higher probability that individuals within the household will consume adequate nutrients and increase household per capita consumption, caloric availability, caloric availability from staples, and caloric availability from non-staples [10]. HDDS score was computed by summing up of 16 food groups consumed by household members. Some food groups in the dietary diversity questionnaire are combined into single food groups and finally, from the twelve food groups proposed by FANTA in the household in the last 24 hours has been taken under consideration. The scale score range from 0 to 12, which include categories into three mutually exclusive dietary diversity categories, i.e., Low dietary diversity (score ≤ 6), Medium dietary diversity (score 7-8) and High dietary diversity (score ≥ 9) [19 & 20].

2.3 Household wealth index

Based on information collected on certain household assets, which have been used as a proxy to measure the wealth status of the household wealth index has been constructed. The principal components analysis (PCA) has been used for the same. Filmer and Pritchett (2001) suggested estimating weights statistically using principal components analysis [21]. As per the aggregated wealth score for each of the household, the wealth index has been divided into five categories as quintile one, quintile two, quintile three, quintile four, and quintile five households

2.4 Data analysis

The study employed univariate, bivariate, and multivariate analysis to meet its specific objectives. Frequency and percentage distribution, the mean and standard deviation were calculated according to the requirement. Ordinal logistic regression was used when the dependent variable is classified according to their order of magnitudes such as 'low' 'medium' and 'high'. Ordered logistic regression assumes that the coefficients that describe the relationship between, say, the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, etc. This assumption is called the proportional odds or the parallel regression assumption. Hence, it is also used as the proportional odds model [22]. Because of the relationship between all pairs of groups is the same, there is only one set of coefficients (only one model). Thus, in this study, the ordered logit models were used to estimate the relationship between an ordinal dependent variable (dietary diversity) and a set of independent variables (sex, religion and caste of the head of the household, type of the family, size of household, socioeconomic status, possession of agricultural land and availability of livestock in the household). CS-pro software has been used for data processing. Quantitative data of the study has been analyzed with the help of Microsoft Office Excel and STATA14.

3. RESULTS

3.1 Profile of the Household

Table 1 provides descriptive statistics of the selected households by some selected socio-economic and demographic characteristics. Result indicates that, out of all the surveyed households, 55 percent were nuclear families and the rest 45 percent of households were joint families. More than a third (37%) of the households had 5-6 members and 28 percent had 7-8 members. Only nine percent of the households had four or less members and 14 percent had ten or more members living in them. The mean household size was 7.5 persons per household in the study area, indicating that on an average

eight members were living in one household. The average number of males and females per household were 1.9 and 2.1 respectively. The mean number of children per family was 3.6.

More than four-fifths (84%) of the households were populated by Hindus, while the remaining 16 percent belonged to Muslims. Caste wise distribution shows that more than half (56%) of the households belonged to Other Backward Castes (OBC), followed by a third (35%) Scheduled Castes (SC) and 9 percent of households belongs to the general castes in the study sample. In the study of wealth quintile. In the study, the wealth quintile of the households was generated based on the indicators of ownership of selected assets, type of houses, possession of the agricultural land, and water and sanitation facilities by using Principal Component Analysis (PCA). As resultant, each quintile represents around 20 percent of households.

The land is an important factor that determines the dietary diversity of households. Table depicts that more than 36 percent of households did not own any agricultural land, and around 34 percent of households owned less than one bigha of agricultural land (34 %). Further, 19 percent of the households owned 1-2 bighas agricultural land and around nine percent of households had 3-5 bighas. On the contrary, only two percent of households had more than five bighas of agricultural land. The rearing of livestock plays a vital role in avoiding both food insecurity and poverty. Around 22 percent of the surveyed households did not have any livestock, while 61 percent of households had 1 to 3 livestock followed by 12 percent of households that owned four to six livestock. Furthermore, only six percent of households had seven or more livestock.

Table 1: Percentage household distribution by the type of family and size of the household, Jaunpur, Uttar Pradesh		
Type and size of the household	Percentage	Total (N)
Type of the family		
Joint family	45.2	143
Nuclear family	54.8	173
Size of the household		
Four or less Person	8.9	28
5 to 6 persons	37.0	117
7-8 Members	27.9	88
9-10 Members	12.7	40
More than 10 Members	13.6	43
Religion		
Hindu	84.2	266
Muslim	15.8	50
Caste		
SC	35.1	111
OBC	56.3	178
General	8.5	27
Wealth Quintile		
Quintile One	20.3	64
Quintile Two	19.9	63
Quintile Three	19.9	63
Quintile Four	19.9	63
Quintile Five	19.9	63
Possession of agricultural land		
No land	36.1	114
Less Than 1 Bigha	33.9	107
1-2 Bigha	19.3	61
3-5 Bigha	8.5	27
5+ above Bigha	2.2	7
Livestock in the Household		
No Livestock	21.5	68
1 to 3 Livestock	61.1	193
4-6 Livestock	11.7	37
7 and more Livestock	5.7	18
Mean size of the household		7.5
Mean Number of Men in household		1.9
Mean Number of Women in the Household		2.1
Mean Number of children in the Household (0-14 years)		3.6
Total	100.0	316

3.2 Dietary Diversity among rural household's

Results explained that around three-fifths of the households (58 %) in the study area were under the medium dietary diversity category, and 14 percent of households reported a low dietary diversity pattern. However, only 28 percent were coming into the category of high dietary diversity (figure 2).

Figure 2: Percent distribution of households by Dietary diversity patterns

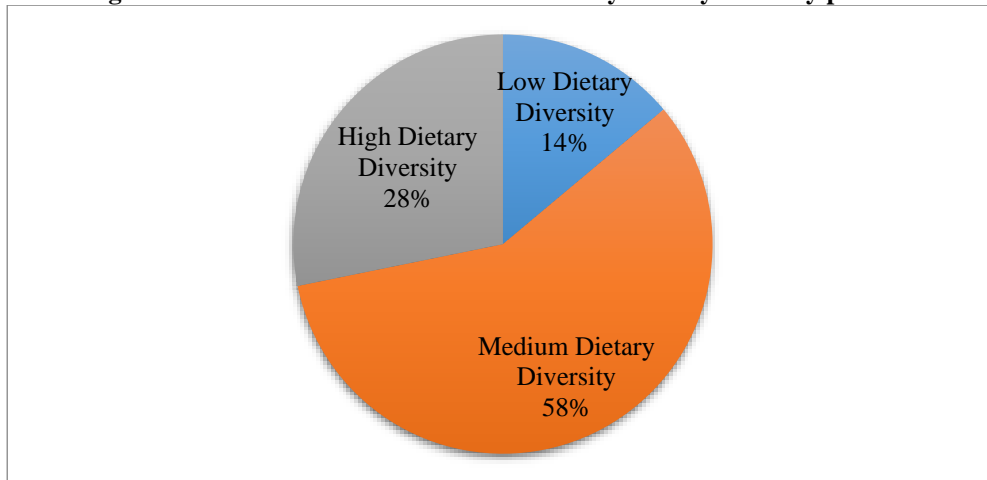


Table 2 describes the dietary diversity pattern of households by some selected socioeconomic and demographic characteristics. Results explain that male-headed households reported a greater proportion of low (14.3%) and high dietary diversity (28.2%) compared to female-headed households. According to religion, a higher proportion of Muslims has high dietary diversity (32%) as compared to Hindu (27%). Caste wise division of dietary diversity conveys a clear picture; as 28 percent of the SC households reported low dietary diversity followed by seven percent of OBC, although no household from general' households was in this category.

The dietary diversity pattern has been reflected according to the types of families and the size of the households. Both the high dietary diversity (35.0%) and medium dietary diversity (60.8%) were found to be higher among joint families than nuclear families. Additionally, households with more than ten members, 54 percent of them reported high dietary diversity, followed by 9-10 members of the household (33%). Around 18 percent of the total households constituted with 7-8 members reported a high dietary diversity pattern, which was lowest, followed by 25 percent of 5-6 members of the households. Low dietary diversity found highest in the houses where family size constitutes with four or fewer members (25%) and 7-8 members (17%). Whereas, less than three percent of total households formed with 9-10 members reported low dietary diversity patterns, followed by around 5 percent more than ten members of the family.

Further, the result shows that with the increasing wealth quintile of the household, the high dietary diversity pattern increased (from 22 % to 41 percent). Similarly, with the increase in agricultural land possession, high dietary diversity has increased (from 27% to 86 %). Around 19 percent of total households possessing no land or less than one bigha of agricultural land reported a higher proportion of the low level of dietary diversity (around 18 % each). Ownership of livestock by households considerably affects household dietary diversity. High dietary diversity was found to be the maximum in the households with 4-6 livestock (46%) and lowest among the households with seven or more livestock followed by the households with no livestock (22%). Similarly, low dietary diversity was highest in the household with no livestock (19.1%) followed by households with 1-3 livestock (15%). However, none of the families with seven or more livestock fell under the category of low dietary diversity, though the maximum proportion of households from this category reported medium dietary diversity (83%).

Table 2: Percent Distribution of Households with Dietary diversity by some selected background characteristics in Jaunpur Districts of Uttar Pradesh			
Background characteristics	Low Dietary Diversity	Medium Dietary Diversity	High Dietary Diversity
Sex of the head of the Household			
Male	14.3	57.5	28.2
Female	11.6	60.5	27.9
Religion			
Hindu	13.5	59.0	27.4
Muslim	16.0	52.0	32.0
Caste			
SC	27.9	47.8	24.3
OBC	7.3	63.5	29.2
General	0.0	63.0	37.0
Type of the family			
Joint family	4.2	60.8	35.0
Nuclear family	22.0	55.5	22.5
Size of the household			
4 or less members	25.0	46.4	28.6
5-6 Members	16.2	59.0	24.8
7-8 Members	17.1	64.8	18.2
9-10 Members	2.5	65.0	32.5
More than 10 Members	4.7	41.9	53.5
Wealth Quintile			
Quintile One	21.9	56.3	21.9
Quintile Two	23.8	54.0	22.2
Quintile Three	14.2	63.5	22.2
Quintile Four	4.7	61.9	33.3
Quintile Five	4.8	54.0	41.3
Possession of agricultural land			
No Land	18.4	54.4	27.2
Less Than 1 Bigha	18.7	57.0	24.3
1-2 Bigha	4.9	70.5	24.6
3-5 Bigha	0.0	59.3	40.7
5+ above Bigha	0.0	14.3	85.7
Livestock in the household			
No Livestock	19.1	58.8	22.1
1-3 Livestock	14.5	57.5	28.0
4-6 Livestock	8.1	46.0	46.0
7 and more Livestock	0.0	83.3	16.7
Total	13.9	57.9	28.2

3.3 Determinants of Household Dietary Diversity

Table 3 displays the adjusted effects of selected predictors on household-level dietary diversity, applying an ordinal logit regression analysis, which indicates the probability of having a high level of dietary diversity versus combined 'middle and low level of dietary diversity'. Results indicate that the households belonging to head involved in domestic work, their chance of having the high level of dietary diversity versus combined middle and low level of dietary diversity was three-times (OR 3.06; $p < 0.01$) higher in comparison to the household associated with head working for cash and kind. Concerning caste, OBC households were two times (OR 2.03; $p < 0.05$), and general caste were 2.6 times (OR 2.60; $p < 0.10$) more likely to be the high dietary diverse households in comparison to scheduled caste. Likewise, results showed that the probability of having a high level of dietary diversity versus combined middle and low level of dietary diversity was 47 percent (OR 0.53; $p < 0.05$) lower in nuclear families compared to the joints. Furthermore, the probability of a high level of dietary diversity was two times (OR 1.90; $p < 0.10$) higher versus combined middle and low level of dietary diversity among quintile four households over quintile one. Household owning more than five bighas of agricultural land was seven times more likely to fall into high dietary diversity than landless households. Similarly, the chance of high level of dietary diversity versus combined middle and low-level dietary diversity was three-time (OR 2.83; $p < 0.05$) higher for the households having 4-6 livestock in comparison to the households without livestock.

Table 3 : Ordinal logistic regression model showing the odds ratio of dietary diversity pattern in the Households			
Determinants		Odds ratio	[95% Conf. Interval]
Sex of the Head of Household	Male®	0.42	(0.15,1.23)
	Female		
Age of the Head of the Household	Less than 35 years®		
	35-44 Year	0.87	(0.37,2.04)
	45-54 Years	1.11	(0.45,2.76)
	55 and above years	0.77	(0.28,2.09)
Marital Status of Head of Household	Currently Married®		
	Widowed	1.31	(0.49,3.50)
Working Status of the Head of Household	Currently working ®		
	Domestic work	3.06***	(1.33,7.02)
	Unemployed and other	1.77	(0.75,4.27)
Religion	Hindu®		
	Muslim	1.02	(0.47,2.18)
Caste	SC®		
	OBC	2.03**	(1.14,3.63)
	General	2.6*	(0.94,7.21)
Type of the family	Joint family®		
	Nuclear family	0.53**	(0.28,1)
Size of the household	4 or less members®		
	5-6 Members	1.01	(0.39,2.62)
	7-8 Members	0.56	(0.2,1.51)
	9-10 Members	1.14	(0.36,3.65)
	More than 10 Members	1.53	(0.47,5)
Wealth Quintile	Quintile One®		
	Quintile Two	0.87	(0.42,1.81)
	Quintile Three	1.2	(0.57,2.54)
	Quintile Four	1.90*	(0.89,4.06)
	Quintile Five	1.27	(0.54,2.98)
Possession of agricultural	No Land®		
	less than 1	0.84	(0.46,1.55)
	1-2 Bigha	0.79	(0.4,1.56)
	3 Bigha to 5 Bigha	0.96	(0.35,2.64)
	More than 5 Bigha	7.43*	(0.74,74.08)
Livestock in the household	No Livestock®		
	1 to 3 Livestock	1.35	(0.72,2.52)
	4-6 Livestock	2.83**	(1.14,7.04)
	7 and more Livestock	0.84	(0.28,2.47)

Note: ®- Reference category, *p <0.01, **p<0.05, ***p<0.10

4. DISCUSSION AND CONCLUSION

Malnutrition in all of its forms imposes unacceptably higher economic and social costs on the households as well as society as a whole. That is why the ambition to ‘End hunger, achieve food security and improved nutrition and promote sustainable agriculture’ has been captured in Sustainable Development Goal (SDG) - 2. However, improving nutrition goes beyond SDG 2, and has been linked to each of the SDGs, and can play a transformational role in driving sustainable development [2]. Nutritionists have long been recognized the dietary diversity as a key element of high-quality diets. Overall increasing the variety of foods and within food groups is recommended in most dietary guidelines in the U.S. and internationally because it is thought to ensure adequate intake of essential nutrients and promote good health [23]. The present study has examined household dietary diversity with the help of Household Dietary Diversity Score in the rural setting. An attempt has also been made in this paper to understand the major correlates of household dietary diversity. About three-fourth of the households were in the category of low or medium dietary diversity. A higher proportion of scheduled caste (SC), joint families, smaller households, and poor households were more likely to have low dietary diversity. Landless or less than one bigha of agricultural land and household with no livestock or less number of livestock were more prone to low dietary diversity. The findings of the several studies also support the findings of the present study [24, 25 & 26]. The study also estimated the factor influencing dietary diversity of the household, which shows that caste, working status of Head of household, type of family, socioeconomic status of the household, possession of agricultural land, and ownership of livestock showed a significant effect on the dietary diversity pattern of households. There is a requirement for a government

initiative to create information about the importance of a diverse diet among rural populations through several mediums, i.e., radio, television, newspapers, wall painting, and street plays. It is also relevant to conduct national-level surveys to understand the food-related challenges different parts of the country for planning the program to deal with food diversity, food and nutrition security.

5. LIMITATIONS

A large number of sample size is advised for assessing the food-related issues like nutrition intake pattern, Food security and Household food dietary diversity. The present study carried out in nine villages of Jaunpur district of Uttar Pradesh, so the result cannot be generalized for all the rural areas of the state. Due to the small duration, the study is not capable of understanding the seasonal variation of dietary diversity patterns in the study area.

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