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Consumption Pattern of Rural and Urban People of Bangladesh: A Comparative Analysis With Respect To Achieving Food Security

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ABSTRACT
Bangladesh is mostly exemplified by rural economy with rapidly growing urbanization. The food consumption pattern is cereal based and less diversified. As consumer derives utility not from actual contents of their consumption basket but from the characteristics of goods in it for example; while consuming cereal utility from carbohydrate not from cereal, in the paper consumption behaviour of the rural and urban people in terms of carbohydrate, protein, vitamin and fat intake has been examined. To estimate the parameters both Seemingly Unrelated Regression Equation (SURE) model and Ordinary Least Square (OLS) has been applied. In the paper, the secondary data from the Household Income and Expenditure Survey (2010) of Bangladesh has been used. The data set included daily data on food consumption for consecutive 15 days for 12,240 households. It is found that rural household consumes more carbohydrate and vitamin than urban households. On the other hand urban household consumes more protein and fat than rural households. Rural children are more suffering from underweight, stunting and wasting compared to the urban children but urban children are more suffering from obesity than that of rural children. It is also evident that rural people are more food insecure compared to their urban counterparts.

KEYWORDS: Consumption pattern, rural household, urban household, nutritional status and food security.

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I. INTRODUCTION

Consumer derives utility not from actual contents of their consumption basket but from the characteristics of goods in it. This was explained by Kelvin Lancaster in his paper titled, "A New Approach to Consumer Theory" in 1966. This new approach helps to predict how preferences will change when consumers change their options or baskets presented to them. This is particularly true for food where utility from food is not derived from a product but from their composition of products or in other words, cooked food. According to Lancaster theory when a person is taking food he is taking it for the attributes or nutrients like carbohydrate, protein, fat, vitamin, etc.

Food consumption pattern means the process by which individuals identify, purchase and consume foods. It is however, multidimensional and shaped by various factors, including physiological, agricultural, historical, religious, socio-economic and psychological ones (Gedrich, 2003). Food consumption pattern of people of a country have significant implications for attaining food security for its population. With available household-level information on individual food items consumed, their shares in total consumption, frequency of intake and nutrient composition, it is possible to make general assessments of their consumption pattern.

Consumption pattern changes over time, being influenced by many factors and their complex interactions. Income, prices, individual preferences and beliefs, cultural traditions, as well as geographical, environmental, social and economic factors all interact in a complex manner to shape consumption patterns. Changes in these factors bring a palpable change in consumption pattern of any country or community in the passage of time. Food policy aimed at to bring change in consumption pattern must give emphasis to these factors.

In the early stage of development of a country significant dependence on cereals are observed and gradually this dependency transform into more reliance on other high valued foods. In addition to that consumption pattern is a good indicator of regional (rural and urban) welfare and typology. It also helps to understand the socio-cultural and environmental behavior that cannot be separated.

Bangladesh is predominantly characterized by rural economy. People living in rural areas are 62.6 per cent. In recent years rapid urbanization is observed in the country and its population is also growing. As a developing country food consumption pattern of the people remains as one of the major concern to the researchers, policy makers and the government.

II. LITERATURE REVIEW

Consumption is an action of using up a resource or an amount of something which is used up or ingested (Oxford English Dictionary). In economics only the final purchase of goods and services by individuals constitutes consumption. If we signify consumption of food it is simply the action of eating or drinking something or food. Food is any substance consumed to provide nutritional support for an organism (Encyclopaedia of Britannica). It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrate, fat, protein, vitamin and minerals. The substance is ingested by an organism and assimilated by the organism's cells to provide energy, maintain life, or stimulate growth.

Walters (1974) defines consumer behaviour as: " ... the process whereby individuals decide whether, what, when, where, how, and from whom to purchase goods and services." Mowen (1993) provides a different definition by explaining consumer behaviour as: "... the study of the buying units and the exchange processes involved in acquiring, consuming, and disposing of goods, services, experiences, and ideas". This definition focuses on buying units in an attempt to include not only the individual but also groups that purchase products or services.

Schiffman and Kanuk (1997) define consumer behaviour as: "The behaviour that consumers display in searching for, purchasing, using, evaluating, and disposing of products, services, and ideas." Schiffman and Kanuk (1997) elaborate on the definition by explaining that consumer behaviour is, therefore, the study of how individuals make decisions to spend their available resources (time, money, effort) on consumption-related items. It includes the study of what, why, when, where and how often they purchase and how they use the purchased product. In addition, it encompasses all the behaviours that consumers display in searching for, purchasing, using, evaluating and disposing of products and services that they expect will satisfy their needs. Engel, Blackwell and Miniard (1990) states that: "those actions directly involved in obtaining, consuming, and disposing of products and services, including the decision processes that precede and follow these actions".

Nagla (2007) stressed that the cultural and social significance of food and eating habits in India is multifaceted and rich in meaning. Consumption is determined by socio-economic characteristics of household, effect of age, land ownership, income and access to public distribution system (Kumar, et al., 2013).

Faridi and Wadood (2010) found that the greater the number of household members in the household, the lower the food security situation in Bangladesh. Household size, age, educational level, sex and salary earning had positive impact on the daily per capita calorie intake.

III. METHODOLOGY

The Model:

Consumer's choice under Lancaster's approach can be written (for two products) as

Maximize U (α_1, α_2, α_3 | θ) subject to $M = P_1X^*_1 + P_2X^*_2$ and so (3-1)

$\alpha_i = f(X_1^*, X_2^*, \theta) \quad \forall\, i = 1, 2, 3$ is the attribute production function. (3-2)

where, X's are goods and services consumed by the consumers, θ is other individual characteristics (social, cultural, etc.), M is income (wage and non-wage) and P's are prices of the goods and services and αi is the attribute i derived from consumption of X*'s (adapted from Nicholson, 2012)

Lancaster's approach is designed to derive production function of food characteristics which is made up from the consumption bundles. As such according to this theory, consumer consumes food to derive utility from different food attributes such as carbohydrate, protein, fat, vitamin and they combine different food items in order to acquire these attributes from their food. Lancaster's approach, therefore, determines consumer's choice using the Household Production Model where consumed goods are combined as input to produce utility providing outputs (attributes). As a result, attributes are the functions of the goods and services consumed by the household.

Assuming X, Y and Z are the three food products consumed by a household, and assuming that α_1, α_2, α_3, and α_4 are different food elements such as carbohydrate, vitamin, protein and fat, it is possible to derive a system of equations that explains intake of food elements in terms of their choice of food items, that is,

$\alpha_i = f$ (X*, Y*, Z* | other household characteristics) $\forall$ i = 1, 2, 3 and 4 (3-3)

Where X*, Y* and Z* are the optimized bundle of consumption of X, Y and Z from the market.

Lancaster used a linear attributes model and his attribute production equations are shown as

$\alpha_i = \delta_{1x}X^* + \delta_{2y}Y^* + \delta_{3z}Z^*$ $\forall$ i = 1, 2, 3 and 4 (3-4)

Lancaster's production approach is particularly useful to study how consumer's choice of food items eventually produces the attributes needed for maximizing satisfaction at the household level.

The Method of Estimation:
To estimate the parameters both Seemingly Unrelated Regression Equation (SURE) and Ordinary Least Square (OLS) has been used.

Sources of Data:
The consumption data of Household Income Expenditure Survey of different year are used in the paper. In the paper, to estimate the parameter the secondary data from the Household Income and Expenditure Survey (2010) of Bangladesh has been used. The data set included daily data on food consumption for consecutive 15 days for 12,240 households. Nutrition data are taken from Bangladesh Health and Demographic Survey.

IV. RESULTS AND DISCUSSION

Per Capita Per Day Calorie and Protein Intake by Residence in Bangladesh

People need calorie to keep body temperature and protein is an essential component of food to attain and maintain healthy life. Deficiency in either of these two will generate malnutrition which is referred as Protein-Energy Malnutrition (PEM). It is the real indicator of consumption of food and major nutrients contents of food. According to the FAO/USDA, the recommended daily minimum intake of protein for adults who are at an average weight and activity level is 56 grams per day for male and 46 grams per day for female. According to joint WHO/FAO Expert Group Guideline 10 to 20 per cent of overall calories must come from protein rich foods. As per Table 1 it is important to note that per capita calorie intake slightly decreased from 1995-96 to 2005 for rural, urban and all households but again increases in 2010. Per capita protein intake also increases from 1995-96 to 2010 for all categories of households. It is also noteworthy that the levels of per capita calorie and protein consumption were well above the absolute poverty line calorie (2122 kcal) and recommended level of protein by FAO/USDA (56 grams) intakes respectively. This implies that on an average the country is able to overcome PEM.

Table 1: Calorie and Protein Intake by Residence from 1995-96 to 2010

Survey Year	Calorie Intake (Kcal/cap/day			Protein Intake(gram/cap/day		
	National	Rural	Urban	National	Rural	Urban
2010	2318.3	2344.6	2244.5	66.26	64.24	69.11
2005	2238.5	2253.2	2193.8	62.35	61.53	64.82
2000	2240.3	2263.2	2150.0	62.50	61.88	64.96
1995-96	2244.0	2251	2209	65.96	64.45	67.50

Source: HIES reports 1995-96, 2000, 2005 and 2010

Food Element Wise Consumption Pattern in Bangladesh

Major food elements from which people generate calorie fall into six food elements. The food elements are; carbohydrate, protein, fat, vitamin, minerals and water. In Bangladesh people derive carbohydrate from cereals like rice and wheat, protein from animal originated food i.e. meat, fish, egg, and plant originated food like pulses, fats from edible oils and vitamins from basically different vegetables. People of the country also eat lots of potatoes because of its availability. Although as a macronutrient contents it falls into carbohydrate category but the people of the country considered it as vegetable. Here potato is considered as a food of carbohydrate category. Milk/milk products is another important food item of the country and it is considered as a balanced food by the nutrition scientist since it is rich in terms of both macronutrient and micronutrient contents. Therefore, milk is considered as a separate food group by not keeping it under any one food category.

Calorie Intake by Food Elements by Residence

According to HIES 2010 total calorie derived from carbohydrate, protein, fat, vitamin and milk/milk products consist of only the food items mentioned in previous section is 2043.9 kcal, 2087.5 kcal and 1921.5 kcal per capita per day at national level, rural and urban areas respectively. On the other hand total calorie derived from all food items consumed in Bangladesh according to HIES 2010 is 2318.3 kcal, 2344.6 kcal and 2244.5 kcal per capita per day at national level, rural and urban areas respectively. Therefore, calorie derived from other foods are 274.4 kcal, 257.1 kcal and 323 kcal per capita per day at national level, rural and urban areas respectively. In Table-2 calorie intake from food elements (carbohydrate, vitamin, protein and fat) and rest of the food items are given by residence in Bangladesh.

Table 2: Food Element-wise Calorie Intake by Residence (per capita per day)

Residence	Food Element					
	Carbohydrate	**Protein**	**Fat**	**Vitamin**	**Milk/Milk Products**	**Others***
National	1593.2	150.1	184.1	89.1	27.4	274.4
Rural	1674.1	132.8	164.3	91.1	25.2	257.1
Urban	1366.1	199.0	239.7	83.2	33.5	323.0

Source: Authors calculation from Household Income Expenditure Survey 2010: Note: *Others include condiments & spices, fruits, sugar/gur and miscellaneous items

As per the Table 2 rural people are taking more calorie in total than the national average and urban population as well as calorie derived from carbohydrate and vitamin. On the other hand urban population is receiving more calories from protein and fat. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake at national level are 68.72%, 6.47%, 7.94% and 3.84% respectively. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake in rural area are 71.40%, 5.66%, 7.01% and 3.88% respectively. Percentages of calorie intake from carbohydrate, protein, fat and vitamin to total calorie intake in urban area are 60.86%, 8.87%, 10.68% and 3.71% respectively. Calorie derived from carbohydrate is more than the recommended maximum percentage of 60% (Quamrunnahar *et al* 2013) both at national level and in rural area. In urban area it is near the recommended level. On the other hand calorie derived from protein and fat is lower compared to the recommended percentage (11% per cent from fats and 13.5 per cent of calorie from proteins as per Quamrunnahar *et al* 2013) at all areas (national, rural and urban area).

Regression Results

The relationship between rural and urban household and food elements (carbohydrate, protein, fat and vitamin) has been estimated. The results are elaborated below:

Table 3: Regression Results

Dependent Variable >>>>	**Seemingly Unrelated Regression Results**			
Explanatory Variable	**Carbohydrate (Kcal)**	**Vitamin (Kcal)**	**Protein (Kcal)**	**Fat (Kcal)**
Rural Household =1, otherwise 0	109.8***	3.316***	-19.87***	-33.12***
	(16.914)	(3.356)	(-12.822)	(-19.623)
	Ordinary Least Square Regression Results			
	125.4***	2.722***	-23.75***	-29.69***
	(19.297)	(2.753)	(-15.309)	(-17.569)

Rural vs. Urban Households: Carbohydrate Intake

The coefficient of rural dummy is positive and significant. This shows that rural household consumes more carbohydrate than urban households. This is consistent with HIES reports. In Bangladesh rice comprises of bulk segment of carbohydrate intake and rural households are habituated to take rice more times a day than urban households. It is true that rural households are generally engaged in agriculture which requires more physical exhaustion and so the consumer needs more calories in their food. In addition, generally rural households take rice thrice a day whereas urban households take rice twice a day.

Rural vs. Urban Households: Vitamin Intake

The coefficient of rural dummy is positive and significant. This shows that rural household take more vitamin than urban households. Vegetables are the major source of vitamin in Bangladesh and rural households are generally endowed with vegetables because of easy availability. On the other hand the urban households have to buy vegetables from the market at a price which is relatively higher than their rural counterparts. As a result, for a similar condition, an urban household takes less vitamin than a rural household in their diet.

Rural vs. Urban Households: Protein Intake

The coefficient of rural dummy is negative and significant. This shows that rural household consumes less protein than urban households. Incidence of poverty is more severe in rural areas as such the rural people are unable to afford protein rich foods which are more expensive.

Rural vs. Urban Households: Fat Intake

The coefficient of rural dummy is negative and significant. This shows that rural household consumes less fat than urban households. Incidence of poverty is more severe in rural areas as such the rural people are unable to afford fat (edible oils) which is more expensive.

Nutritional Status by Residence

A successful economy needs people who are productive and motivated, and neither productivity nor motivation can be strong when people are lack in access to nutritious foods. There exists a two-way relationship between undernutrition and development. Undernutrition acts as a cause of underdevelopment and on the other hand it is also the outcome of underdevelopment. Prevalence of undernutrition is a hidden threat for the betterment of any country which will continue for generations. Food consumption pattern affect nutritional status of a person. In Table 4 under five children nutritional status by residence is given:

Table 4: Children Nutritional Scenario by Residence

Residence	Underweight	Stunting	Wasting	Obesity
Rural	35.2	42.7	13.6	3.7
Urban	31.7	36.4	12.6	5.5
National	34.4	41.2	13.4	4.1

Source: Child and Mother Nutrition Survey of Bangladesh 2012

In comparison with urban children rural children are more underweight, stunted and wasted but urban children suffered more in obesity compared to rural children. The overall nutritional figures are very high which means that consumption pattern of both rural and urban areas do not fulfil the nutritional need of the people.

Consumption Pattern and Food Security

Food consumption pattern of the people impacted the attainment of food security. To attain food security the consumption pattern of the country should be such that the food they take should be preferred to them and at the same time it must be nutritious. The above analysis of consumption pattern showed that rural people depend more on carbohydrate for their calorie requirement than urban residents. On the other hand as the urban people revealed an increased dependency on other foods their intake of carbohydrate reduces. These patterns present a case for further analysis into the nature of food preferences and their intake of food elements such as carbohydrate, vitamin, protein and fat. Rural people are taking less diversified food and in addition to that they eat less protein compared to urban people. Both these are important for attaining food security. Therefore, rural people are more food insecure in Bangladesh compared to urban people.

V. CONCLUSION

Consumer derives utility not from actual contents of their consumption basket but from the characteristics of goods in it. In other words when a consumer consumes food he consumes it for the attributes in it. To be clearer while having cereal a consumer consumes it for getting carbohydrate from it. This is the main thought of the paper. In this paper consumption pattern of rural and urban people has been estimated in terms food nutrients such as carbohydrates, protein, vitamin and fat. Then its possible impact over nutrition and food security is also analysed.

From the regression results it is found that the coefficient of rural dummy for carbohydrate intake is positive and significant. This shows that rural household consumes more carbohydrate than urban households. The coefficient of rural dummy for vitamin intake is positive and significant. This shows that rural household take more vitamin than urban households. Vegetables are the major source of vitamin in Bangladesh and rural households are generally endowed with vegetables because of easy availability. On the other hand the urban households have to buy vegetables from the market at a price which is relatively higher than their rural counterparts. The coefficient of rural dummy for protein intake is negative and significant. This shows that rural household consumes less protein than urban households. Incidence of poverty is more severe in rural areas as such the rural people are unable to afford protein rich foods which are more expensive. The coefficient of rural dummy for fat intake is negative and significant. This shows that rural household consumes less fat than urban households. Incidence of poverty is more severe in rural areas as such the rural people are unable to afford fat (edible oils) which is more expensive.

The impact of stated consumption pattern of rural and urban areas on nutritional status of children is seen. Compared to urban children rural children are more underweight (urban 31.7 and rural 35.2), stunted (urban 36.4 and rural 42.7) and wasted (urban 12.6 and rural 13.6) than urban children. The consumption pattern of rural people is less diversified and much more dependent on cereal. They also take less protein as compared to urban people. Therefore, rural people are more food insecure compared to the urban people.

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