Spatial Differences in Diet Quality and Economic Vulnerability to Food Insecurity in Bangladesh: Results from the 2016 Household Income and Expenditure Survey

Mst. Maxim Parvin Mitu
Institute of Nutrition and Food Sciences
University of Dhaka
Dhaka-1000

General Objective

To explore the spatial differences in diet quality and economic vulnerability of food insecurity with the association of sociodemographic characteristics at the household level in Bangladesh

Specific Objectives

- to evaluate diet quality using household dietary diversity score (HDDS), and percentage of food energy from staples (PFES)

- to evaluate economic vulnerability to food insecurity based on the percentage of expenditure on food (PEF)

- to explore the relationship of sociodemographic factors on the variation of diet quality

- to apply spatial analysis to explore the regional variation of diet quality with the urban-rural-city household levels in Bangladesh along with statistical approaches.

Materials and Methods

Data source:

The study was used Household Income and Expenditure Survey (HIES) 2016

Study design:

Secondary analysis of cross-sectional data

HIES Sampling:

- The HIES 2016 data is divided into division level as 20 strata as rural (8), urban(8) and city corporation (4), excluding new two cities (Mymensingh and Rangpur), Barishal and Sylhet as they are showed similar characteristics as urban

- Data was also divided into districts level as 132 sub-strata, rural (64), urban (64), and City (4)

- Up to sub-district level weightage provided in the data from a sample to the population

- Total of 46080 households were sampled in Bangladesh. There are a total of 2304 primary sampling units (PSU), 36 PSU per district, and each PSU consists of 20 households

- Food consumption data HIES 2016 consists of a distinct part with 145 categories of food items, during the preceding 14 days using seven 2-day diaries

- A total of 125 food items of HIES data were considered in the diet quality analysis excluding cigarettes and other smoking items

- Used the software R Studio, STATA, ArcGIS, and Microsoft Excel to process the data

(1) Household Dietary Diversity Score (HDDS)

- Calculated the HDDS to assess the diet quality per household per day

- HDDS can be defined as the number of distinct food groups consumed per household per day. HDDS is calculated in 12-point scores and it indicates the ability of household economic access to foods

- The HDDS is divided into three categories of dietary diversity using tercile such as low (HDDS=4.4-4.9), medium (HDDS=5.0-6.7) and high (HDDS=6.7-9.1) and mapped spatially using the average household HDDS value of sub-district (Upazila) levels of Bangladesh (FAO, 2010)

(2) Percentage of food energy from staples (PFES)

- Calculated the percentage of food energy consumed from staples per household in the HIES data of Bangladesh in 2016

$$PFES = \frac{Total\ energy\ from\ staples\ (Kcal)}{Total\ energy\ from\ all\ foods\ (Kcal)} \times 100$$

- Higher percentage of total food energy from staples (more than 75%) indicate poor diet quality i.e., lower percentage of consumed food from staples are better (Smith and Subandoro, 2007)

- Spatial distribution of this indicator was mapped to observe the level of food consumed from stable in sub-district levels of Bangladesh

(3) Economic Vulnerability to Food Insecurity:

- Estimate the economic vulnerability to food insecurity per household by the percentage of expenditure on food (PEF) in Bangladesh using HIES 2016 data

$$PEF = \frac{Total\ expenditure\ on\ food}{Total\ expenditure} \times 100$$

- In general, the higher percentage of total consumption expenditure on food (more than 75%) indicates very high vulnerability of food insecurity or poor diet quality (Smith and Subandoro, 2007).

- The average percentages of expenditure on food per sub-district (Upazila) households were analysis spatially to illustrate the spatial distribution scenarios in Bangladesh

(4) Association between diet quality with its determinants:

Diet quality parameters (i.e., HDDS, PFES and PEF) of sample households were correlated with characteristics of nine sociodemographic determinants using ANOVA statistical test

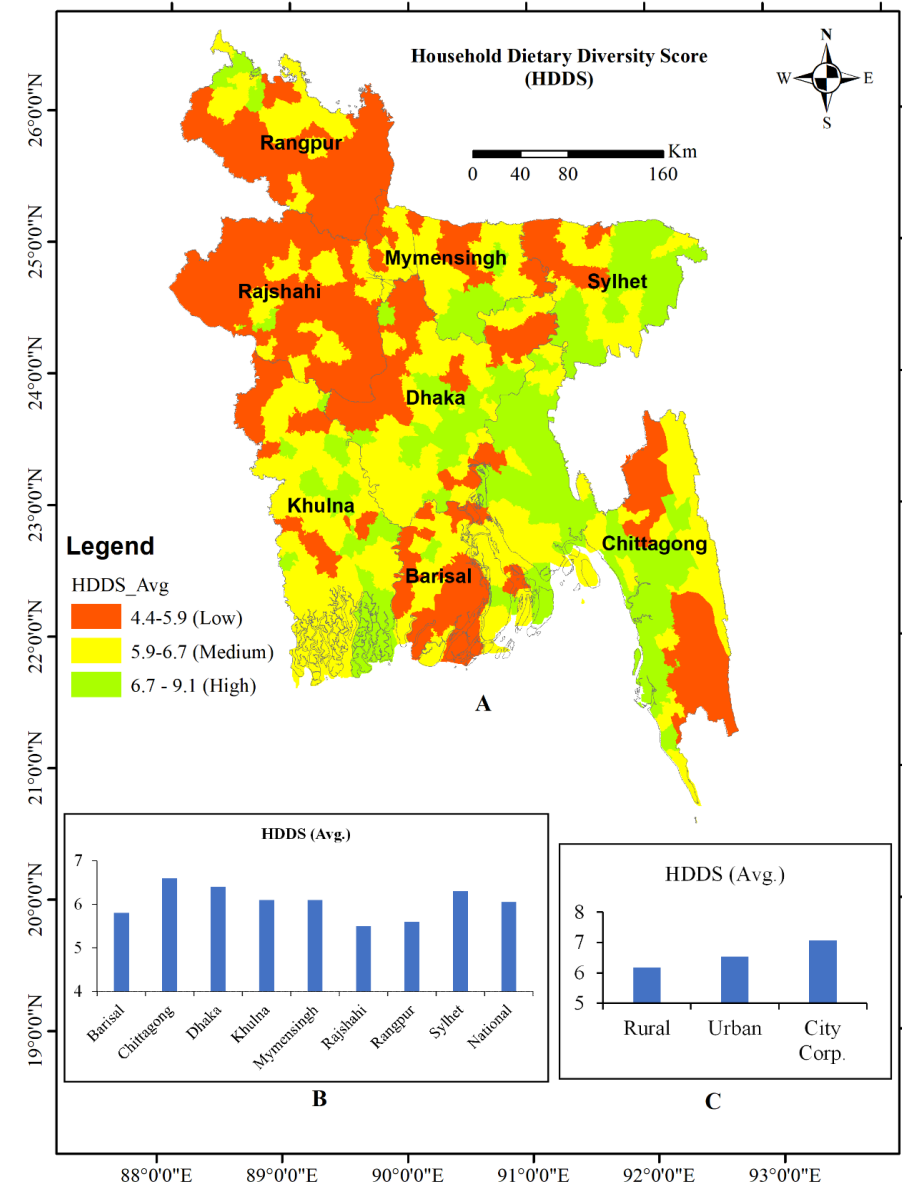### *Dependent variables*

Diet quality (HDDS, PFES and PEF)

Independent variables

Sociodemographic conditions (i.e., income, age, gender, education of household head, religion, number of earners and location/region) of the surveyed households

Results

(1) Household Dietary Diversity Score (HDDS)

- The average national diet diversity was about 6.3 in Bangladesh during the study period.

- Divisionally, the range of HDDS was from 5.6 to 7.2. The highest average household diet diversity prevailed in Chittagong and the lowest in the Rangpur division

- The HDDS showed that rural regions in terms of settlements and the north, northwest, and southeastern regions had mostly low diet diversity.

- The highest average household diet diversity prevailed in Chittagong and the lowest in the Rajshahi division

- Low dietary diversity was observed in rural areas

Percentage of Food Energy from Staples (PFES)

Legend
PFES% (Diet Quality)
- <40% (V. Good)
- 40-60% (Good)
- 60-75% (Poor)
- >75% (V. Poor)

- North, north-west and southeastern regions illustrated poor diet quality having more dependence on staple as a source of energy

- central region (regions around the capital, Dhaka) showed better diet quality with lesser dependence on staples

- Poor quality diet in terms of high PFES also prevailed in rural areas (71%) among different kinds of settlements, highest in Rangpur (77%) and lowest in Chittagong (64%) among all divisions

Diet quality in households with type area
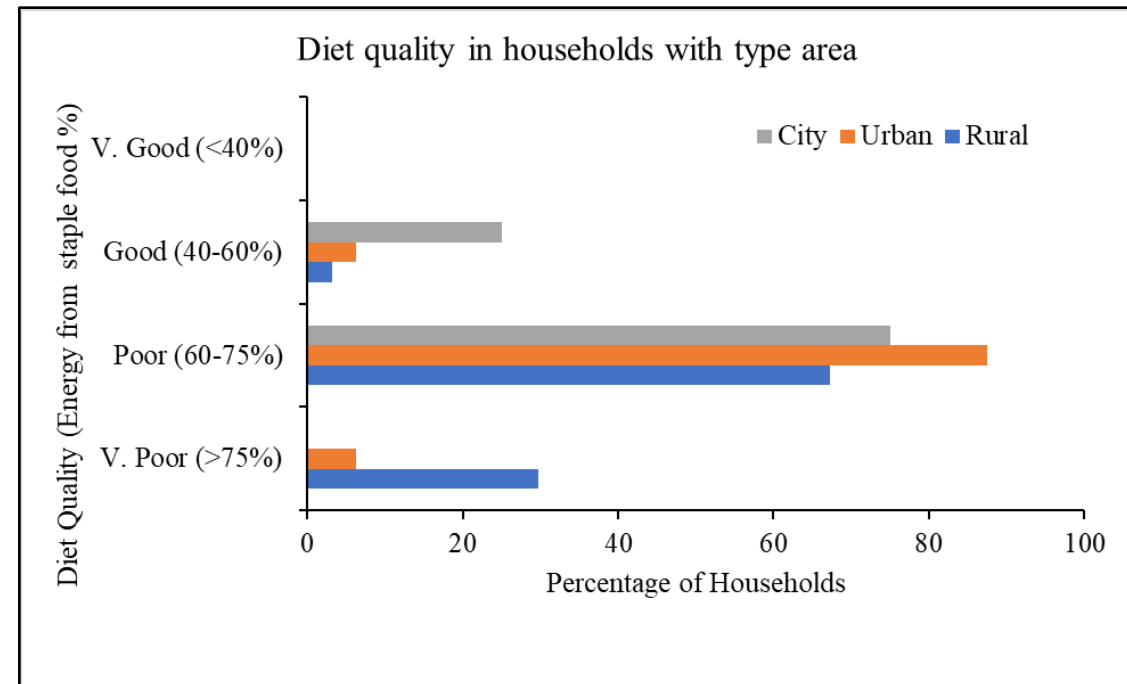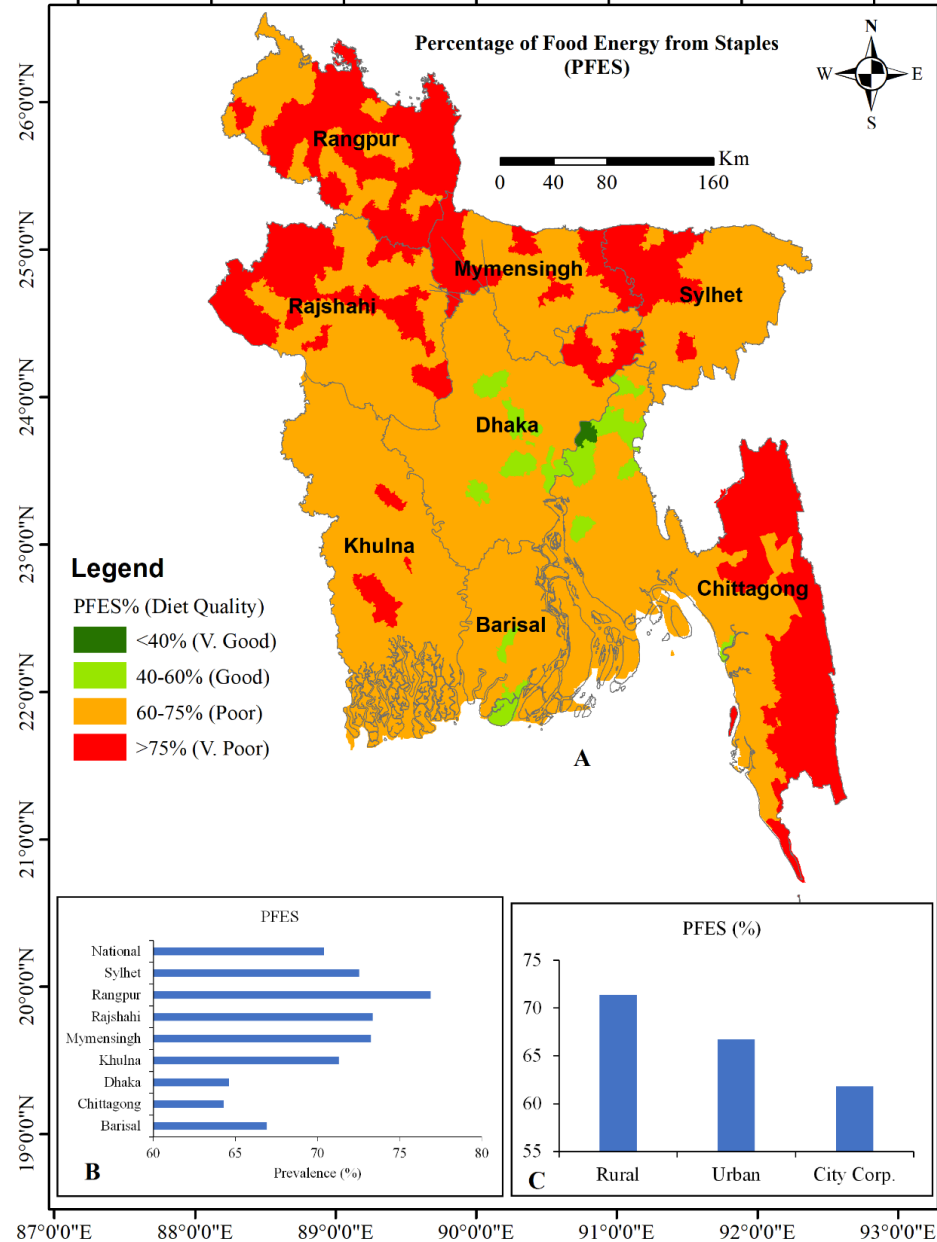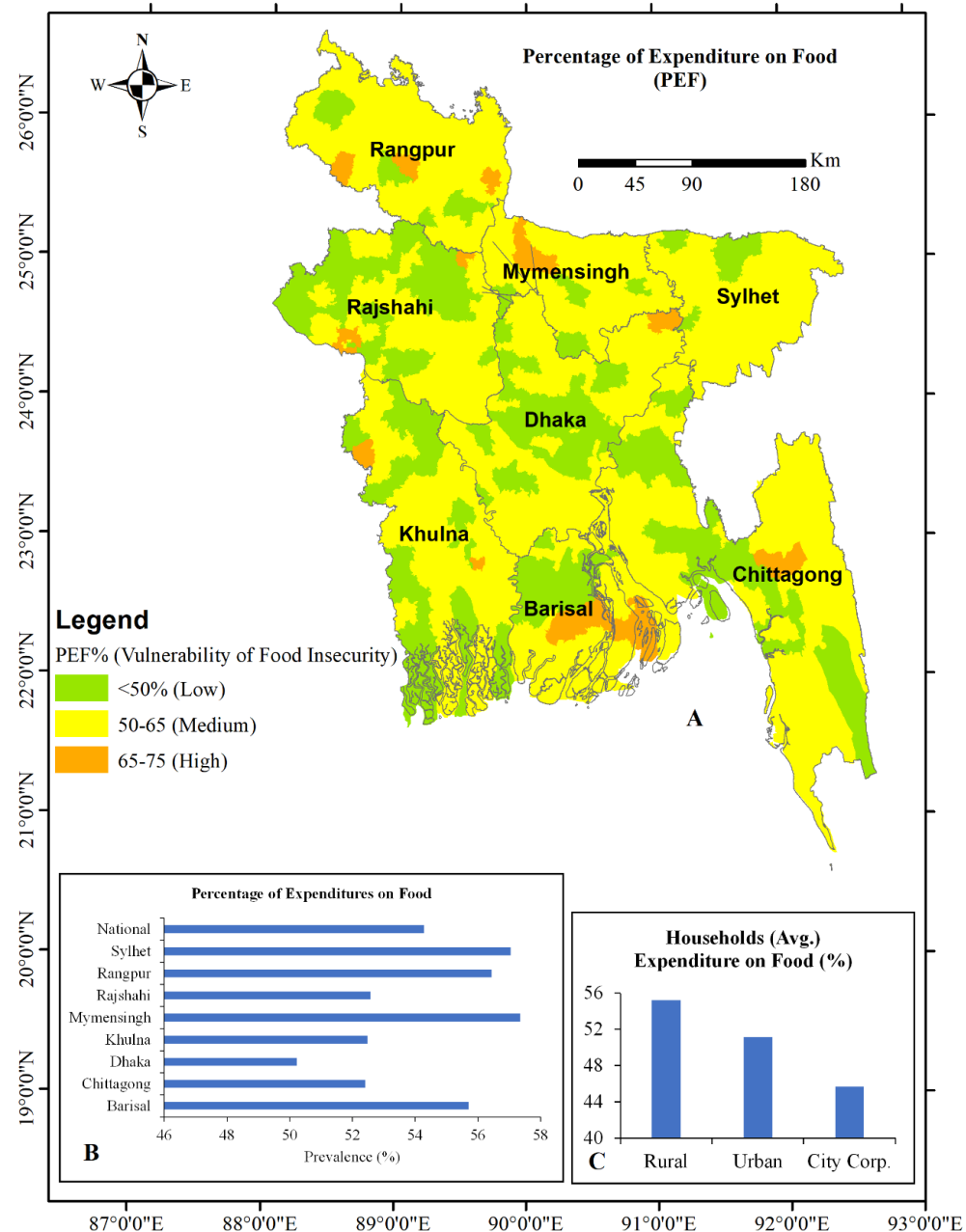
- Medium level of vulnerability prevailed throughout the country, showing yellow color

- Central parts of the country seemed to be at the lowest risk of vulnerability, showing green

- Mymensingh division observed highest vulnerability to food insecurity and Dhaka division had the lowest

- In terms of settlements, rural areas had comparatively high PEF i.e., high EVFI
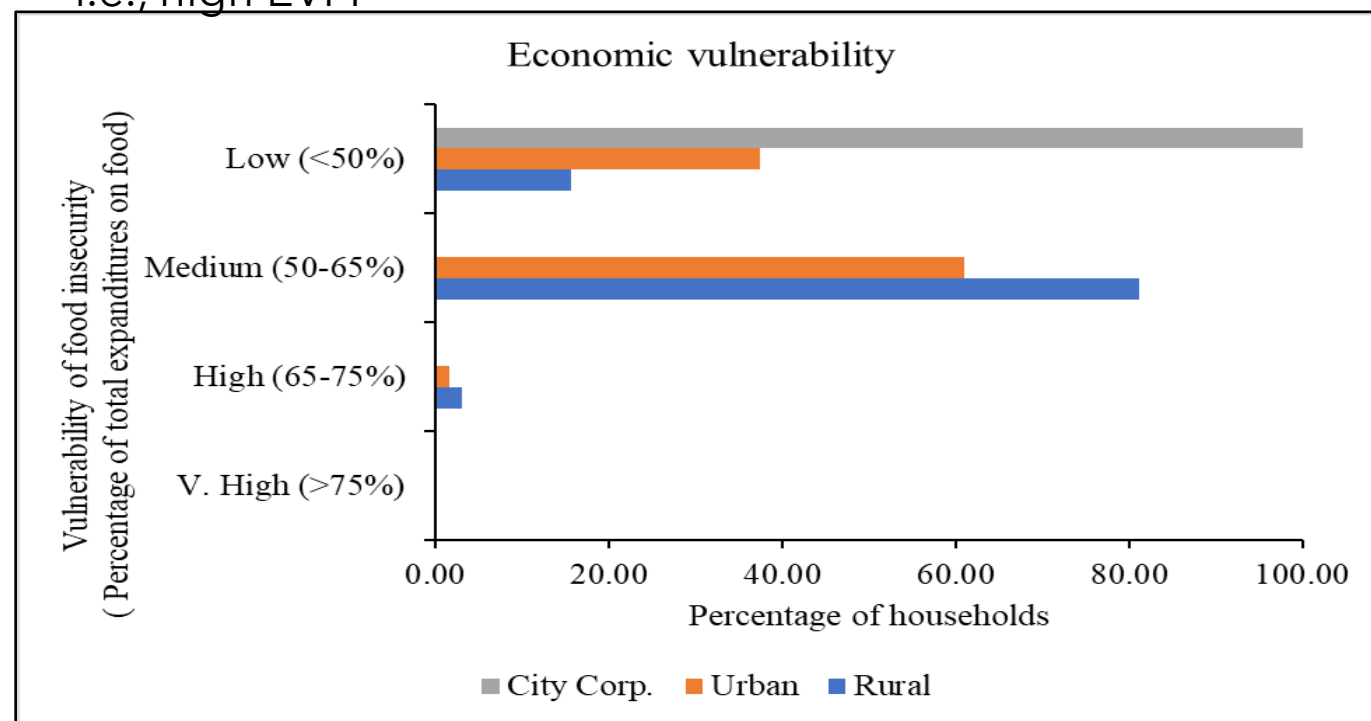
Relationship between sociodemographic characteristics and diet qualities of households

- Diet quality parameters (i.e., HDDS, PFES and PEF) of sample households were correlated with characteristics of nine sociodemographic determinants (Table).

- The results stipulated significant relationships between sociodemographic determinants and dietary quality parameters in this study ($p < 0.05$)

Determinants	Frequency, %		HDDS		% of Food Energy from Staples (PFES)		% of Expenditure on Food (PEF)	
	n	%	Mean	*p*-Value	%	*p*-Value	%	*p*-Value
(i) Gender of household head								
Male	40,066	87.4	6.27	<0.001	70.4	<0.001	54.1	<0.001
Female	5802	12.7	6.44		66.1		52.2	
(ii) Education of household head								
Post-Graduate	563	1.2	6.72		62.0		42.5	
Graduate	2680	5.8	6.76		62.1		42.8	
High School	12,015	26.2	6.43	<0.001	68.8	<0.001	50.0	<0.001
Primary	13,033	28.4	6.31		71.9		54.9	
No Education	17,577	38.3	6.18		72.8		56.6	
(iii) Literacy of household head								
Literate	28,291	61.7	6.39	<0.001	69.9	<0.001	51.9	<0.001
Illiterate	17,577	38.3	6.18		72.8		56.6	
(iv) Earner of household								
More than one	15,850	34.4	6.34	<.001	70.1	<0.001	53.0	<0.001
One	30,218	65.6	6.27		69.7		54.2	
(v) Religion of household head								
Islam	39,925	87.0	6.30	<0.001	69.4	<0.001	53.7	<0.001
Others	5943	13.0	6.24		72.8		54.4	
(vi) Age of household head								
Young-Age Adult (18–35)	14,106	30.6	6.29		68.8		55.0	
Middle-Age Adult (36–55)	21,508	46.9	6.30	<0.001	70.7	<0.001	52.9	<0.001
Older Adult (>55)	10,256	22.4	6.27		69.7		54.1	
(vii) Region by division								
Barisal	4320	9.4	6.0		67.3		55.1	
Chittagong	7916	17.2	6.84		67.8		53.8	
Dhaka	9360	20.3	6.54		64.6		52.3	
Khulna	7200	15.6	6.20	<0.001	70.9	<0.001	52.3	<0.001
Mymensingh	2880	6.3	6.33		72.9		58.2	
Rajshahi	5760	12.5	5.73		73.0		51.7	
Rangpur	5760	12.5	5.78		75.6		55.8	
Sylhet	2880	6.3	6.75		72.6		56.6	
(viii) Monthly income (Quintile)								
Lowest	7723	16.9	6.07		71.8		56.3	
Low	8552	18.7	6.06		74.1		56.4	
Medium	9099	19.9	6.31	<0.001	71.9	<0.001	55.6	<0.001
High	9634	21.1	6.40		70.5		53.2	
Highest	10,703	23.4	6.60		67.6		48.5	
(ix) Area type								
Rural	32,096	69.7	6.13		71.9		55.6	
Urban	11,860	25.7	6.61	<0.001	65.8	<0.001	50.6	<0.001
City	2120	4.6	7.10		61.7		45.7	

Conclusion

- Diet quality degraded from central to peripheral parts of the country.

- The north-northwest regions were mostly low in diet quality in Bangladesh.

- The majority of the sub-districts/districts showed a medium level of food insecurity vulnerability, while the countryside areas show higher food insecurity

- Diet qualities are significantly high in households where the head being female, middle-aged, Muslim, higher educated, higher income, and residing in cities

- Proper understanding of the underlying factors causing disparity in dietary quality and economic vulnerability to food security can assist policymakers in undertaking proper interventions and establishing equality and food sustainability in these sectors.

- The occurrence of regional food quality variations underscores the importance of sub-district-level interventions to enhance access to nutritious non-staple foods.

- The study also suggests establishing women empowerment, nutrition and general education, and income-generation activities in targeted areas, as these characteristics were linked to better diet quality.

Thank You

Acknowledgments