



# Household consumption expenditure behaviour towards outside ready-made food: Evidence from Bangladesh

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## ABSTRACT

Young and middle-aged people in Bangladesh are increasingly eating out. This paper examines consumer demand characteristics associated with consumption expenditure patterns toward eating out using the nationally representative Bangladesh Integrated Household Survey 2018-19 dataset, which is conducted by the International Food Policy Research Institute in all 64 districts of Bangladesh. Data from 5604 sample households and 20,717 individuals within those households were analysed for this study. The descriptive statistics highlight that gender, education, employment status, and occupation are significant individual-level characteristics related to having prepared outside food. People generally eat snacks and sample ready-made foods from local shops and the *Haat/Bazar* (market). Empirical evidence based on Cragg's double-hurdle model assesses that secondary or higher school education, family size, and annual food expenditure are important determinants of the likelihood of household participation in consumption and spending on eating out in the past week. In contrast, raising livestock noticeably reduces expenditures on eating outside meals. This study, therefore, recommends that educated households be aware of the adverse health effects of eating food prepared outside. In addition, livestock raising could complement the diet outside the home and decrease expenses on eating out.

## 1. Introduction

These days, the consumption of ready-made food is becoming increasingly popular in developing countries like Bangladesh [1,2]. Over the decade, the trend of eating out-of-home quickly evolved in different regions of Bangladesh. Although people's food consumption behaviour may vary because of geographic position, cultural diversity, and food items [3]. Bangladeshi people usually cook their daily meals at home, but food made outside is also common, particularly among youth. Usually, the eating-out trend is higher in cities than in the countryside [4]. However, information on food away from home is limited and only covers specific locations, not Bangladesh in general.

According to the FAO, informal workers, office employees, pupils, children, and homemakers are the prime consumers of prepared outside food in most countries [5]. For example, teenagers, students, day workers, rickshaw pullers, hawkers, and street people usually eat out during their break time in the Dhaka metropolitan area of Bangladesh [6]. Hectic work schedules in large cities have resulted in people preferring to dine out [7]. Besides, individuals sometimes try new outdoor recipes instead of food usually prepared in their kitchens, mainly youth, who love to eat out when celebrating a birthday, wedding, or festival [8].

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The prepared food could be served and sold at various food outlets across Bangladesh. For instance, in Dhaka city, consumers frequently eat at medium- and small-sized restaurants, street vendors, and roadside stalls [6]. Nevertheless, professionals would prefer eating at luxurious restaurants and related fast-food shops.

Global demand for consuming outside food has recently increased due to increased income [9–11]. In developing countries, on average, households spend 50% of their total expenditure on food [12]. Over time, per-capita income and food spending have grown in Bangladesh [13]. Consequently, consumer participation and expenditure on out-of-home food have risen in numerous regions of the country [14].

In many countries, outdoor foods have become an essential part of people's diets [15]. In Bangladesh, individual diets tend to integrate supplementary non-starchy foods that are often eaten out [16]. Diversified outside food provides higher energy and nutrient intake regardless of distinctive tastes [5,17]. Children and teenagers who eat fast food are likely to intake high calories and a lower-quality diet [18]. Such shifts in diets can drastically affect people's health. Indeed, ready-made outside meals are unhealthy compared to homemade food [19]. Hence, sustainable healthy dieting behaviour is a rising concern in the world today.

The Consultative Group on International Agricultural Research (CGIAR), France, and the International Food Policy Research Institute (IFPRI) [20] teamed up to come up with the idea of "Sustainable Healthy Diets through Food Systems Transformation (SHiFT)." They aimed to "i) accelerate the demand for/consumption of sustainable healthy diets; ii) production/distribution of nutritious, safe, affordable, and sustainably produced foods; and iii) increase livelihoods, gender equity, and social inclusion in all food system subsectors targeting eight developing countries [20]." Besides, CGIAR intends to "improve the ability of MSMEs<sup>1</sup> and informal businesses to deliver sustainable nutritious foods and inclusive income opportunities for women, youth, and other marginalised groups" in Bangladesh, Vietnam, and Ethiopia by 2024 [20].

This research distinguishes the women and men, their ages, education, occupation, and employment status, who usually eat outside food in Bangladesh. It also identifies the reasons for eating out and the kinds of people who work in the food environment. Thus, this study seeks to respond to the SHiFT intentions for Bangladesh, concentrating on the research questions (RQs): 1) *What characteristics of the individual and household are associated with having outside-prepared food?* 2) *What reasons motivate people to eat out?* 3) *From which types of outlets do people buy out-of-home food?* 4) *What factors are associated with household expenditure levels for outside ready-made food consumption?*

However, empirical evidence about eating out in Bangladesh is rare and limited to consumers and food venues, such as restaurants and street vendors [5,6]. The sample size and area are relatively small, specifically in a city, district, or professional premises [6,7]. In addition, there is a notable lack of promising research findings for the intended topic. As far as I acknowledged, in general, no such study has been conducted on outside food consumption at individual and household levels in Bangladesh.

Therefore, this research aims to fill these gaps by analysing a large sample in all 64 districts of the country using the nationally representative Bangladesh Integrated Household Survey (BIHS) 2018–19 [21]. Considering the existing issues and the SHiFT intentions, I aim to assess the factors associated with household consumption expenditure behaviour towards ready-made outside food in Bangladesh.

This paper is organised gradually into four sections. Next, Section 2 explains the materials and methods, including a theoretical framework, data description, study area & sample, and empirical model. Section 3 displays and discusses the study results. Finally, a concluding remark and policy recommendations are drawn up in Section 4.

## 2. Materials & methods

### 2.1. Theoretical framework

This study developed a theoretical framework for demand characteristics related to consumer spending patterns on outside food in light of a consumption function.

#### 2.1.1. Consumer demand characteristics & consumption function

Primarily, eating-out behaviour depends on the consumer's participation decision in eating outside food [22,23]. Afterwards, the participation decision is taken to the consumption level, referred to as the expenditure-level decision, signifying the amount spent on eating out [22,23]. The demand theory illustrates that consumers generally decide how much of a good or service to purchase based on its price, taste, the prices of other goods, income, market information, and state interventions [24]. Typically, consumption is a function of income and other factors, which is an essential element of aggregate demand. Keynes' (1936) consumption function reveals the relationship between income and consumption, uncovering a behavioural link in economics [25].

Higher income dramatically influences household consumption behaviour linked to eating out [11]. Generally, rising per capita income increases people's demand for food prepared outside [26]. Hence, individuals with higher incomes often dine out and spend more on outside food [27]. Besides, the geographical region, family size, characteristics of members, and head induce household eating-out expenditure [28]. Especially secondary school students and employed individuals are more likely to take part and spend on eating out [22,23]. Sen et al. [7] observed that income, gender, age, education, and occupation positively impact household eating-out patterns in Chittagong City, Bangladesh. Thus, participation and spending behaviour towards outside food may be associated with

<sup>1</sup> MSMEs stand for Micro, Small, and Medium Enterprises.

household socioeconomic characteristics in the form of a consumption function, though it may differ among individuals and households.

Based on the theoretical issues and following Binkley [10], Perloff [24], and Fan et al. [29], I formed a general consumption (demand) function for outside food as follows:

$$D_i = f(P, Y, S) \quad (1)$$

$D_i$  is the demand for prepared outside food of the  $i$ th household,  $P$  is the food prices,  $Y$  represents the household income, and  $S$  involves socioeconomic and other factors.

### 2.1.2. Household-level consumption function

I further devised a household-level consumption function for food prepared outside based on Equation (1) and relevant data in the BIHS 2018–19 [21], as stated below:

$$C_j = \gamma_0 + X_j' \gamma + \epsilon_j \quad (2)$$

$C_j$  is the consumption behaviour related to eating food prepared outside, associated with different demand characteristics for the  $j$ th household.  $X_j$  is the vector of household characteristics and other factors;  $\gamma_0$  is the constant;  $\gamma$  stands for the vector of the respective coefficients;  $\epsilon_j$  is the error term, distributed independently and normally with mean zero and standard deviation one, i.e.,  $\epsilon_j \sim N(0, 1)$ .

Theoretical aspects confer that household expenditure decision on food consumption is impacted by prices, income, and time constraints [29]. As there is no direct price data in the BIHS 2018–19, the variation in prices could not be directly measured. However, prices depend on location. For instance, separate locations could capture variations in the prices of food products, and consumers in the same region are presumed to experience the same market prices [10,11,22,29]. Based on Equation (1), the household location is considered an indicator of prices in Equation (2). It specifies the location, either of households in the same district or other districts, which captures the effects of price differences for eating out among districts.

However, because of the substitution and income effects on individual demand, consumer behaviour may be varied by price and income changes. The substitution effect changes consumer demand for a good due to price increases, while the income effect changes demand for a good due to income changes [24]. In addition, price elasticity measures the change in quantity demanded in response to price changes; income elasticity determines the change in quantity demanded in response to income changes; and cross-price elasticity ascertains the change in quantity demanded in a specific good when the prices of an associated good change [24,30]. Hence, changes in the price, income, and prices of related products affect the food consumption of another good [10,11,22,29]. Engel's law shows the relationship between the quantity demanded of a particular good and income, showing that rising income decreases food expenditure share [24]. However, as people's income grows, the quantity and quality of food demand also go up [31].

Apparently, food expenditure rises with increased household income [19]. Thus, income positively impacts eating-out spending due to the greater income elasticity of demand for outside food [11,26]. According to the Bangladesh Bureau of Statistics (BBS), monthly household income has risen by over 39% in 2016 compared to 2010, indicating an increased trend in consumption expenditure at the national level [32]. The tendency for outside food consumption could also increase during this period, and income seems to have a positive association with eating-out expenditure in Bangladesh. Using food expenditure as a proxy for income, Mutlu and Gracia [33] found a significant positive association among different out-of-home food expenditures in Spain. Following them and based on the theoretical background, I used household annual food expenditure as an income proxy in Equation (2) to link with Equation (1). Moreover, employment status was used to deal with time constraints because it depends on the number of hours people work [29].

## 2.2. Data description

This study used the BIHS 2018–19 round three dataset, generated by IFPRI [21]. Using two-stage stratified random sampling, IFPRI surveyed 5604 rural households in 325 primary sample villages across seven administrative divisions in Bangladesh (Dhaka, Chittagong (Chattogram), Rajshahi, Khulna, Barishal, Sylhet, and Rangpur), which have a total of 64 districts [34]. Data were gathered through face-to-face interviews with a structured questionnaire from November 2, 2018, to April 16, 2019, for the past 12 months. Thus, the sample represents the national and each division level of Bangladesh, referring to 2018 [21].

This research used household and individual-level data regarding the BIHS 2018–19 "Household Questionnaire." Modules for sample household & identification; household composition & education; employment; household assets owned; land & pond/water bodies possessed; food consumption (purchases, home production, & other sources); and consumption of food prepared outside were considered for analyses. Notably, no transformation was made to the data. The questions used for generating particular variables (Table 1) are discussed below.

Socioeconomic characteristics were assessed using questions on household size, gender, age, education, employment status, and occupation of the household members and head. Besides, livestock ownership and land size were conferred based on household animal assets possessed and land held or under-operated.

Consumption participation was determined based on the questions related to eating food prepared outside in the past 24 h and seven days. Reasons for eating out were ascertained by recognising people's motives for eating diverse types of outside food in the previous 24 h. Also, purchasing outlets were identified through the places where household members bought ready-made food.

Eating-out expenditure levels were computed by the monetary value of foods consumed in the last seven days. However, values for

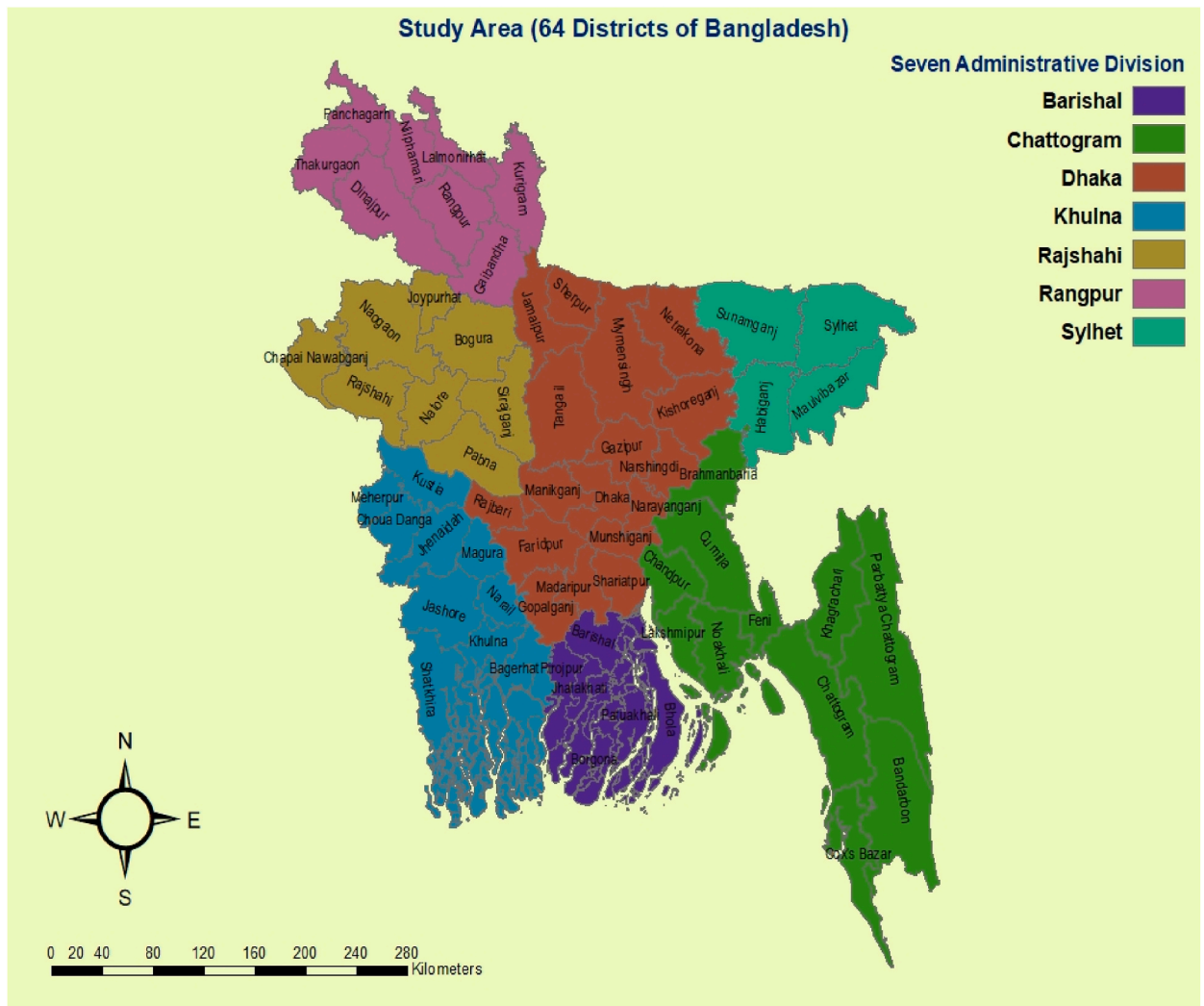
**Table 1**  
Description of variables.

Variables	Description
<b>Outcome Variable for Participation Equation</b>	
<i>Consumed Outside Food (past seven days)</i> (for the jth household) (regarding RQ1)	1 = Yes, if the household eats out 0 = No, if does not eat out
<b>Outcome Variable for Consumption Equation</b>	
<i>Total Outside Food Expenditure (past seven days)</i> (for the jth household) (regarding RQ4)	Taka/Tk. (Bangladesh Currency) (Natural log values)
<b>Explanatory Variables (at Household-Level for Cragg's Model)</b>	
<i>Gender of Head</i>	1 = Male, 0 = Female
<i>Age of Head</i>	Years (Natural log values)
<i>Education of Head</i>	1 = No Schooling, 0 = Otherwise 1 = Primary, 0 = Otherwise 1 = Secondary & Above, 0 = Otherwise
<i>Employment Status of Head</i>	1 = Employed, 0 = Unemployed/Homemaker
<i>Family Size</i>	Total number of household members
<i>Total Food Expenditure (annual)</i> (Proxy of Income)	Taka/Tk. (Bangladesh Currency) (Natural log values)
<i>Livestock Ownership</i>	1 = Yes, if owns, 0 = No, if does not own
<i>Total Land Size</i>	Hectare
<i>Household Location</i>	1 = Same district, 0 = Other district
<b>Other household-level variables used for descriptive statistics (outside the equations)</b>	
<i>Main Occupation of Head</i> (regarding RQ1)	1 = Wage Labor, 0 = Otherwise 1 = Salaried Worker, 0 = Otherwise 1 = Self-employment, 0 = Otherwise 1 = Farming, 0 = Otherwise 1 = Non-earning, 0 = Otherwise
<b>Individual-level variables used for descriptive statistics (outside the equations)</b>	
<i>Gender of Member</i>	1 = Male, 0 = Female
<i>Age of Member</i>	Years (Natural log values)
<i>Education of Member</i>	1 = No Schooling, 0 = Otherwise 1 = Primary, 0 = Otherwise 1 = Secondary & Above, 0 = Otherwise
<i>Employment Status of Member</i>	1 = Employed/Student, 0 = Unemployed/Homemaker
<i>Main Occupation of Member</i>	1 = Wage Labor, 0 = Otherwise 1 = Salaried Worker, 0 = Otherwise 1 = Self-employment, 0 = Otherwise 1 = Farming, 0 = Otherwise 1 = Non-earning, 0 = Otherwise
<i>Reasons for Eating Out</i> (regarding RQ2)	1 = I work outside of home 2 = School tiffin (light midday meal) 3 = There was no food in the house 4 = I like the taste of this food 5 = Ate as a snack; 6 = Miscellaneous
<i>Types of Purchasing Outlet</i> (regarding RQ3)	1 = Street Vendor, 2 = Local shop 3 = Haat/Bazar (Market) 4 = School gate; 5 = Miscellaneous
<i>Consumed Outside Food (past 24 h)</i> (regarding RQ1, RQ2 & RQ3)	1 = Yes if the household member eats out 0 = No, if does not eat out

food items unrelated to a meal were excluded. In addition, household annual food expenditures were estimated by the weekly spending on purchased quantities of different food items. These food items are divided into twelve categories: cereals; pulses; edible oil; vegetables; leafy vegetables; meat, eggs, & milk; fruits; fish; spices; other food; drinks & beverages; and other foods prepared outside the home. Finally, the household location was found using the question of where it is located, whether in the same village, upazila, or district.

### 2.3. Study area & sample

Anywhere in Bangladesh, people can consume outside food. This study considered all 5604 sample households of the BIHS 2018–19 in 64 districts of Bangladesh (Fig. 1) for household-level analysis. In addition, there are 23,684 individuals in the 5604 households. However, children (age below six) were excluded (2967 observations) due to the study's focus on those members who eat out. In fact, children under the age of six are babies and do not eat out. Thus, for individual-level analysis, the total sample is 20,717.



**Fig. 1.** Bangladesh Map

**Note:** Using ArcGIS, the author created the map of Bangladesh for all 64 districts, as shown in Fig. 1.

**Source:** Author Creation

#### 2.4. Empirical model

Despite descriptive statistics for RQ1, household characteristics associated with outside food consumption behaviour are examined using an empirical model. Based on the BIHS 2018–19 [21], whether the household eats outside food indicates their participation in eating out. Likewise, regarding the RQ4, households may spend on eating out or not; thus, observations would drop based on their participation. As a result, the outcome variable (expenditure levels) can have zero observations. This study found that 5385 families consumed outside food, whereas 219 did not in the past seven days, out of 5604 households. Similarly, at the individual level, out of

**Table 2**

Frequency distribution of consumed outside food.

	Consumed Outside Food			
	Past 24 h		Past seven days	
	Frequency	Percent	Frequency	Percent
Yes (Eats out)	5727	27.64	5385	96.09
No (Does not eat out)	14,990	72.36	219	3.91
<b>Total (N)</b>	<b>20,717</b>	<b>100</b>	<b>5604</b>	<b>100</b>

**Source:** Author Estimation; **Note:** The author estimated the results of Table 2 based on the respective data in BIHS 2018–19 [21].

20,717 members, only 5727 ate out in the past 24 h, while 14,990 did not, as shown in Table 2.

Such an analysis better fits Cragg's double-hurdle model, combining a Probit and Truncated Regression [35,36]. Empirical studies, such as Mottaleb et al. [1], Liu et al. [22] and Mutlu and Gracia [33] used a two-part model to assess the factors associated with ready-made outside food. However, prior studies, for instance, Binkley [10], Ma et al. [11], McCracken and Brandt [27], and Mutlu and Gracia [33] ascertained varied factors related to eating out based on Becker's (1965) household production theory. Also, Bhuyan [19] used the theory of planned behaviour to determine consumers' attitudes and preferences for eating out. This research differs from previous studies by developing a household-level consumption function (Section 2.1.2) based on consumer demand characteristics for food made outside and applying Cragg's model.

Cragg [35] developed an alternative to the Tobit model, which is a normal two-part expansion of the Tobit model (a model for the censored outcome variables) [37,38]. This model is the Truncated Normal or Double Hurdle Model [37–39]. It combines the probability of positive values ( $y > 0$ ) through a Probit regression and the given values (amount) of  $y$  through the Truncated Normal regression/type I Tobit [35–37].

A selection model illustrates the “correlation between participation and amount decisions” [37]. Cragg's model refers to both participation and quantity decisions, or a combination of selection (participation) and outcome (consumption) equations [40,41]. Outside food consumption behaviour relies on the consumer's participation decision, and then participation is taken to the consumption level, called the expenditure-level decision [22,23]. The expenditure-level decision determines how much consumers spend on food prepared outside. In this study, household participation in eating out exhibits the participation equation, and expenditure levels for consuming outdoor food represent the consumption equation. Jones [40] and Madden [41] clarified that Cragg's model consists of the following elements:

$$\text{Observed consumption : } C = d.C^{**} \quad (3)$$

$$\text{Participation (selection) equation : } P_j = X_j'\alpha + \mathcal{E}_j; \quad d = 1 \text{ if } P > 0, d = 0 \text{ otherwise} \quad (3.1)$$

$$\text{Consumption (outcome) equation : } C_j^* = \max [0, C^*], C_j^* = Z_j'\beta + \mu_j \quad (3.2)$$

$P_j$  is the household participation in consuming outside prepared food, indicating that either household eats out or not (1 = yes; 0 = no), while  $C_j^*$  is a latent (unobserved) variable that determines the household consumption (expenditure) levels for outside food. Both outcome variables are associated with distinct characteristics (factors) for the  $j$ th household.  $X_j$  and  $Z_j$  are the vectors of the household characteristics;  $\alpha$  and  $\beta$  are the vectors of respective coefficients;  $\mathcal{E}_j$  and  $\mu_j$ , are the error terms that are independently and normally distributed with mean zero and variance,  $\mathcal{E}_j^2$  and  $\sigma_j^2$ , i.e.,  $\mathcal{E}_j \sim N(0, \mathcal{E}_j^2)$  and  $\mu_j \sim N(0, \sigma_j^2)$ , respectively.

When  $P_j$  &  $C_j^*$  are positive (i.e.,  $P_j > 0$  &  $C_j^* > 0$ ), the observed outcome variable,  $C_j$  is equal to  $C_j^*$  [35,37]. That is to say,

$$C_j = C_j^* = Z_j'\beta + \mu_j \quad (3.2.1)$$

While  $P_j < 0$  &  $C_j^* < 0$ ; the observed outcome variable,  $C_j$  is zero. That is to say,

$$C_j = 0 \quad (3.2.2)$$

Thus, the likelihood of observed consumption (Equation (3)) is separated into those with positive consumption (Equation 3.2.1) and those with zero consumption (Equation 3.2.2) [40].

In Equation (3.1) and Equation (3.2), the outcome variables are *Consumed Outside Food (past seven days)* and *Total Outside Food Expenditure (past seven days)*, respectively. The response and explanatory variables were selected considering the household consumption function (Equation (2)) for the demand characteristics related to eating out and available data in the BIHS 2018–19 [21]. In addition, Table 1 measures all variables used in this study.

As discussed in Section 2.1.2, this study considered explanatory variables: household annual food expenditure as an income proxy, location as an indicator of prices, and employment status for time constraints. Other variables, such as the age and education of the household head, family size, livestock, and land owned by the household, are expected to be associated with eating out. Notably, I used the same set of household-level variables in the participation (Equation (3.1)) and consumption (Equation (3.2)) equations to link with Equation (2).

Thus, using the Probit Regression (Cragg's participation equation), I assessed household demand characteristics associated with participation in eating out in the past seven days for RQ1. However, individual characteristics are excluded from the participation equation because data on their participation in eating out was available for the last day. It was supposed to estimate eating-out expenditure levels in the past 24 h, but expenditure data was gathered only for the past seven days in the BIHS 2018–19 [21].

Therefore, the first decision is whether an individual has consumed outside food in the last 24 h. If so, what was the expenditure level on eating out during the previous 24 h? Alternatively, the first decision is whether a household has eaten food outside the home in the last seven days, and if so, what is the amount spent on eating out over the previous seven days? Since participation and expenditure-level information has been available for the past seven days, this study considered household-level data regarding Cragg's participation and consumption equations. Finally, the Truncated Normal Regression (Cragg's consumption equation) was used to examine the factors associated with household eating-out expenditure levels in the past seven days regarding the RQ4.

## 2.5. Multicollinearity tests

Multicollinearity creates problems if two or more or a combination of explanatory variables are highly correlated [42]. But it can be detected by checking the Variance Inflation Factor (VIF) for the relation between the independent continuous variables and the association between the discrete (dummy) variables through the contingency coefficients [43,44]. Verbeek [42] and Dougherty [45] estimated the VIF as follows:

$$VIF(X_i) = 1 / (1 - R_i^2)$$

$R_i^2$  is the coefficient of determination between  $x_i$ . When  $VIF > 10$  of a variable, it is supposed to be highly collinear [42,45,46]. I checked the VIF, and the results confirm that the continuous explanatory variables used in Probit and Truncated regressions had a VIF just above 1, suggesting no major multicollinearity, as stated in Table A1.

Moreover, the contingency coefficient (CC) measures the strength of association or dependency between discrete variables [44,47]. Following Mirkin [44], Harris and Treloar [47] and Schenkelberg [48], I estimated the CC using the formula given below:

$$C = \sqrt{\chi^2 / (\chi^2 + N)}$$

Here,  $C$  is the contingency coefficient,  $\chi^2$  = chi-squared value and  $N$  = Total sample size.

The value of CC must be between 0 & 1 [43]. The greater the value, the higher the degree of association between variables [44,48]. In this study, the CC values are much lower than 1, which confers no visible multicollinearity among the dummy explanatory variables used in Probit and Truncated regressions, as shown in Table A2.

## 3. Results & discussion

### 3.1. Characteristics of individuals and households

Descriptive statistics ascertained the demand characteristics of the individual and household towards eating out, responding to RQ1. The chi-squared test for categorical or dummy variables and the  $t$ -test for continuous variables were used to assess the group differences. Notably, all statistical test results are considered at a 5% significance level as a rule of thumb.

Table 3 displays individual characteristics depending on whether household members have eaten out or not in the past 24 h. As seen, people who eat out are more likely to be male, while those who do not eat out are more likely to be female. Most of them are young-aged (over 30 years), concerning both categories of individuals (insignificant). However, individuals who eat out mostly have primary education, whereas those who do not eat out have attained secondary and above education. Approximately 90% and 85% of

**Table 3**  
Characteristics of individuals by participation in consuming outside food (past 24 h).

Characteristics	Eats out (N <sub>1</sub> = 5727)	Does not eat out (N <sub>2</sub> = 14,990)	Test Statistic (p-value)
<b>Gender of Member</b> (1 = ) Male	.619 (.486)	.406 (.491)	.000 <sup>c</sup>
<b>Age of Member (Years)</b>	33 (20.34)	31 (18.96)	1.000 <sup>t</sup>
<b>Education of Member</b> (1 = ) No Schooling	.335 (.472)	.296 (.456)	.000 <sup>c</sup>
(1 = ) Primary	.340 (.474)	.332 (.471)	
(1 = ) Secondary & Above	.326 (.469)	.373 (.483)	
<b>Employment Status of Member</b> (1 = ) Employed/Student	.895 (.307)	.849 (.358)	.000 <sup>c</sup>
<b>Occupation of Member</b>			.000 <sup>c</sup>
(1 = ) Wage Labor	.078 (.268)	.054 (.226)	
(1 = ) Salaried Worker	.034 (.182)	.031 (.173)	
(1 = ) Self-employment	.158 (.365)	.090 (.286)	
(1 = ) Farming	.166 (.372)	.092 (.290)	
(1 = ) Non-earning	.563 (.496)	.732 (.443)	

**Notes:** The author estimated the results of Table 3 based on the respective data in BIHS 2018–19 [21]; Values outside the parentheses indicate the mean, and values in the parentheses indicate the standard deviation; c & t stand for the chi-squared and  $t$ -test, respectively.

**Source:** Author Estimation

**Table 4**  
Characteristics of households by participation in consuming outside food (past seven days).

Characteristics	Eats out (N <sub>1</sub> = 5385)	Does not eat out (N <sub>2</sub> = 219)	Test Statistic (p-value)
<b>Gender of Head</b> (1 = ) Male	.794 (.404)	.658 (.476)	.000 <sup>c</sup>
<b>Age of Head</b> (Years)	46 (13.74)	54 (13.12)	.000 <sup>t</sup>
<b>Education of Head</b> (1 = ) No Schooling	.430 (.495)	.635 (.483)	.000 <sup>c</sup>
(1 = ) Primary	.267 (.442)	.233 (.424)	
(1 = ) Secondary & Above	.304 (.460)	.132 (.340)	
<b>Employment Status of Head</b> (1 = ) Employed	.906 (.292)	.877 (.330)	.150 <sup>c</sup>
<b>Occupation of Head</b> (1 = ) Wage Labor	.134 (.341)	.110 (.313)	.001 <sup>c</sup>
(1 = ) Salaried Worker	.053 (.225)	.037 (.188)	
(1 = ) Self-employment	.271 (.445)	.174 (.380)	
(1 = ) Farming	.328 (.470)	.388 (.488)	
(1 = ) Non-earning	.213 (.409)	.292 (.456)	
<b>Family Size</b> (Total #Members)	4.17 (1.73)	3.00 (1.52)	1.000 <sup>t</sup>
<b>Total Food Expenditure</b> (annual) (Taka/Tk.)	409,181 (220,808)	422,262 (216,595)	.195 <sup>t</sup>
<b>Livestock Owned</b> (1 = ) Yes	.767 (.423)	.763 (.426)	.870 <sup>c</sup>
<b>Total Land Size</b> (Hectare)	3.415 (8.243)	3.314 (7.353)	.571 <sup>t</sup>
<b>Household Location</b> (1 = ) Same district	.914 (.280)	.927 (.261)	.508 <sup>c</sup>

**Notes:** The author estimated the results of Table 4 based on the respective data in BIHS 2018–19 [21]; Values outside the parentheses indicate the mean, and values in the parentheses indicate the standard deviation; c & t stand for the chi-squared and t-test, respectively.

**Source:** Author Estimation

people are likely to be employed/students who eat out and do not eat out, respectively. Besides, over 56% and 73% of them have a probability of a non-earning occupation, followed by farming and self-employment for those who do or do not eat out. Moreover, the p-values of chi-squared and t-tests for all characteristics vary significantly between the two groups except for individual age.

The household-level characteristics of whether they ate out or not in the previous seven days are shown in Table 4. In both households, family heads are more likely to be male. It says that households with one or more members eating out are more likely to have male heads, and on average, they are middle-aged. More than half of the families that eat out are likely to have educated heads with primary, secondary, or higher schooling levels, while nearly 64% of those who do not eat out have no formal education. Most households are likely to have employed heads (insignificant) and tend to be involved in farming following self-employment. Households who eat out, on average, spend about Tk. 13,801 less annually on food than those who do not (insignificant). Over 76% of households own livestock and possess more than 3 ha of land, though these are not significant. Besides, above 91% of households are likely to be located in the same district (insignificant). Moreover, test statistics for the gender, age, education, and occupation of family heads differ significantly between groups, while other household characteristics do not.

Furthermore, Probit regression results are presented in Table 5 by gender of the household head for answering RQ1. The results are the first part of Cragg's model (participation equation), which examines demand characteristics associated with household participation in eating out. Tables 3 and 4 also support responding to RQ1. The Wald test output shows that homoscedasticity is rejected (p-value < .05), implying heteroscedasticity is detected for each result category. To control heteroscedasticity, the marginal effects of the respective coefficients are mentioned in Table 5.

The age of the family head illustrates that the likelihood of households eating out decreases by about 85% as the male head gets older. In other words, the marginal effects make it clear that with increasing age, male heads are less likely to consume outside food by nearly double (5.8% points) than their female counterparts. Older household heads do not go out often, which could lower their involvement in eating out. Besides, young members could attend school or work, reducing family heads' participation in eating out over the past seven days. Tables 3 and 4 outline the individual and household characteristics that also shed light on this issue. Tan [49] found that household involvement in eating out declines remarkably with each additional year of head age, which aligns with this study's findings.



**Table 5**  
 Probit regression results for outside food consumption.

Explanatory Variables	Male Head		Female Head		Total	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
(ln) Age of Head (Years)	-0.849*** (0.147)	-0.058*** (0.011)	-0.287 (0.255)	-0.033 (0.030)	-0.647*** (0.120)	-0.051*** (0.010)
<b>Education of Head</b>						
(1 = ) Primary	0.098 (0.101)	0.007 (0.007)	0.111 (0.158)	0.015 (0.022)	0.080 (0.083)	0.007 (0.007)
(1 = ) Secondary & Above	0.305*** (0.108)	0.019*** (0.006)	0.651*** (0.215)	0.062*** (0.018)	0.372*** (0.095)	0.026*** (0.006)
<b>Employment Status of Head</b>						
(1 = ) Employed	-0.372** (0.183)	-0.019*** (0.007)	0.183 (0.227)	0.023 (0.030)	-0.091 (0.122)	-0.007 (0.009)
<b>Family Size</b>						
(Total #Members)	0.190*** (0.031)	0.013*** (0.002)	0.213*** (0.062)	0.025*** (0.007)	0.211*** (0.027)	0.017*** (0.002)
(ln) Total Food Expenditure (annual) (Bangladesh Taka)	0.123** (0.053)	0.008** (0.004)	0.061 (0.046)	0.007 (0.005)	0.094*** (0.035)	0.007*** (0.003)
<b>Livestock Owned</b>						
(1 = ) Yes	-0.041 (0.105)	-0.003 (0.007)	-0.323 (0.213)	-0.036 (0.022)	-0.094 (0.090)	-0.007 (0.007)
<b>Total Land Size</b>						
(Hectare)	-0.004 (0.004)	0.0002 (0.0003)	-0.012 (0.014)	-0.001 (0.002)	-0.004 (0.004)	-0.0003 (0.0003)
<b>Household Location</b>						
(1 = ) Same district	0.020 (0.146)	0.001 (0.010)	-0.107 (0.234)	-0.012 (0.024)	-0.033 (0.124)	-0.003 (0.009)
Constant	2.684** (1.083)		1.073 (1.264)		2.085*** (0.767)	
N	4422		1182		5604	
Pseudo R <sup>2</sup>	0.10		0.11		0.11	
Wald chi2	109.74		57.39		174.15	
Prob > chi2	.000		.000		.000	

**Notes:** Outcome Variable: Consumed Outside Food (past seven days) (1 = Yes); P < .01\*\*\*, p < .05\*\*; Values in parentheses indicate Robust Standard Error (Robust SE).

Education<sup>2</sup> signifies that over 37% of households with secondary or above schooling have a higher probability of eating out. The marginal effect shows that households with secondary or higher school education are more likely to eat out compared to households without school education over the preceding week. Surprisingly, female-headed families who attained secondary or higher school education (about 6% points) are more likely to participate in eating out than male-headed families (nearly 2% points). Tan [49] also illustrated that with each extra school year, the participation of female-headed households in eating out nearly doubles that of male-headed households. Besides, Langellier [50] found a positive association between adults with a higher secondary or college education and eating out. These findings resonate with this research result.

The employment status delineates a 37% decrease in the likelihood of eating out for households headed by men. The marginal effect implies that employed male-headed families are 1.9% points less likely to have outside food than those led by unemployed/homemakers.<sup>3</sup> It could be because, instead of the household head, other household members worked outside in the past seven days and took part in eating out. Table 3 also clarifies this issue since there is a significant association between employed members and consuming outside food, while the relationship is insignificant between employed household heads and eating out (Table 4).

Family size increases the probability of household participation in eating out by more than 21% overall. The marginal effects reveal that an increase in family size by one member is associated with an increase in the likelihood of eating out by 1.3 and 2.5% points, respectively, for male and female-headed households, although female-headed families have a higher effect. More family members could work outside or go out for other reasons, inducing them to eat more outside food. Mutlu and Gracia [33] explain that household size considerably increases the likelihood of taking breakfast and snacks, supporting this study's results.

Annual food expenditure, in general, shows a significant positive coefficient, suggesting that an increase in yearly food spending increases the probability of household involvement in eating out by over 9%. The marginal effects reveal that the likelihood of male-headed household participation in eating out in the last week has grown by nearly 1% point with growing annual food expenditure. This finding relates to Mottaleb et al. [4], who revealed that food expenditure leads to higher eating-out participation in Bangladesh.

Moreover, owning livestock insignificantly affects the likelihood of household participation in eating out compared with those who do not have livestock.<sup>4</sup> Likewise, the size of the land is not associated with household consumption of food outside. The household location<sup>5</sup> typically exerts a small negative coefficient and a marginal effect. Thus, their participation in eating out in the past seven days is less likely to vary in the same district than in other districts (insignificant).

<sup>2</sup> Regrading 'education of head', the reference category is the 'no schooling' as defined in Table 1.

<sup>3</sup> 'Unemployed/homemaker' is the reference dummy for the 'employment status of head' as defined in Table 1.

<sup>4</sup> Regarding 'livestock ownership', the reference dummy is 'no (if does not own livestock)' as defined in Table 1.

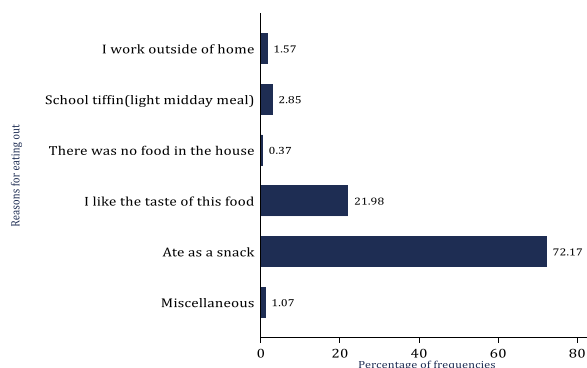
<sup>5</sup> For 'household location', the reference dummy is 'other district' as defined in Table 1.

### 3.2. Reasons for eating out

To answer RQ2, the percentage of frequency distribution identified the reasons for individuals who eat out, as shown in Fig. 2. It illustrates why people in Bangladesh are persuaded to consume ready-made outside food. Different motives could influence consumers' eating-out habits. People often have a snack and like to taste a variety of food items prepared outside. Some take meals away from home for school tiffin (a light midday meal), and a tiny fraction of individuals eat out because they work outdoors and for other reasons. However, people eat out less often due to the unavailability of food in their homes.

### 3.3. Types of outlets from which people buy out-of-home food

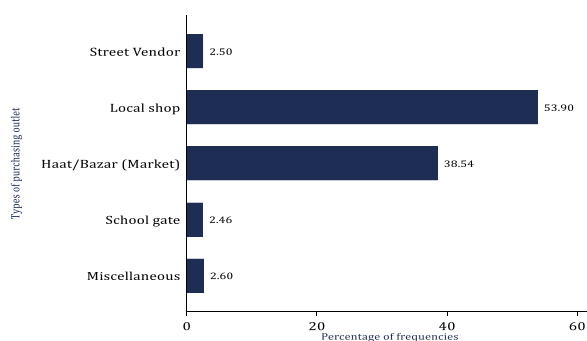
Responding to RQ3, the percentage of frequency distribution identified the places from which individuals buy ready-made outside food, as presented in Fig. 3. It recognises the types of outlets in Bangladesh where people purchase prepared food. Consumers could buy their preferred food items from various outlets. Most frequently, they purchase ready-made food from local shops and the *Haat/Bazar* (market). A minimal portion of people buy outside food from street vendors and other venues, although they less frequently purchase ready-made food at the school gate.



**Fig. 2.** Reasons that motivate people to eat prepared food outside

**Note:** The author created Fig. 2, estimating the percentage of frequency distribution for those individuals who eat out based on the respective data in BIHS 2018–19 [21].

**Source:** Author Estimation



**Fig. 3.** Types of outlets where people purchase prepared food

**Note:** The author created Fig. 3, estimating the percentage of frequency distribution for those individuals who eat out based on the respective data in BIHS 2018–19 [21].

**Source:** Author Estimation

### 3.4. Factors that are associated with household expenditure levels for eating out

Regarding RQ4, Table 6 displays the second part (truncated regression) results of Cragg's model (consumption equation) to examine the factors associated with household expenditure-level in eating out over the past seven days. However, the coefficients of dummy variables in the semi-logarithmic truncated regression are estimated and interpreted following the transformation suggested by Halvorsen and Palmquist [51] and Kennedy [52], as specified in the parentheses.

Overall, the age of the family head rationalizes that households tend to spend about 15% less money on eating out at an increased age, and the effect is much higher for male-headed households. In the last week, households headed by men spent around 22% less on out-of-home food compared to their women counterparts. In Bangladesh, older males are usually the household heads, which could reduce their eating out expenditure. Binkley [10] uncovered a similar negative association between family head age and eating out spending that is in line with this research finding.

Households with secondary or higher school education spent approximately 14% more on outside-prepared food consumption during the last seven days than those without formal education. Remarkably, female-headed households that accomplished secondary or above schooling spent much more on eating out than male-headed households (21.9% vs. 13.5%). Table 4 also confers that most households are educated, which could explain why they spend more on dining out. These findings are consistent with the result of Mottaleb et al. [4], who explained that educated households spend more on taking outside food in urban areas of Bangladesh.

Nonetheless, household employment status shows no significant association with eating out. It suggests that household weekly expenditures on eating food outside the home are unrelated to work status. The issue could be that other household members, rather than the family head, engaged in outdoor work in the past seven days. Besides, Table 4 provides insight into this issue by showing an insignificant association between employed household heads and eating out.

Family size significantly impacts eating-out expenditure, and both households with increased family members spent roughly 15% more in the previous week. The reason could be that in a larger family, more members work outside, encouraging them to spend more on eating out. In a recent study, Liu et al. [22] also clarified that spending on eating out increases as the number of household members increases.

The annual food expenditure (income proxy) leads to an increase of around 6% of households' average weekly expenditure on eating out. However, the male-headed household spent considerably more (over 12%) on eating out, with increased yearly food expenses, than the female-headed household. This finding supports the results of Mottaleb et al. [4], who found that total food expenditure in rural and urban Bangladesh increases eating-out spending.

Livestock ownership exerts a strong negative association with household eating-out expenditures. Possessing livestock lowers household outside food consumption spending by 19.4% more than those without livestock. A similar effect was seen for male-headed families, while it was comparatively smaller and insignificant for female-headed families. Raising livestock could allow households to consume home-produced eggs, meat, and milk, which reduces their expenditure on eating ready-made outside food. Also, land size shows a tiny negative and insignificant coefficient, implying it does not affect household spending on eating out.

Furthermore, the household location generally exhibits an insignificant negative coefficient. Hence, the household expenditure

**Table 6**

Truncated regression results for the household expenditure levels of outside food consumption.

Explanatory Variables	Male Head		Female Head		Total	
	Coefficient	Robust SE	Coefficient	Robust SE	Coefficient	Robust SE
(ln) Age of Head (Years)	-0.215***	0.062	0.027	0.145	-0.152***	0.055
<b>Education of Head</b>						
(1 = ) Primary	0.062 (6.26)	0.042	0.031 (2.63)	0.095	0.055 (5.57)	0.039
(1 = ) Secondary & Above	0.128*** (13.53)	0.042	0.203** (21.88)	0.099	0.130*** (13.81)	0.038
<b>Employment Status of Head</b>						
(1 = ) Employed	0.026 (2.32)	0.084	-0.165 (-15.89)	0.128	0.020 (1.78)	0.061
<b>Family Size (Total #Members)</b>	0.147***	0.010	0.157***	0.024	0.154***	0.009
(ln) Total Food Expenditure (annual) (Bangladesh Taka)	0.124***	0.031	-0.072	0.047	0.057***	0.026
<b>Livestock Owned</b>						
(1 = ) Yes	-0.209*** (-18.93)	0.044	-0.116 (-11.53)	0.116	-0.215*** (-19.38)	0.040
<b>Total Land Size (Hectare)</b>	-0.003	0.002	-0.002	0.015	-0.002	0.002
<b>Household Location</b>						
(1 = ) Same district	-0.033 (3.40)	0.061	0.048 (4.29)	0.106	-0.028 (-2.88)	0.053
Constant	3.491***	0.574	5.619***	0.978	4.303***	0.479
Sigma	1.061***	0.011	1.095***	0.022	1.072***	0.010
N	4278		1107		5385	
Wald chi2	288.64		67.12		360.79	
Prob > chi2	.000		.000		.000	

**Notes:** Outcome Variable: (ln) Total Outside Food Expenditure (past seven days) (Bangladesh Taka);  $P < .01^{***}$ ,  $p < .05^{**}$ .

Values in parentheses indicate the percentage effects of the discrete explanatory variables on the (log) response variable in the semi-logarithmic truncated regression following the transformation suggested by Halvorsen and Palmquist [51] and Kennedy [52].

levels for outside prepared food consumption do not significantly change in the same district compared to other districts with increased prices of outdoor food items in the past seven days.

#### 4. Conclusion & policy recommendations

Consumption of outside-prepared food is an emerging trend in the food environment of Bangladesh. This research provides useful insights into people's consumption expenditure behaviour related to eating out using the nationally representative Bangladesh Integrated Household Survey 2018-19 across all 64 districts in Bangladesh.

This study first analysed which characteristics of individuals and households are associated with eating prepared food outside. The descriptive statistics emphasize that gender, education, employment status, and occupation of individuals are important factors associated with eating food away from home. In addition, the result of probit regression reveals that secondary or above schooling level, family size, and annual food expenditure are significant household characteristics that increase their likelihood of participating in eating out in the past seven days. Next, the study identified the reasons that motivate consumers to eat prepared food and the places where they buy such foods. It figures out that people most often have a snack and taste a plethora of food items from local shops and the *Haat/Bazar* (market). Finally, this research assessed the factors associated with household expenditure levels for outside ready-made food consumption. The crucial finding of the truncated regression discloses that secondary or higher school education, family size, and yearly food expenditure are significant determinants that noticeably increased household eating-out spending over the last week. In contrast, head age and livestock ownership significantly decrease household eating-out expenditures in Bangladesh.

However, individual-level characteristics are ascertained using descriptive statistics but excluded from Cragg's model, which might limit the study. This is because of data on individual participation in eating out in the BIHS 2018–19 for the last 24 h. Unexpectedly, eating-out expenditures were found only for the past seven days. Therefore, this study used last week's expenditure data, which suits Cragg's double hurdle model.

Nevertheless, this research gives some useful insights that shed light on the SHiFT initiative, revealing its intentions for Bangladesh. The study's findings would allow experts to recognise male and female consumers, their age, education, occupation, and employment status, who usually eat ready-made outside food at the individual and household levels. Certain motives behind people's dieting behaviour in Bangladesh could be identified as reasons why they consume out-of-home food. Additionally, this study differs from prior studies by developing a household-level consumption function based on consumer demand characteristics related to eating out.

Moreover, the key findings uncover that secondary or higher school education considerably encourages household participation and expenditure on eating out. Thus, this research recommends that educated households be aware of the health risks associated with eating outside ready-made food. On the other hand, owning livestock significantly discourages households from spending money on restaurant visits. Hence, this study also recommends that households focus on home livestock rearing. Consequently, homemade food consumption would increase, which is healthier than eating outside meals. Besides, the government needs to expand financial support for households, engaging them in domestic production that would generate income opportunities. However, neither food safety nor healthy dieting patterns were analysed in this study. People may still be unconcerned about food safety issues and unhealthy dieting habits. Therefore, future studies should be carried out on the harmful effects of eating food prepared outside and the impact of sustainable healthy dieting practices in Bangladesh.

#### Ethical statement

This research used the BIHS 2018-19 dataset of IFPRI [21]. It is an open dataset and was downloaded in accordance with IFPRI's ethical terms and conditions of data use.

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#### Author contribution statement

Md. Rashid Ahmed: Conceived and designed the experiments; Performed the experiments; Analysed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

#### Data availability statement

Data associated with this study has been deposited at the International Food Policy Research Institute (IFPRI). 2020. Bangladesh Integrated Household Survey (BIHS) 2018-2019. Washington, DC: IFPRI [dataset]. <https://doi.org/10.7910/DVN/NXKLZJ>. Harvard Dataverse. Version 2.

#### Additional information

No additional information is available for this paper.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Annex A. . Results of multicollinearity test

**Table A1**

VIF for continuous independent variables

Explanatory (continuous) variables	VIF	
	Participation equation (N = 5604)	Consumption equation (N = 5385)
(ln) Age of Head (Years)	1.02	1.02
Family Size (Total #Members)	1.05	1.04
(ln) Total Food Expenditure (annual) (Bangladesh Taka)	1.05	1.04
Total Land Size (Hectare)	1.03	1.03

**Note:** The author estimated the VIF as in [Table A1](#) for the continuous explanatory variables used in Probit and Truncated regressions.

**Source:** Author Estimation

**Table A2**

Contingency coefficient of explanatory dummy variables

Explanatory (dummy) variables	Participation equation (N = 5604)			
	Education of Head	Employment Status of Head	Livestock Owned	Household Location
Education of Head	1			
Employment Status of Head	0.074	1		
Livestock Owned	0.046	0.365	1	
Household Location	0.033	0.010	0.036	1
	Consumption equation (N = 5385)			
Education of Head	1			
Employment Status of Head	0.075	1		
Livestock Owned	0.047	0.371	1	
Household Location	0.034	0.010	0.037	1

**Note:** The author estimated the contingency coefficients as in [Table A2](#) for the discrete (dummy) explanatory variables used in Probit and Truncated regressions.

**Source:** Author Estimation

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