Empirical Analysis of Household Food Consumption Pattern in Fata Region of Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. Author MHS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SU and KU managed the analyses of the study. Author MTA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Fata region has diverse characteristics of income and consumption than the other regions of Pakistan but no study is available in literature which address the household consumption in Fata region. To feel this gap, the study examines the impact of socioeconomic and demographic factors on household's monthly expenditure on food items in FATA region of Pakistan in 2017. Regression analysis revealed that monthly income of household head, household size, education, experience, and region significantly determined the expenditure on food commodities. Income elasticity of less than unity (0.37<1) confirmed that food commodities are necessities and supported the Engel law. Household size has positively influenced the monthly expenditure on food commodities while

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education and experience have negatively influenced the food expenditure of households. Empirical results also confirmed that households in Kurrum agency spend less on food commodities as compared to Khyber agency households.

1. INTRODUCTION

The household food consumption in Pakistan has been analyzed in empirical literature covering different aspects including time periods, scope, methodological innovation etc. The socioeconomic and demographic factors of consumption pattern are also studied in literature however; the region of FATA has been neglected mainly due to the data unavailability. In addition, the FATA region has diverse characteristics of income and consumption as compare to the other regions which need to explore in more detail. This study tries to fill this gap by using primary data. Indeed, the people self-employment preferably business on small scale and securing jobs in foreign living in FATA region has diverse income structure as the inadequate of farmland, low level of education and unavailability of proper infrastructure. Altogether these factors result in smaller contribution in government and private jobs, due to this reason the majority of the people divert to the countries especially the Middle East as unskilled workers. FATA has been merged into Khyber Pakhtunkhwa province, the government may need to investigate the consumption pattern of FATA people for the implementation of tax policy and the diverse income structure. In past FATA region is ignore and no such research on that area, and this is the primary motivation to work and explore this area.

Consumption is the daily routine practice of the life and consumer has to satisfy their wants against the limited available resources. Thus, consumption plays a significant role in daily life. Each and every person faces consumption on different activities like shelter, clothing, education, health, food, transportation etc. The most important among these is the consumption on food commodities as food is the basic necessity of all human beings. People make use of a fraction of their income on expenditure on food commodities to maximize their satisfaction. Economists defined the concept of utility as, "the satisfaction or welfare that a person achieves from different commodities subject to the budget constraint" [1,2]. Various households spend their incomes on food items in different ways known as food consumption patterns. These patterns are used to indicate their standard of living. The major factors determining food consumption pattern are household income, household size, prices, location, number of employed persons per household etc [3]. According to De Oliveira et al. [4] food consumption provide a good contribution to the total energy of actual consumption for the most main food consumed by Brazilian population.

Engel's law (Ernst Engel, 1857) explains that as the total expenditure of individual increases, the percent share of their income spent on food commodities decreases. Expenditure elasticities also known as Engel elasticities varies with a change in income of the household. Food consumption pattern is different for both rural and urban areas of Pakistan [5]. Along with income, household size is also determining the food consumption pattern. Houthakker [6] stated that as household size increases, it raises the need for different commodities. Abdulai [7] pointed out that with the household size increase, per capita demand for food commodities declines. Food consumption pattern is dynamic in nature. It changes continuously with a change in time and human needs and demographic characteristics may influence these patterns. Davis et al. [8] concluded that general education of household has no significant impact on food consumption pattern, however, nutritional knowledge of household affected the food expenditure pattern. Demographic factors such as gender, age, marital status, place of residence and employment are significant determinants of food consumption pattern [9].

In developing countries like Pakistan, expenditure on food commodities are used to indicate the living standard of the people in society [10]. Many developing countries are facing the problem of poverty. Pakistan also faces this serious problem, according to Official Pakistani Population Clock: Pakistan is the sixth largest populated country in the world. About 22.6 percent population of the country lies below the international poverty line of US $1.25 per day [11].

The objective of this paper is to analyze the consumption pattern in Pakistan for the federally administered tribal areas (FATA), which merged into Khyber Pakhtunkhwa province in 2018. FATA region is more important as compared in other parts of Pakistan because household incom is very diverse, which also determines household consupmtion. In addtiton no study has been conducted to explore household income and consuption pattern regarding this region. The area of FATA covers 27220 square kilometers adjacent with Afghan border which is 3.4 percent of total area of Pakistan. FATA consists of seven political agencies and six tribal pockets called 'Frontier Regions' (Altaf-Ullah, 2002). These agencies include North Waziristan, South Waziristan, Orakzai Agency Bajaur, Khyber, Kurram, and Mohmand agency. Whereas Frontier Regions are in the Bannu, Dera Ismail Khan, Kohat, Lakki Marwat, Peshawar and Tank districts [12].

Table 1 presents the historical population pattern obtain from census after every 10 years. However, in 2007 the census has conducted due to some official reasons. Nevertheless, the population growth is a dynamic trend, in the first 3 census population is decreasing and negative in 1981 but then increase thereafter and in 1998 and 2017. The dynamic trend of the population may have diverse implication for the consumption pattern in FATA. The living standard of households in FATA region worse. The region of FATA faces the poor infrastructure, indeed the recent military operation in this area massively distracted the infrastructure, compel people to migrate to non-war areas in order to find a secure shelter. There are numerous problems like electricity, education, roads, water etc. but the major problem among all these is the unavailability of suitable food and the high cost of transportation cost of food items. Any additional increase may also boot up prices and hence reduces the purchasing power of the people. Most of the portion of income spent on these costly food items, therefore, this paper is trying to know the consumption behavior in the FATA region.

Table 1. Population in FATA

Year	Population	% per year
1951	1332005	-
1961	1847195	3.32%
1972	2491230	2.76%
1981	2198547	-1.38%
1998	2746490	1.32%
2017	5001676	3.21%

2. MATERIALS AND METHODS

The present study was conducted in FATA, Pakistan in 2017. For this purpose, two agencies named Kurrum agency and Khyber agency were selected at random. Simple random sampling technique was used to make the sample space. A total of 500 respondents (Households) were selected as a sample size. The total population's size of Kurrum agency and Khyber Agency is 619553 and 986973 respectively. Primary data were collected through a well-structured questionnaire on consumption of various food commodity groups. The included food commodities were wheat, meat, rice, milk, vegetables, pulses, edible oil, fruits, eggs, sugar, and tea. Data were also collected on socioeconomic and demographic characteristics of the household head.

Table 2. Definition of variables

	Variable	Definition
Dependent variable	Expenditure on food items	Household monthly expenditure on food commodities measured in Rupees
	Income	Household total monthly income (total expenditure) measured in Rupees
	Household size	Total number of persons living in household measured in number of persons
	Age	Age of the household head measured in number of years
Explanatory variable	Education	Educational level of the household responsible person measured in number of years
	Experience	Experience of the household head as a responsible person measured in numbers of years
	Marital status	Marital status of household head 1 if married and 0 if single
	Employment status	Employment status of the household head 1 if employed 0 if unemployed
	Region	Region of household 1 if Kurrum agency 0 if Khyber agency

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2.1 Variables of the Study

Numerous studies used a different type of socioeconomic and demographic variables based on data availability in order to assess their impact on food consumption pattern of households. In our study, we have selected the following socioeconomic and demographic factors that can influence the household food expenditure pattern. The detail of each variable and their definition is described in Table 2.

3. MODEL SPECIFICATION

3.1 Theoretical Framework

Like Ahmad et al. [10] Rehman et al. [13] and Safdar et al. [14] the present study was also primary data. Therefore, it is assumed that all consumers/households face the constant prices of all food commodities available for use. This assumption leads us to the following food consumption function;

$$X_i = f_i (Y) \qquad (1)$$

Equation -1 postulates that expenditures on food commodity (X) by i^{th} household is the function of income of that particular household as presented by Engel. The household size was also included in the formulation of Engel function as household size is positively correlated with the household income [6]. By including household size as an explanatory variable in the model, equation (1) is rewritten as;

$$X_i = f_i (Y, HHS) \qquad (2)$$

Demographic factors may also believe to influence the household expenditure on food commodity or commodity group. These demographic attributes are household head age, gender, education, marital status, location etc. Incorporating these demographic characteristics in the Engel function extends equation (2) as;

$$X_i = f_i (Y, HHS, AGE, EDU, EXP, MST, EMST, REG) \qquad (3)$$

Where

X_i = Monthly expenditure on food commodities by i^{th} household
Y = Monthly income of household
HHS= Household size (number of persons in the family)
AGE= Age of the household head
EDU= Education of household head

EXP = Experience of household head
MST = Marital status of household head
EMST= Employment status of household head
REG = Region of household

3.2 Empirical Model

Selection of an appropriate functional form of the model is a matter of great concern. Many functional forms such as linear, quadratic, semi-logarithmic, double-logarithmic or log-log etc. have been used [15]. In our study, we have selected the log-log or double-logarithmic functional form for analysis as its interpretation is easy. Studies like [16,17,18] and [19] shows different determinants of household food consumption. The functional form of food consumption pattern presented in equation (3), is therefore expressed in mathematical form as;

$$X_i = \alpha_i + \beta_1 Y + \beta_2 HHS + \beta_3 AGE + \beta_4 EDU + \beta_5 EXP + \beta_6 MST + \beta_7 EMST + \beta_8 REG + u_i \qquad (4)$$

By taking natural log to both sides of the equation (4), the log-log or double-logarithmic form of the model was found as;

$$\ln X_i = \alpha_i + \beta_1 \ln Y + \beta_2 \ln HHS + \beta_3 \ln AGE + \beta_4 EDU + \beta_5 EXP + \beta_6 MST + \beta_7 EMST + \beta_8 REG + u_i \qquad (5)$$

3.3 Statistical Analysis

Statistical and econometric technique of ordinary least square (OLS) was applied to the double-log multiple regression [15] in order to find out the influence of socioeconomic and demographic factors on food expenditure pattern. Econometrical packages of Stata 14 was used for analysis purposes.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 3 showed the summary statistics of household's socioeconomic and demographic factors that determines monthly expenditure on food commodities in FATA region. The table showed that on average each household consumed Rs.17154.09 on food commodities out of the total monthly income of Rs. 42988.52 or more precisely, about 40 percent of total monthly income was spent on food items. On average each household consisted of 11 persons. The mean age of the household responsible person was found about 40 years. They are not well-educated and, on average their educational

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background was found to be higher secondary school. They have an experience of about 6 years in performing a role of the household responsible person. Similarly, 78 percent of household head were married and 86 percent were found to be employed.

Table 3. Summary statistics of the study variables

Variable	Mean	Std: dev	Min	Max
expenditure on food	17154.09	7068.27	5837.50	38730.00
Income	42988.52	15846.69	11500.00	78400.00
Household size	11.00	4.12	3	22
Age	40.00	10.70	20	65
Education	12.00	3.83	0	16
Experience	5.83	1.87	2	12
Marital status*	0.78	0.41	0	1
Employment status*	0.86	0.34	0	1
Region*	0.48	0.48	0	1

*Note: variables denoted with * are dummy. The rest are continuous variables*

Table 4. Monthly expenditure per household on food commodities

Group name	Items	Unit	Quantity	Rate	Food exp	% share in food exp
Wheat	Wheat	Kg	131.95	35.97	4746.24	27.67
	--	Rs.	--	--	4746.24	27.67
	Beef	Kg	2.51	265.43	665.15	3.87
	Poultry	Kg	4.17	190.34	793.72	4.63
Meat	--	Rs.	--	--	1458.87	8.50
	Rice	Kg	4.45	80.12	356.53	2.08
Rice	--	Rs.	--	--	356.53	2.08
	Milk pack	Pack	43.29	22.33	966.67	5.63
	Raw milk	Kg	11.7	65.53	766.70	4.47
Milk	--	Rs.	--	--	1733.37	10.10
	Tomato	Kg	15.39	49.22	757.49	4.42
	Potato	Kg	4.14	20.24	83.79	0.49
	Onion	Kg	15.67	40.45	633.85	3.70
	Okra	Kg	3.57	90.43	322.83	1.88
	Tori	Kg	6.41	32.88	210.76	1.23
	Egg plant	Kg	2.25	30.57	68.78	0.40
	Pumpkin	Kg	2.31	20.48	47.31	0.28
	Spinach	Kg	8.43	25.65	216.23	1.26
	Cauliflower	Kg	6.21	45.22	280.81	1.64
	Radish	Piece	4.12	10.38	42.76	0.25
Vegetable	--	Rs.	--	--	2664.61	15.55
	Lentil	Kg	0.73	144.35	105.38	0.61
	Gram	Kg	1.32	87.26	115.18	0.67
Pulses	--	Rs.	--	--	220.56	1.28
	Ghee	Kg	13.21	108.44	1432.49	8.35
	Cooking oil	Kg	5.35	143.29	766.60	4.47
Edible oil	--	Rs.	--	--	2199.09	12.82
	Grapes	Kg	2.29	86.54	198.17	1.15
	Apple	Kg	6.92	72.51	501.77	2.93
	Banana	Dozen	5.17	54.62	282.38	1.64
	Orange	Kg	5.23	48.44	253.34	1.48
	Guava	Kg	0.77	21.33	16.42	0.10
Fruit	--	Rs.	--	--	1252.08	7.30
	Egg	Egg	48.00	10.00	480.00	2.80
Egg	--	Rs.	--	--	480.00	2.80
	Sugar	Kg	22.63	55.58	1257.77	7.33
Sugar	--	Rs.	--	--	1257.77	7.33
	Tea	Kg	1.18	665.23	784.97	4.57
Tea	--	Rs.	--	--	784.97	4.57
Total	--	**Rs.**	--	--	**17154.09**	**100**

Table 5. Regression analysis of household per month expenditure on food commodities for FATA region

Variable name	Coefficient	Standard error	t-ratio	P-value
Constant	2.38	0.17	13.70	0.00
Monthly income	0.37	0.04	9.91	0.00
Household size	0.31	0.04	7.19	0.00
Age	0.00	0.00	0.36	0.72
Education	-0.01	0.01	-6.28	0.00
Experience	-0.01	0.03	-4.43	0.00
Marital status	0.01	0.02	0.77	0.44
Employment status	-0.02	0.02	-1.05	0.30
Region	-0.03	0.01	-1.82	0.07

$R^2 = 0.58$; F-statistic = 61.97; R^2 (Adjusted) = 0.57; P-value (F) = 0.00

4.2 FATA Household Monthly Expenditure on Food Commodities

Households in FATA region made their expenditure on various food groups including wheat, meat, vegetable, fruits, edible oil etc. Selected food items mentioned in Table 4 were available in market at survey time and were purchased by a household. Detail description of per household monthly expenditure on food items is given in Table 4. On average per household expenditure on food items were calculated as Rs.17154.09. Much of the expenditure (27.67 percent of total monthly expenditure) were made on wheat item followed by vegetable (15.55 percent), edible oil (12.82 percent) and milk (10.10 percent) and so on. Collectively these three commodities make a large portion (56.04 percent) of total expenditure on food commodities. Expenditure on wheat is dominating because wheat is routinely used item throughout the month. On the other hand, minimum expenditure was made on pulses items (Rs.220.56) which contributed to the total food expenditure by 1.28 percent. Contribution of each food group and their sub-items towards total monthly expenditure on food items are given in Table 4 with detail.

The results obtained from regression analysis to determine the impact of socioeconomic and demographic factors on monthly food expenditure are described in Table 5. The value of F-statistic in this model, the calculated value of F-statistic is 61.97 and is highly significant at 1% level of significance, indicated that the model is highly significant. The coefficient of determination (R^2) is 0.58, indicated that 58% changes in the dependent variable (monthly expenditure on food commodities) were explained due to the explanatory variables of the model. The analysis showed that there is a positive significant relationship between monthly income (total expenditure) and expenditure on food commodities. The estimated value of expenditure elasticity indicated that a one percent increase in total expenditure raised the food expenditure of households by 0.37 percent. Expenditure elasticity of less than unity (0.37<1) confirmed that food commodities are necessities. This value is also in line what the Engel's law says. Food expenditure was also positively influenced by the household size and found to be highly significant. One unit increase in household size leads to raising the expenditure on food items by 0.31 percent approximately. The results showed both education and experience of the household head as a highly significant factor of food consumption pattern. Education and experience are inversely correlated with expenditure on food commodities. Therefore, an additional year of both education and experience reduced the household expenditure on food items by 0.01percent. Finally, the empirical results indicated that expenditure on food commodities are significantly different in both Kurrum and Khyber agency. The estimated value of region showed that on average as compared to Khyber agency households, Kurrum agency households spent 0.03 percent less on food commodities.

5. CONCLUSION

The study examines the socioeconomic and demographic factors on household expenditure on food items in FATA region of Pakistan. For this purpose, primary data were collected from 500 households through a well-designed questionnaire and on average each household spent Rs.17154.09 out of a total monthly income of Rs.42988.52 on food commodities. Wheat is a dominant item as each household spent 27.67 percent of total expenditure on food commodities. Other food items including vegetables and edible oil collectively possess a large portion of the total expenditure of

household on food commodities. The results also show that household monthly income, household size, education of household head, the experience of household head and region have considerable influence on monthly food consumption pattern in FATA region. Household monthly income and household size have positively affected the pattern whereas education and experience have negatively influenced the food consumption pattern. Further, it is also concluded that in both Kurrum and Khyber agencies the food consumption pattern is different from each other. The empirical results depict that 37% of increased income is spending on food consumption purposes. Therefore, it is suggested that in order to enhance the standard of living, the government should raise household's monthly income or control the prices of food items. The results also confirmed that education has an inverse relationship with food consumption pattern. It is, therefore, necessary for the government to adopt such policies by which the educational position of people should increase in order to minimize the expenditure on food items consumed.

CONSENT

As per international standard or university standard written participant consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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