Research Article

An Investigation into Food Consumption Patterns and Related Poverty in District Mardan, Khyber Pakhtunkhwa, Pakistan

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Abstract | The main theme behind this research work is to describe the food consumption patterns of households and estimate the related poverty line based on daily calories intake in district Mardan, Khyber Pakhtunkhwa-Pakistan. The average total household size is 5.75 that consist of 1.89 children (32.95%), 3.72 adults (64.69%) and 0.125 (2.17%) aged person (≥60 years). Based on calorie requirement at various stages of age of a person, an adult equivalent has been calculated as 5.271of actual household size 5.75. The results reveal that on average an adult equivalent consumed 243.48 gm flour, 142.86 gm meat, 249.19 gm vegetables, 74.04 gm of rice, 81.99 gm of pulses, 42.24 gm fats, 77.02 ml milk, 54.66 gm of sugar, 29.81 gm tea and 149.07 gm total fruits daily. In the study area an adult takes 2647.66 calories from the daily food consumption representing a positive figure which is more than the recommended calories of 2350. The estimated poverty line (1.13) based on daily food consumption patterns shows that the people in the study area, on the average, are above the poverty line.

Introduction

The status of the food consumption of a population is very necessary in estimating its effects on the health and supports of the public health policy decisions (Neufeld and Tolentino, 2012). Nationwide dietary surveys directly measures individual food consumption with appropriate collection instruments such as 24 hours recalls or food records (Fielder *et al.*, 2012). Conversely, these techniques are difficult in low income and middle income countries (Gibson, 2005). In the absence of these kind of surveys, the researchers have been dependent on the data of food purchase to conclude the data of food consumption. The surveys of household budget have also been conducted to occasionally in many countries and generally collected information regarding the amount and price of all the food commodities by the members of household throughout the defined period.

The household living in rural and urban areas make expenditure on different commodities to achieve utility and satisfaction. The expenditure on food commodities and substances are most important in the household performance, as food is known as basic nutritional constituent for the health of every human being. Therefore, in the examination of consumer behavior the food consumption is said to be the expenditure made by the consumer on different food commodities, which he purchases to meet the daily food needs. It is observed that people sustained expenditure on food items like, wheat, rice, vegetables, fruits, meat and such other kitchen items. The consumption of these food items of any household is generally the function of income of household, price of commodities, taste of the consumers and some other factors. Consumption function establishes relationship between consumption and real disposable income of the consumer treating other factors constant.

Consumption expenditure on food commodities are used to indicate the living standard of the household in a developing country like Pakistan. The food expenditures and consumption patterns are also used to measure the poverty level in the country. Consumption expenditure also sustained upon the non-food items including electricity, clothing, furniture, housing, transport and education etc. to facilitate the several aspects of human life. Therefore, the analysis of the consumption expenditure and consumption patterns provides an insight into status of human resources of a country. Therefore, consumption analysis of food at rural urban basis explains the differences among regions in the country and provides the rational for future investment planning decisions in the country.

Many studies and researches have been conducted at regional, national and international level to estimate/ find out the poverty line based on food consumption patterns, expenditures *etc*. Keeping the same central theme in mind the current study has been conducted in district Mardan to achieve the following objective:

1. To find out the structure and composition of households in the study area.
2. To evaluate the weekly consumption patterns of essential food items by the respondent households.
3. To estimate the daily calories intake based on daily consumptions of the essential food items.
4. To calculate the poverty line based on calories intake.
5. And to recommend policy prescriptions based on findings of the study.

Materials and Methods

Step wise procedures were applied to make the research fruitful and accurate. This section of the report normally deals with the tools and methodologies that would be adopted for the analysis of raw data.

Research site

District Mardan (the second largest city of Khyber Pakhtunkhwa, Pakistan) has been selected for the collection of data. A sample of 100 households was selected via simple random sampling method. The data has been collected on food consumption patterns/ expenditure. For this purpose the lady in-charge of the household was interviewed. A predesigned questionnaire was scheduled for data collection including questions regarding household size, household structure, education and income level, quantity, price and value of the food commodities consumed by the household in the last week.

Analysis of Data

The raw data was analyzed using a computer soft package SPSS. Composition of actual household size along with descriptive statistics (mean, standard deviation, minimum, and maximum) was estimated and the details are presented in Table 1.

Table 1: *Household composition by age.*

Descriptive Statistics					
Particulars	Age	Mean value	Standard Deviation	Mini- mum	Maxi- mum
Household Size	40	5.75	2.03	3	12
Children below 5 years	40	0.57	0.74	0	2
Children 5-10 years	40	0.75	0.7	0	2
Children 11-15 years	40	0.575	0.81	0	3
Adults: 16-60	40	3.72	1.98	2	9
Aged: above 60	40	0.125	0.463	0	2

Source: *Survey data.*

Data on the consumption of food items were taken on weekly basis from the entire households. The data was then converted into food consumption patterns per capita per day. For this purpose the actual household size (5.75) was transferred into adult equivalent (5.271). The adult equivalent was estimated on the

basis of actual household size and the calorie requirements for the people of different ages (Table 2). The whole process for data transformation (*i.e.* food consumption per capita per day in grams) took place with the help of the following formula (Karim *et al.*, 2018).

$$FPCPD(gms) \frac{FPHPW}{5.271 \times 7} \times 1000$$

Where;
FPCPD: Food consumption per capita per day in gram; FPHPW: Food consumption per household per week in kilogram; 5.271: Adult Equivalent; 7: Number of days in a week.

While multiplying the equation with 1000 means to convert food consumption items in to grams from kilograms.

The study was compared with the two other studies conducted by the Federal bureau of statistics Islamabad at national level of household integrated economic survey during 2013 for the year of 2010-11 and 2011-12.

The food consumption per capita per day was then converted into calorie intake estimates by employing calorie content in per 100 grams of different food items (Table 7). For determining the poverty line, calories estimates were used by using the following formula (Karim *et al.*, 2018).

$$Poverty\ Line\ (PL) = \frac{Daily\ calorie\ intake}{2350}$$

According to government of Pakistan, poverty line is the level of income or expenditure per capita per day which ensures the availability of basic food items for the provision of 2350 calories for an adult equivalent (CRPRID-2002). Hence a person is considering being poor if he/she takes food per day that provides him/her equal or less than 2350 calories. If a person consumes 2350 calories daily will be on poverty line and his PL will be equal to 1. If the PL is less than 1 then the person will be considered below the poverty line and if PL is greater than 1 the he would be fall in a category of above poverty line.

Results and Discussion

Household size and composition
Data of Table 1 shows that the average size of the households in the target area is 5.75 comprising children (≤15 years), adults (16-60 years) and aged people (≥60 years).

The above data shows the estimated minimum and maximum household size for the current study as 3 and 12 respectively. The mean is 5.75 and the standard deviation is 2.06. The total household size (5.75) consists of 1.89 children (32.95%), 3.72 adults (64.69%) and 0.125 aged people (2.17%). The data presented in the above table was then converted into adult equivalent. This conversion was done on the basis of calorie requirement (Table 2) which was needed at different stages of the age of a person.

Table 2: *Daily per capita calorie requirement by age and sex.*

Age (in Years)	Male	Female
Children Below 5 years	1304	1304
Children from 5-9 years	1768	1768
Children from 10-14 years	2816	2464
15-19	3087	2322
20-39	2760	2080
40-49	2640	1976
50-59	2460	1872
60+	2146	1632

Source: *Adopted from CRPRID (2002), Pakistan Human Condition Report, Center for Research and Poverty Reduction and Income Distribution, Pak Secretariat, Islamabad, p. 79.*

Table 2 shows that the children from 01-04 years requires 1304 calories per day, which estimates 0.55 of the calorie requirement of an adult (2350). Likewise, children from the age of 05-09 require 1768 calorie energy per day for the normal growth which estimates 0.75 of the adult calorie requirement. Children from 10-14 years required 2640 calorie energy per day in which 2816 calories needed for male and 2464 calorie energy is essential for female. According to research carried out, people from the age of 15 to the age of 59 are considered as adult who require 2350 calorie on daily basis for their normal growth. For the aged people above 60, the average calorie requirements for a male is 2146 and female is 1632, and the average of these two estimates at 1889 or 0.80 of that of adults.

Based on the above mentioned fractions, the actual household size (5.75) presented in Table 1 has been converted into its adult equivalent (5.27) as can be seen from Table 3.

Food consumption

The data, concerning various food consumption commodities, were collected on weekly basis, which are consumed by the entire family per week and then converted into means while using the statistical package SPSS (Table 4).

Table 3: *Actual household size converted to adult equivalent.*

Composition	Actual Strength	Weight (Convert to adult equivalent)	Adult-equivalent
Children below 5 years	0.57	0.55	0.3135
Children 5-10	0.75	0.75	0.5625
Children 11-15	0.575	1	0.575
Adult 16-60	3.72	1	3.72
Aged: Above 60	0.125	0.8	0.1
Household Size	5.75		5.271

Source: *Survey data.*

Table 4: *Food consumption per household per week in kg.*

Particulars	Consumption per household per week (kg)	Particulars	Consumption per household per week in (kg)
Flour	9.8	Mash Dal	0.75
Beef	2.1	Dal Chana	0.75
Mutton	0	Masur Dal	0.3
Poultry	3.65	Total Pulses	3.3
Total Meat	5.75	Ghee	1
Tomato	2	Cooking Oil	0.7
Onion	1	Total Fat	1.7
Garlic	0.21	Raw Milk	3
Tori	0.32	Milk Pack	0.1
Potato	2	Total Milk	3.1
Pumpkin	1.5	White Sugar	1.5
Ladyfinger	1.5	Brown Sugar	0.7
Brinjil	0.5	Total Sugar	2.2
Cauliflower	0.5	Black tea	0.8
Karela	0.5	Green tea	0.4
Total Vegetables	10.03	Total Tea	1.2
Kernal Rice	0.08	Apple	1.5
Sela Rice	1.15	Mango	1
Mota Rice	0.25	Banana	2.5
Kainat Rice	1.5	Guava	1
Total Rice	2.98	Total fruits	6
Red Bean	1.5		

Source: *Survey data.*

Figure 1 describes the diagrammatical representation of Table 4. The graph clearly shows and compares the consumption of different food items by the households in target area.
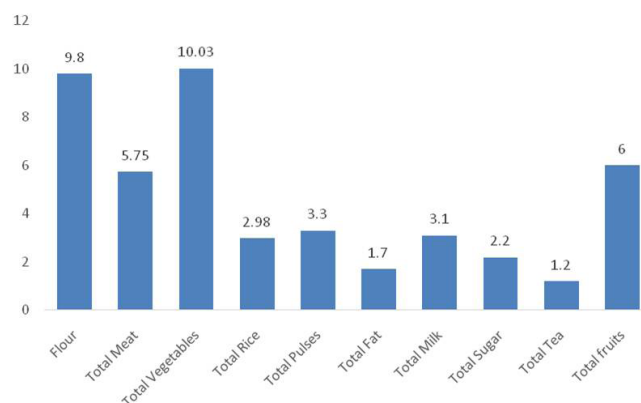

Figure 1: *Food consumption per household per week in kg.*

The data presented in Table 4 (averages household food consumption per week) was further converted into food consumption per capita per day with the help of the following formula (Karim *et al.*, 2018).

$$FPCPD(gms) = \frac{FPHPW}{5.271 \times 7} \times 1000$$

In the above formula FPCPD stands for food consumption per capita per day in grams whereas FPHPW stands for food consumption per household per week in kilogram. 5.271 stands for adult equivalent while 7 shows number of days in a week. The above formula was multiplied by 1000 to convert the food consumption items from kilogram to grams.
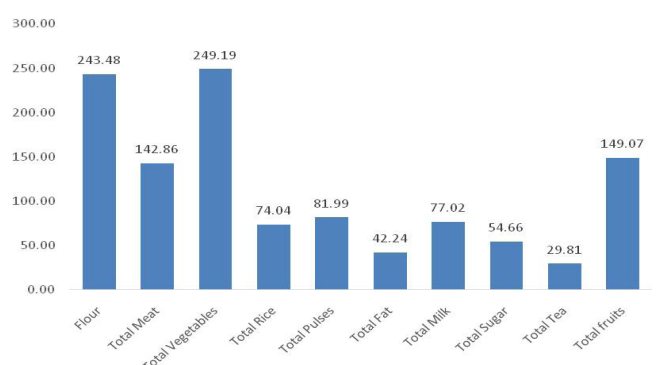

Figure 2: *Food consumption of major food commodities per capita per day (gm).*

According to the data given in Table 5 the daily food commodities consumed by an adult equivalent are 243.48 g flour, 142.86g meat, 249.19 g vegetables, 74.04 g rice, 81.99 g pulses, 42.24 g fats, 77.02 ml milk, 54.66 g sugar, 29.81 g tea and 149.07 g fruits.

Table 5: *Food consumption per capita per day in grams.*

Particulars	Consumption per household per week in kg	Consumption per household per day in gm	Particulars	Consumption per household per week in kg	Consumption per household per day in gm
Flour	9.8	243.48	Dal e Mash	0.75	18.63
Beef	2.1	52.17	Dal e Chana	0.75	18.63
Mutton	0	0.00	Dal e Masur	0.3	7.45
Poultry	3.65	90.68	Total Pulses	3.3	81.99
Total Meat	5.75	142.86	Ghee	1	24.84
Tomato	2	49.69	Cooking Oil	0.7	17.39
Onion	1	24.84	Total Fat	1.7	42.24
Garlic	0.21	5.22	Raw Milk	3	74.53
Sponge guard	0.32	7.95	Milk Pack	0.1	2.48
Potato	2	49.69	Total Milk	3.1	77.02
Pumpkin	1.5	37.27	White Sugar	1.5	37.27
Ladyfingers/okra	1.5	37.27	Brown Sugar	0.7	17.39
Brinjil	0.5	12.42	Total Sugar	2.2	54.66
Cauliflower	0.5	12.42	Black tea	0.8	19.88
Bitter guard	0.5	12.42	Green tea	0.4	9.94
Total Vegetables	10.03	249.19	Total Tea	1.2	29.81
Kernal Rice	0.08	1.99	Apple	1.5	37.27
Sela Rice	1.15	28.57	Mango	1	24.84
Mota Rice	0.25	6.21	Banana	2.5	62.11
Kainat Rice	1.5	37.27	Guava	1	24.84
Total Rice	2.98	74.04	Total fruits	6	149.07
Red Beans	1.5	37.27			

Source: *Survey data.*

The table reveals that 142.86 g total meat comprises 52.17 g beef and 90.68 g poultry. Out of total 249.19 g vegetables contains 49.69 g tomato, 24.84 g onion, 5.22 g garlic, 7.95 g sponge guard, 49.69 g potato, 37.27 g pumpkin, 37.27 g ladyfingers/okra, 12.42 g brinjil, 12.42 g cauliflower and 12.42 g bitter guard. Total rice of 74.04g comprises of Kernal rice 1.99 g, sela rice 28.57 g, mota rice 6.21 g and kainat rice 37.27 g. The total 81.99 g total pulses contain 37.27 g red bean, 18.63 g dal mash, 18.63 g dal chana and 7.45 g masur dal. It is also clear from the tabular data that the 24.84 g ghee and 17.39 g cooking oil are included in 42.24 g total fat whereas 77.02 g total milk includes 74.53 g raw milk and 2.48 g milk packs. The 54.66 g total sugar contains 37.27 g white sugar and 17.39 g brown sugar. The 29.81 g total tea is comprised of 19.88 g black tea and 9.94 g green tea. Last but not the least the group of total fruits consumption that sums up 149.07 g containing 37.27 g apple, 24.84 g mango, 62.11 g banana and 24.84 g guava.

Comparison of the current study with the survey conducted at national level

Furthermore the results of the current study have been compared with the surveys conducted at national level in Pakistan during 2010-11 and 2011-12 and are presented in Table 6.
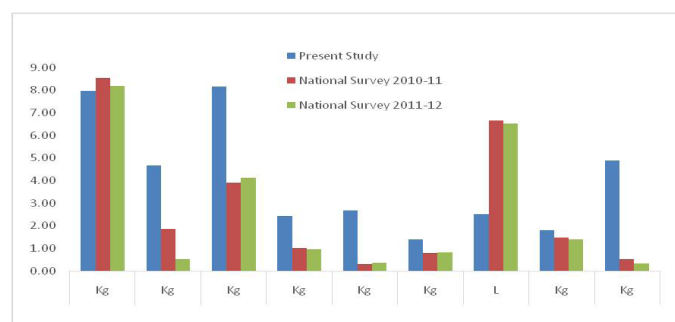

Figure 3: *Comparison of the study with survey conducted at national level.*

To make the comparison easy and clear the data of the current study, based on household consumption patterns, has been converted into consumption per

capita per month as has been presented in the national survey. The Table 6 reveals that the flour consumption per capita per month is slightly less than in the present study as compared to surveys performed in 2010-11 and 2011-12. The other food consumption items such as meat, vegetables, rice, pulses, fats, sugar and fruits were consumed more by per capita per month in the present study as compared to 2010-11 and 2011-12. The meat consumption in the present study is 4.58 whereas in 2010-11 and 2011-12 it was 1.85 kg and 0.51 kg respectively. According to the survey conducted at 2010-11 and 2011-12 the total vegetables 3.89 kg and 4.12 kg were consumed per capita per month whereas in the present study it was 8.16 kg. The rice consumption is 2.42 kg per capita per month in the present study while in the 2010-11 it was 1.02 kg and in 2011-12 it was 0.95 kg. The milk consumption in the present study is very low *i.e.* 2.52 L as compared to 2010-11 and 2011-12 which was 6.65 L and 6.52 L respectively. In the same way 4.88 kg fruits consumption was recorded in the present study whereas 0.52 kg and 0.32 kg fruits consumption was noted in 2010-11 and 2011-12 surveys respectively. Similarly, the total sugar consumption was recorded as 1.79 kg in the present study while in 2010-11 and 2011-12 surveys it was 1.47 kg and 1.39 respectively.

Table 6: *Food consumption per capita per month (FCPH–PW/5.271*7)1000.*

Particulars	Unit	Present Study	National Survey 2010-11	National Survey 2011-12
Flour	Kg	7.97	8.53	8.18
Total Meat	Kg	4.68	1.85	0.51
Total Vegetables	Kg	8.16	3.89	4.12
Total Rice	Kg	2.42	1.02	0.95
Total Pulses	Kg	2.68	0.31	0.36
Total Fat	Kg	1.38	0.8	0.81
Total Milk	L	2.52	6.65	6.52
Total Sugar	Kg	1.79	1.47	1.39
Total fruits	Kg	4.88	0.52	0.32

Source: *Pakistan Bureau of Statistics 2010-2011 and 2011-12.*

Food consumption, calorie intake and poverty
The data regarding calorie intake from the food consumption per capita per day are presented in Table 7. It is clearly observed from all the figures how much each food item provides the respective calories to the consumers.

Table 7: *Estimated calorie per capita per day.*

Particulars	Food consumption per household per day	Calories per 100 grams of food weight	Estimated Calorie per capita per day
Flour	243.48	349	849.74
Beef	52.17	212	110.61
Mutton	0.00	178	0.00
Poultry	90.68	185	167.76
Total Meat	142.86	191.667	273.81
Tomato	49.69	20	9.94
Onion	24.84	41	10.19
Garlic	5.22	149	7.77
Tori	7.95	19	1.51
Potato	49.69	81	40.25
Pumpkin	37.27	35	13.04
Ladyfinger	37.27	31	11.55
Brinjil	12.42	25	3.11
Cauliflower	12.42	25	3.11
Karela	12.42	19	2.36
Total Vegetables	249.19	44.5	110.89
Kernal Rice	1.99	364	7.23
Sela Rice	28.57	364	104.00
Mota Rice	6.21	364	22.61
Kainat Rice	37.27	364	135.65
Total Rice	74.04	364	269.50
Red Bean	37.27	350	130.43
Mash Dal	18.63	363	67.64
Dal Chana	18.63	357	66.52
Masur Dal	7.45	354	26.39
Total Pulses	81.99	356	291.88
Ghee	24.84	900	223.60
Cooking Oil	17.39	880	153.04
Total Fat	42.24	890	375.90
Raw Milk	74.53	106	79.01
Milk Pack	2.48	106	2.63
Total Milk	77.02	106	81.64
White Sugar	37.27	391	145.71
Brown Sugar	17.39	310	53.91
Total Sugar	54.66	350.5	191.58
Black tea	19.88	290	57.64
Green tea	9.94	300	29.81
Total Tea	29.81	295	87.95
Apple	37.27	58	21.61
Mango	24.84	64	15.90
Banana	62.11	108	67.08
Guava	24.84	78	19.38
Total fruits	149.07	77	114.78

Source: *Survey data.*

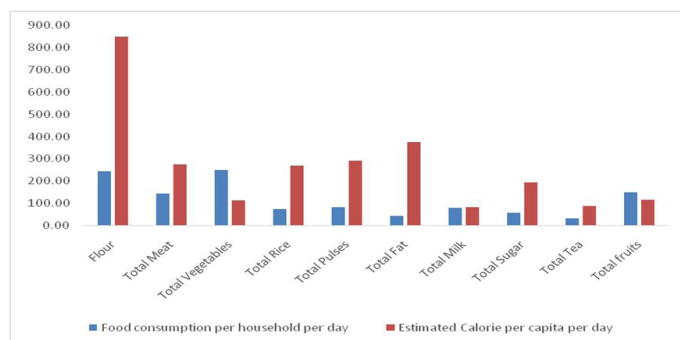**Figure 4,** represents the graphical presentation of the data given in Table 7.

Figure 4: *Per capita estimated daily food consumption and the estimated calorie.*

Calorie intake and poverty line

It has been reported that an adult person needs 2350 calories for his/her normal and healthy life. The standard of 2350 calorie energy is also used to determine whether a person in on, below or above the poverty line. For this purpose we used the following formula (Karim *et al.*, 2018).

$$Poverty\ Line\ (PL) = \frac{Daily\ calorie\ intake}{2350}$$

Many studies reveal that if PL is greater than 1 then the person is considered to be above the poverty line. If PL is equal to 1 then the person is on the poverty line and if PL is less than 1 then the person is below the poverty line. Using the given poverty line formula we calculate the poverty line for the average calorie intake of the current study.

Based on the analysis carried out the daily calorie intake in the study area has been observed as 2647.66. Putting this value (2647.66) in the mentioned formula (for poverty line) we obtained the following results for the target area.

$$Poverty\ Line\ (PL) = \frac{2647.66}{2350} = 1.13$$

Based on the obtained result for determination of poverty line (PL = 1.13) in the target area we conclude that the surveyed respondents are above the poverty line.

Conclusions and Recommendations

This study shows per capita food consumption patterns and related poverty in District Mardan, KP

Province of Pakistan. The average total household size is 5.75 which is comprising 1.89 children (32.95%), 3.72 adults (64.69%) and 0.125 aged (2.17%). Using calorie requirement at various stages of age of a person an adult equivalent has been estimated as 5.27 of actual household size (5.75). It has also been estimated that on average an adult equivalent consumed total of 243.48 g flour, 142.86 g meat, 249.19 g vegetables, 74.04 g rice, 81.99 g pulses, 42.24 g fats, 77.02 g milk, 54.66 g sugar, 29.81 g tea and 149.07 g fruits daily.

For comparison purpose the weekly data of the current study has been converted into monthly consumption patterns. By comparing the results, with those of the surveys conducted by the government of Pakistan in 2010-11 and 2011-12 at national level, show that the flour consumption per capita per month is slightly less in the present study as compared to surveys performed in 2010-11 and 2011-12. The consumption of other food items such as meat, vegetables, rice, pulses, fats, sugar and fruits were observed comparatively more in the present study as compared to 2010-11 and 2011-12. The meat consumption in the present study is 4.58 kg whereas in 2010-11 and 2011-12 it was estimated at 1.85 kg and 0.51 kg respectively. The milk consumption in the present study is very low (i.e. 2.52 L) as compared to 2010-11 and 2011-12 which was recorded as 6.65 L and 6.52 L respectively. Similarly total fruit consumption of 4.88 kg was recorded in the present study whereas 0.52 kg and 0.32 kg was noted in 2010-11 and 2011-12 surveys.

Based on daily food consumption patterns and calories intake, the poverty line has been estimated as 1.13 indicating that the respondents of the surveyed area, on the average, are above poverty line.

On the basis of the conclusion drawn, it is recommended that a similar study should be replicated to further reinvestigate the research findings with larger sample size as well as data collection techniques should be improved. The comparison with national survey shows that in most of the cases, food consumption has reduced due to price hike, so it is suggested that actions should be taken to either stabilize the prices by subsidizing the major food items or to increase the monthly incomes of households to help them increase food consumption.

Novelty Statement

The international poverty line is a monetary threshold under which an individual is considered to be living

in poverty. The poverty lines thereafter, updated for the current study.

Author's Contribution

Robina Karim: Main manuscript writing and data analysis.

Farhan Ali and Ali Muhammad: Data collection and questionnaire preparation.

Nasrullah: Data analysis and figures formation.

Azra: Tables formation and refining of reports.

Tahir Mehmood: Data analysis and format setting.

Conflict of interest
The authors have declared no conflict of interest.

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