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### Food Security and Vivacious Circle of Poverty Among Rural Households in Pakistan

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#### ABSTRACT

Food security and poverty are interrelated as well as important factors for determining the household's development. We conducted this study in District Muzaffargarh of Punjab Province to analyze the food security and poverty nexus. District Muzaffargarh was selected purposively as a study area because it is food insecure and the poorest district in the Punjab province. The sample was selected using a multistage random sampling technique. A total of 349 respondents were selected from 8 villages. This study was quantitative. Data were analyzed using descriptive statistics, correlation, cost of calorie method, FGT poverty index and logit regression. Results indicated that agriculture was a profound source of income and a heft dependency of families was seen attached to agriculture. This can be deduced that food security in the study area was directly associated with agricultural growth. The majority of the respondents in the study area were food insecure, especially in terms of food accessibility and utilization. The majority of constituents of the sample were poor as their expenditures were found to exceed their earnings. As result, the families were trapped in the vivacious circle of poverty. Households had no proper coping strategies or safety nets to confront poverty and achieve food security. This study established that food insecurity was mainly caused by persisting poverty. Thus, eliminating poverty among households through governmental efforts, subsidies, technical support, training, skill development opportunities and microfinance loaning to initiate micro-level businesses.

#### INTRODUCTION

Food security is the state when all the people in the community have physical, social and economic access to adequate, secure and nourishing food to meet nutritional requirements (World Food Summit, 2003). Food security has remained an extensive and multidimensional concept which is comprised of all the issues from food access to food supply (Iram and Butt, 2004). Food insecurity is a dilemma that is tainted by many world organizations as well. It is initially focused on Millennium Development Goals (MDGs) 2015 agenda in expressions to wipe out poverty and starvation and after that, it is in the same way addressed in the sustainable development goals 2030 agenda. To classify whether the state is either in a social context and economically developed or not, the food security analysis is an accurate marker. The factors that are causing food insecurity are more complex today than in

the previous decade, especially economic factors. The present challenges that cause hindrances from achieving food security are price instability, uncertainties in the financial market, nutritional requirements, unbalanced food preferences and climate change (Naylor, 2011). Similarly, the prices of food items continue to increase in world markets with a high level of fluctuations. This tenacious situation increases the concerns for the world food economy to provide food to billions of people in future (WHO, 2016).

Poverty has been a multidimensional event which interrupts not only the purchasing power but also disturbs the susceptibility to several strains that may stop a person from enjoying a healthy life. This susceptibility is measured by livelihood patterns such as services, housing, education and health. It is imperative to observe differences in gender concerning poverty, susceptibility and living expenses, and to have an

understanding of the reasons for these differences so that strategies could be prepared for poverty reduction (UNDP, 2019). Poverty convergence has long been a significant problem for emerging countries. Despite significant increases in wealth, the problem of poverty has become more widespread in Asia over time (Khan and Shah, 2020). For the past few years, poverty has just changed from a unidirectional causality from economic to a multilayered spectrum, allowing for a range of basic and numerical elements to be considered (Khan et al., 2014). Instead, an increase in wealth does not guarantee a reduction in the scale of poverty as a result of many social and economic aspects in society (Vijaya et al., 2014). Many agricultural extension programs have been initiated one after the other for the improvement of the community. These programs were mainly aimed at empowering a sense of self-help and persuading community towards the better living condition through assistance and participation in the development programs (Davidson et al., 2001). Although, those programs had limited impacts as reported by Ashraf et al. (2019). They argued that the different programs of community development failed one after the other with meagre impacts of poor coordination, political involvement, scanty participation of local people in the planning of programs and misuse of funds.

Of the determinants of poverty, budget deficiency, expenditures and unemployment had a significant impact on the poverty situation. This implies that with the increase in expenditure and unemployment poverty is likely to increase (Ali and Ali, 2018). Kamran et al. (2014) pointed out that unemployment in rural areas was higher as compared to urban areas where people have more chances of employment due to industrial expansion. In rural areas, the major income source remains crop and livestock farming which seems the more important tool for employment generation and poverty alleviation. It is evident from the statistics that agriculture contributed 22.7% to the national GDP and provided employment to around 34% of the people (Government of Pakistan, 2022). Over the years, the engagement of people with agriculture is decreasing, giving rise to an inclination towards non-farming income sources perhaps as a strategy to cope with unemployment, and poverty and achieve food security. Non-farm income had a significant positive influence on agricultural productivity (Rashidin et al., 2020). Households' revenue sources change in routine, particularly in rural areas, which suggests that

non-farm income has importance in rural areas in terms of income generation (Abdallah et al., 2019). This points to the need to analyze the poverty and food security nexus in rural areas to outlay their strategies to cope with prevailing poverty and food insecurity. This is deemed important for the reason that over 40% of households in Pakistan are poor and facing food shortages (Khalid et al., 2005). This situation may be worsened in the Areas of the Punjab province like district Muzaffargarh, which is termed as the poorest among total districts of the Punjab province. The socio-economic conditions of the people in Muzaffargarh are not in a good state. Cheema and Khawaja (2010) have reported a poverty rate of 50.8% in District Headquarters Muzaffargarh. The major concern of this study was to explore food security, and poverty in the District Muzaffargarh, using a quantitative approach, cost caloric method, and poverty analysis approach.

#### **METHODOLOGY**

This research was quantitative following a survey-based research design. Of the total districts of the Punjab, provinces, this study was conducted in the purposively selected District Muzaffargarh because it is the poorest and food insecure district of Punjab (Suleri and Haq, 2009; UNDP, 2016). All the heads of households of district Muzaffargarh were the population of the study. The heads of household were the respondents of the study. A multistage sampling technique was used to select the sample from the targeted population. District has total four tehsils (Muzaffargarh, Ali Pur, Jatoi, Kot Adu) and two tehsils (Ali Pur and Muzaffargarh) were selected using simple random sampling technique. Similarly, two rural union councils were selected from each selected tehsil randomly. From each selected union council, two villages were selected at random. The total number of households in the eight selected villages was 3819. The number of households was calculated from the lists of villages available at the Union council's offices. The sample size 349 was determined using online sample size calculator [www.surveysystem.com](http://www.surveysystem.com) keeping 95% confidence level and confidence interval at 5. A structured, validated and reliable questionnaire was used for the data collection. Data were collected through face-to-face interview technique. Collected data were then analyzed using descriptive statistics, cost of calorie method, FGT index (Foster Greer Thorbecke) and logit regression.

**Cost of calorie method**

This method was used to estimate food security status in the study area. Food is available in the markets but affordability is the main cause of nutritional food insecurity. Using this method, the food insecurity line is given as;

$$LNx = \alpha + bC \tag{1}$$

Where; X = is the adult equivalent food expenditure (in Rupees), and,

C = is the actual calorie consumption/adult equivalent of a household (in kcal). The calorie content of the recommended minimum daily nutrient level (L) (FAO, 2012) was used to determine the food insecurity line (s) using the equation:

$$S = e(a+bL) \tag{2}$$

Where, S = the cost of buying the minimum calorie intake (food insecurity line), a & b = parameter estimates from equation (1);

L = recommended minimum daily energy (calorie) level (2350 calories) Based on the S calculated, households will be classified as food secure or food insecure, depending on which side of the line they fall.

**Poverty analysis**

The FGT index (Foster Greer Thorbecke) was used to determine the poverty status of households and was represented using descriptive statistics. It is computed with the mathematical formula stated below:

$$FGT_{\alpha} = \frac{1}{N} \sum_{i=1}^Q \left(\frac{Z-Y_i}{Z}\right)^{\alpha} \tag{1}$$

Where; Z = poverty line

$$Poverty\ Line = \frac{1}{2} (\sum HI) / n \tag{2}$$

$\sum HI$  = Summation of household income,

n = total sample,

Q= the number of poor,

Y = average household monthly per capita expenditure,

$\alpha$  = poverty index which takes the value of 0, 1 and 2

1. When  $\alpha = 0$ , the poverty index (PID) becomes the Head Count Ratio or Poverty Incidence Index (HCR or PII) i.e. the proportion of people below the poverty line. It is used to determine the number of households having per capita income below the poverty line. It is stated as  $Po = H/n$ . where H is the headcount. The PII (P0) gives the prevalence of poverty at a point in time.

2. When  $\alpha = 1$ , PID becomes the Poverty Gap Index (PGI) i.e. the aggregate shortfall in the income of the household from the poverty line. It measures the difference between actual income and minimum non-

poverty income. The proportion of the poverty line (value) that the average poor requires to meet the poverty line; the lower the value, the lower the poverty gap. The PGI (P1) gives the depth of poverty at a point in time.

**The binary logistic regression model**

Binary logistic regression model was used to measure the relationship between food security and the poverty status of the household.

The logistic curve which relates the independent variable X (Poverty) to the dependent variable (Food Security) can be written as;

$$P = \frac{e^{a+bX}}{1 + e^{a+bX}}$$

Where P is the probability of a 1, e is the base of the natural logarithm and a and b are the parameter of the model. The value of a yield P when X is zero and b adjusts how quickly the probability changes with changing X a single unit. Moreover, because the relation between X and P is non-linear, b does not have a straightforward interpretation in this model.

In Logist regression, the dependent variable is a logit, which is the natural log of the odds i.e.

$$\log(odds) = \text{logit}(P) = \ln\left(\frac{P}{1-P}\right)$$

If P is the probability of risk factor, then the probability of otherwise is  $1 - P$ .

Then P can be defined as

$$P = \frac{1}{1+e^{-z}}$$

$$1 - P = 1 - \frac{1}{1+e^{-z}}$$

Then

$$\frac{P}{1-P} = e^z$$

Taking log of the both sides of the equation

$$L_i = \ln\left(\frac{P}{1-P}\right) = z$$

Where

$L_i$  = the log odd ratio which is also referred as the logit

$$z = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n$$

Where Y = is a binary variable defined as 1 if the household is food secure and 0 if Otherwise

$\beta_1 - \beta_n$  = Logistic regression coefficients

$X_1$  = Poverty status : ( Poor =1, 0 otherwise)

## RESULTS AND DISCUSSIONS

### Demographic attributes of respondents

Table 1 shows that 12.9% of respondents have aged less than 3 years and slightly more than one-fifth (21.5%) of respondents were aged between 31-40 years. Of the total respondents, 34.7% of respondents were aged 41-50 years and 22.9% were aged 51-60 years. This is deduced from the results young individuals have less inclination towards income-generating activities like agriculture which is the income source for more than half of respondents in the study area. Perhaps, the old age people are involved in agriculture and other income-generating activities. This age division might have harmed technological advancement which could have fostered the food production process. Results regarding the educational level of the respondents show that 33.2% of the respondents had primary to middle and 22.9% had matriculation level of education. One-fifth (20.6%) of the respondents were illiterate, whereas 17.1% were educated up to primary and only 6.2 % of the respondents had their education between middle to matriculation. One of the reasons for the poor educational level was the persistence of poverty and limited access to the basic facilities in the study area. As for as a source of income was concerned, 51.6% of the respondents were dependent on the agriculture sector either in the form of raising crops or keeping livestock

and fish farming. Out of the total respondents, 16% were reliant on business and other livelihood ways like remittances/small industry as their sources of income and 14.9% of the respondents were doing some kind of other business. One in ten respondents was dependent on a job followed by 8.3% of respondents who had both job and agriculture dependence to generate income.

Regarding marital status majority (70.8%) of the respondents were married while 13.8% of respondents were widowed and one-tenth (10%) of the respondents were single. Only 5.4% of respondents were divorced. The reason for the majority of respondents being married is that data were collected from the head of households and most of them lie between the ages of 31-60.

Data regarding family size shows that nearly half (44.4%) of the respondents had 6-10 members in their family. More than one-third (39.3%) of the respondents had a family size of fewer than 5 members and only 16.3% had more than 10 members in their family. This implies that there were considerably more or less large families in the study area. It was observed that for most of the cases entire family was involved in the farm operations. Especially women had a prominent role in the study area in practicing farming along with their male counterparts.

Table 1. Frequency distribution table of demographic attributes of respondents.

Characteristics	Frequency	Percentage (%)
<b>Marital Status</b>		
Single	35	10.0
Married	247	70.8
Divorced	19	5.4
Widowed	48	13.8
Total	349	100.0
<b>Age</b>		
Below 30 years	45	12.9
31-40 years	75	21.5
41-50 years	121	34.7
51-60 years	80	22.9
Above 60 years	28	8.0
Total	349	100.0
<b>Family size</b>		
Upto 5	155	39.3
6-10	137	44.4
Above 10	57	16.3

Total	349	100.0
Educational Status		
Illiterate	72	20.6
Up to primary	60	17.1
Primary to middle	116	33.2
Middle to matriculation	21	6.2
Above matriculation	80	22.9
Total	349	100.0
Sources of income		
Agriculture	180	51.6
Job	32	9.2
Job + Agriculture	29	8.3
Business	52	14.9
Remittances/small industry	56	16.0
Total	349	100.0

### Food security analysis

The cost of calorie method was employed to know the food security status in the study area. Table 2 indicate that based on the recommended energy level of 2350 calories per day, the food security line (Z) for the sample of 349 households was calculated at Rs. 673.23 per day per adult equivalent. Only 30.7% of the households were food secure while 69.3% of the households were food insecure. Further, the average expenditure gap indicates that every household needs Rs. 458.53 to meet their basic food requirements.

### Poverty Analysis

Poverty analysis was done using FGT (Foster, Greer, and Thorbecke weighted poverty index). It makes use of the headcount ratio that provides a complete picture of income, expenditures consumption patterns and other necessities of life. Previously Official Poverty Measure (OPM) and Supplemental Poverty Measure (SPM) were used to define the percentage of the population to be poor and non-poor but, both methods ignore the cost of necessities. Using FGT, the produced results are shown in Table 3

Table 2. Food security status of respondents.

Household food Security Characteristics	
Cost of the calorie equation	$\ln X = a + Bc$
The equation for minimum cost	$S = e^{(a+bl)}$
Constant	6.496
Slope Coefficient	0.00682
FAO Recommended Daily Energy (L)	2350 kcal/day
Food Security Line	Rs. 673.23 Rs
Number of Food Secure Household	107
Number of Food Insecure Household	241
Percentage of Household (For food Secure)	30.70
Percentage of Household (For food Insecure)	69.30
Average Expenditure Gap	Rs.458.53

Table 3. Household poverty analysis.

Indicators of poverty	
Poverty line	Rs. 7957 per adult per month
Percentage poverty incidence	65.9%
Poverty gap	Rs. 3103.23 (39%)

Table 3 shows that the average household expenditures to meet the necessities of life were Rs. 7957 per adult per month in the study area. Comparing this amount with the poverty line, 65.9% of respondents were facing poverty in the study area. The poverty gap is an expenditure gap which shows that respondents need to spend Rs. 3103.23 more to take themselves out of the poverty situation. Results imply that any household with income above or equal to 7957 was non-poor in the study area and those having below this amount were poor. The results are in line with the Punjab economic report which showed the district-wise profile of poverty indicating that Muzaffargarh is the poorest district in Punjab. The incidence of poverty in Muzaffargarh was 64.8 in 2014-15 (Planning commission, 2015). Similar

results were shown in the reports of the Benazir Income Support program. However, results contradict PIDE (2021) the ratio of poverty in Punjab stood at 61.8% in 2000 and is reducing continuously up to 21.4 % in 2019.

#### **Relationship between food security and poverty**

The logistic regression model was used to measure the relationship between food security and the poverty status of the households. The logistic regression model is used when we have one dependent and one or more than one independent variables. It is mainly used to predict categorical dependent variables. This model was statistically significant and it was fit as well keeping food security as dependent and poverty as independent variables. Results are shown in Table 4.

Table 4. Relationship between food security and poverty.

Variables	Coeff.	S.E	Wald	Sig.
Poverty status	-4.505	0.417	116.435	0.000
Constant	7.782	0.75	107.483	0.000

The data from Table 4 indicate that poverty had a highly statistically significant ( $P = 0.000$ ) impact on food security in the study area. The negative sign shows an inverse relation indicating that if poverty increases food security decreases and vice versa. This is established that poverty and food security are directly related.

## **DISCUSSION**

### **Demographic attributes of respondents**

Results of demographic attributes indicate that the majority of respondents fell in the category of 41-50 years of age. Results regarding age factor are in line with that of (Amir, 2015) who found most of the respondents were between 41 to 60 years old. However, the results contradict that of (Lassi *et al.* 2013) who found the majority of respondents were in the old age category. Based on an educational level, most of the respondents have education up to the middle. Present findings are almost similar to (those of Abdul Kalam, 2021) who found that only 23% of respondents had an education above matriculation however, results contradict that of (Amir, 2015) who found that 33.33% had an education above matriculation. Agriculture was the highly adopted occupation among respondents. Similar results are observed by (Chang and Wen, 2011) who showed that

agriculture is a highly adopted occupation in the sub-continent. However, the results contradict the HIES data which showed that most of the respondents earn from doing some kind of job either private or government. The data also contradicted the two variables i.e. farming and business, business is in the second position in Pakistan according to HIES data and farming is in the third position (HIES, 2020). The majority of the respondents were married having a family size of between 6-10 members. Similar findings were reported by (Lyocks *et al.* 2013) which showed that 73.60% of youth were married while the rest were single Another study showed that the majority (88.10%) of the people belonging to agriculture occupation were married and remaining were unmarried (Naamwintome and Bagson, 2013). Somewhat similar findings were reported (Shahbaz, 2017) which showed that Pakistani houses usually have six to seven persons in a family on average.

### **Food security status of respondents**

Results regarding the food security status of respondents contradict those of (Habib *et al.* 2019) which showed that the food insecure ratio in Muzaffargarh was 47%, the data were collected with the help of key informant interviews ignoring the

underprivileged sector of the area. The national nutrition survey conducted by UNICEF showed that 37% of households in Muzaffargarh are facing nutrition-related food insecurity or in other words, are malnourished, and 63% of children under 5 years of age were anaemic (National nutrition survey, 2011). The data is somewhat similar to (World Food Program, 2018) which showed that 60% of Pakistan's population is food insecure. However, the data contradict those of (Bashir *et al.* 2012) who indicated that 31% of respondents were food insecure in the Punjab province of Pakistan.

### Poverty status of respondents

Results imply that any household with income above or equal to 7957 was non-poor in the study area and those having below this amount were poor. The results are in line with the Punjab economic report which showed the district-wise profile of poverty indicating that Muzaffargarh is the poorest district in Punjab. The incidence of poverty in Muzaffargarh was 64.8 in 2014-15 (Planning commission, 2015). Similar results were shown in the reports of Benazir Income Support program. However, results contradict with (PIDE, 2021) the ratio of poverty in Punjab stood at 61.8% in 2000 and is reducing continuously up to 21.4 % in 2019.

### Relationship between food security and poverty

Poverty had a highly significant result on food security in the study area. The negative sign of the coefficient shows an inverse relation indicating that if poverty increases food security decreases and vice versa. Results are in line with (Abiodum *et al.* 2018) and (Fanifosi *et al.* 2016) which concluded that poverty had an inverse relationship with food security i.e. when poverty increases then food security decreases and vice versa. Although poverty is the main cause of food insecurity results of the present study contradict that (Ibrahim *et al.* 2019) which showed that food security had a positive relationship with that poverty.

### CONCLUSIONS AND RECOMMENDATIONS

We concluded that considerably older respondents were the major constituent of sample, having an ordinary educational level, usually large families and heavily dependent on agriculture to generate the income. The study area was poverty ridden and food insecurity was existing due to inadequate access to the nutritional

access. The earning of the families was way less than their family expenditures, guiding an expenditure gap resulting into poverty and food insecurity on households' level. Households had no proper coping strategies or safety nets to confront poverty and achieve food security. This study established that food insecurity was mainly caused by the persisting poverty. Thus, eliminating poverty among households through the governmental efforts, subsidies, technical support, trainings, skill development opportunities and micro finance loaning to initiate micro level businesses. As the agriculture is major income source in the study area, there is a dire need to support farmers and alluring them to increase their production level through the institutional support. Apart from the financial services, Agricultural Extension Sector should assist farmers to adopt modern day technologies and enhance the farm production. There is also need to promote off-farm income generating opportunities among families along with on-farm income sources.

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