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## Effects of COVID-19 Pandemic on Food Chain and Poverty in Pakistan

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COVID-19 pandemic has severely affected the food supply throughout the world. Pandemics affect the economy of nations badly but a number of countries were facing food insecurity even before COVID-19 pandemic. In this paper yearly data of food security is collected from the year 2015 to 2020 to inspect the consequences of poverty and COVID-19 pandemic through spatial regression analysis. The analysis shows that the food insecurity index has increased up to 33.5% by the year 2020 due to prevailing COVID-19 pandemic. The Asian residents which are already living in developing countries have faced higher food insecurity between the years 2015 and 2018. The spatial regression analysis babbled that the discriminations like race, religion and creed doesn't play any significant role in poverty and food insecurity. The primary factor of food insecurity is poverty. The poverty affected strongly during the years 2015 and 2018, the condition was worsened by the arrival of COVID-19 pandemic in 2020.

**Keywords** Food Insecurity, Demographic, Spatial, COVID-19, Poverty

### Author's Contribution

All authors have contributed equally.

### Conflict of interest

The authors declare no conflict of interest in

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## Introduction

Pakistan's social and living standards state that food insecurity is a lack of access to adequate food required to maintain a healthy lifestyle [1]. Food security levels are distributed into four levels, high, marginal, low and very low. High level of food security indicates adequate delivery of food in a society. In marginal food security, the society faces problems in accessing food, though the quantity, quality or variety of food is not reduced substantially. Quality and variety of food is reduced in low level of food security while the consuming patterns of members of a family are disrupted in very low level of food security due to lack of food resources and money [2].

In Pakistan, food insecurity affected 16.4 out of 100 houses with marginal to low food insecurity in the years 2018 and 2019 [3]. This number was higher than the previous years. Nearly 11.8 % of Pakistani population faced food insecurity by the year 2017, this population lacked adequate food required for a healthy life [4]. The food insecurity was low in the year 2016 that was nearly 12.3 % [5,6,7]. The food security was above 4.9 % but it reduced to 4.5 % by the year 2016 [8]. High inflation rate, increasing unemployment, poverty and lack of adequate quantity of food has complicated the issue of eradication of food insecurity in Pakistan [9]. Food insecurity is source of multiple issues including birth deficiencies, anxiety, depression, anemia and malnutrition. According to latest research, food insecure families are at higher risk of having anemia, asthma and other malfunctions including poor growth [10]. These families are at 2 to 3 times higher risk of having malnutrition children [11].

Pakistan being underdeveloped and the sixth highly populated country, has moderately high levels of undernourishment and food insecurity. Nearly 15 % population including women and children consume barely acceptable quantities of food per day [12]. Although, Pakistan is self-dependent for the production of wheat but the level of hunger and malnutrition is extremely high in the country. One of the major reasons of food insecurity is poverty. Nearly 18.4 % population of Pakistan is of elders who lies among non-productive members of society [13]. Children share 35 % of the population of country. [14, 15].

Nearly 54 % families of Pakistan lie below poverty line and struggle to get adequate food on daily basis [16]. Rate of food insecurity is 11.2 % higher in south as compared to the northern west region i.e., Punjab where the food insecurity is 9.6 % [17,18]. Further policies were made by the government of Pakistan to address the issue of food insecurity. Government introduced a food security policy in 2018 for the first time in Pakistan. This program was introduced to attenuate hunger and poverty and to encourage the sustainable food production [19].

Several other efforts are being made including the Food for Peace (FFP) program through which US has provided an aid of nearly 2 million dollars to fight acute malnutrition prevailing in Pakistan [20]. UNICEF is an organization working in Pakistan since 1948 for the welfare of children providing the basic amenities including nutrition, sanitation and general hygiene [21]. UNICEF is supporting government of Pakistan to ensure health and nourishment of children in Pakistan. In 2018, the FFP program donated 21 million dollars to UNICEF to eradicate food insecurity, malnutrition and health issues of the country [22]. The natural disasters are also considered the root cause of food insecurity. Livelihood of millions of people was affected in 2019 due to drought as a consequence of floods and heavy rain falls. Over one million people in seven districts of Pakistan were severely affected by drought which resulted in high food insecurity. Nearly 40 % population has encountered multidimensional poverty while 25 % lies below this line. About 38% children in Pakistan are suffering from malnutrition and stunt growth [23].

COVID-19 pandemic has severely affected the economy and food accessibility to nearly 210 countries with approximately 1.5 million deaths globally [24, 25]. The pandemic brought a global crisis of food, infrastructure and economy. The unemployment rate was also increased in this pandemic due to lockdowns and social distancing. In Pakistan this pandemic has affected livelihoods of nearly 7.15 million people [26].

This study reveals that the food security is related to employment and inflation rate of a society. The study also suggests that the disable children are more vulnerable to food insecurity as compared to healthy children. Poverty strongly impacts the circulation of food in different households in varying quantity.

**Materials and method**

The annual, demographic and regional effects of pandemic on poverty and food insecurity is studied through spatial regression model. In this paper theoretical and empirical data is used for measuring the effects of COVID-19 for the years 2018 and 2020.

**Theoretical Model**

The model is derived from the household’s utility maximization and defined as:

$$u=f(x), \text{subject to income}(I)\text{constraint}(1)$$

such that  $I=px.X$ . Where,  $px$  is the price of the bundle of food consumed; and  $I$ , the income.

$$[U(X)=f(x)=PxX(2)$$

For a unit cost,

$$Px=1(3)$$

Inserting (3) into (2) gives:

$$U(X)=X(I)(4) \quad du=dx dx dx(I)(5) \quad x=f(I)(6)$$

Since the primary goal of the study is to examine the effects of poverty on food security, we assumed poverty ( $z$ ) as a proxy of income.

$$x=f(z,r,b,w) (7)$$

Equation (7), is a yearly model applied to a spatial regression technique to examine the regional, demographic, and poverty effects on food security in Pakistan,

**Data Construction and Source, and Estimation Procedures**

The data of food insecurity for the years 2018 and 2020 was collected from various open sources e.g, statistics bureau. It provided adequate information regarding different levels of food in security in different households. It also provides information regarding unemployment and economic variations of a country. The annual data regarding poverty, unemployment and economic changes was estimated through R software.

**Results and Discussions**

The study reveals that in Pakistan food insecurity affected 16.4 out of 100 houses with marginal to low food insecurity in the years 2018 and 2019. Food insecurity was reduced up to 10% in 2018. In 2015, there were nearly 44.58 million food insecure households which decreased to 39.92 million in the year 2018. The rate of food insecurity decreased due to intervention of several government programs that were introduced to reduce poverty. However, after the prevalence of COVID-19 pandemic the rate of food insecurity increased up to 53.29 million which was nearly 33%.

According to IPC Acute Food Insecurity analysis, Sindh and Baluchistan are the highest food insecure provinces of Pakistan. This survey revealed that nearly 26% population of these two provinces have suffered with high food insecurity levels in the year 2019 due high food prices, lockdowns and natural disasters including rainfall, floods and drought etc. Figure 1 is showing yearly statistics about the effects of COVID 19 pandemic on different provinces of Pakistan.

The results show that nearly 40% of Pakistani families are encountering moderate to high food insecurity levels. In spite of being self-dependent in staple foods, the country is facing food insecurity from a couple of years. Nearly a quarter population of Pakistan lies below the poverty line and about 20 % population of Pakistan is malnourished including 45% children which are under the age of 5 according to the datasets of UN World Food Program (WFP). In the year 2019, there were nearly 1.3 million people suffering from extremely high levels of acute food insecurity. Table 1 presents the yearly regression analyses of the regional distribution of food insecurity persons.

## Poverty Percentage in different regions of Pakistan

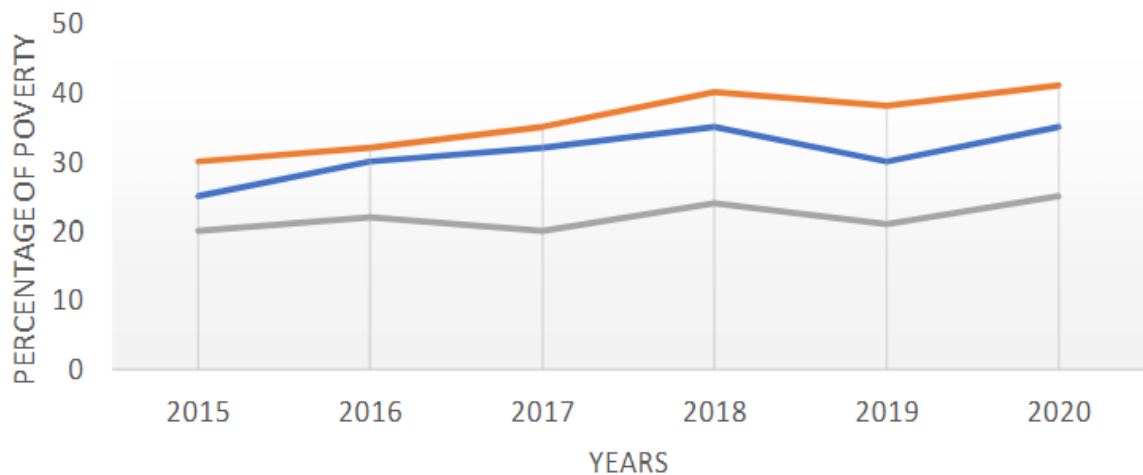


Figure 1. Food insecurity trend in Pakistan.

Table 1. Regression analyses of food insecurity by year.

	Dependent variable: Food Insecurity				
Years	2015	2016	2017	2018	2020
Sr. No	(1)	(2)	(3)	(4)	(5)
Poverty	0.212*** (0.062)	0.581*** (0.081)	0.579*** (0.084)	0.467*** (0.086)	1.204* (0.608)
Sindh	-0.030 (0.076)	0.048 (0.058)	0.001 (0.059)	0.025 (0.060)	-0.410 (0.425)
Baluchistan	0.065 (0.080)	0.060 (0.059)	0.112* (0.059)	0.100 (0.063)	-0.002 (0.428)
Punjab	0.278*** (0.078)	0.194*** (0.061)	0.153** (0.064)	0.148** (0.064)	-0.762* (0.433)
Constant	-0.426 (0.413)	-0.355 (0.318)	-0.487 (0.322)	-0.365 (0.345)	6.071*** (2.210)
Observations	51	51	51	51	51
R2	0.979	0.987	0.987	0.986	0.314
Adjusted R2	0.976	0.985	0.985	0.984	0.220
Residual Std. Error (df = 44)	0.171	0.131	0.133	0.135	0.957
F Statistic (df = 6; 44)	335.852***	561.839***	544.553***	528.710***	3.357***

Note: \*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01.

The prevalence of COVID-19 has created high food insecurity and hit the economy of Pakistan hard. According to Pakistan Bureau of Statistics (PBS), 20% rural and 9.2% of urban population of Pakistan was facing severe food insecurity in the year 2019. According to world food program, half million population in Sindh and Baluchistan was in an emergency situation in 2019. The country faced nearly 5.1 billion dollar economic loss in the years 2018 and 2019. The inflation rate of country was about 8.2% in the year 2018 which increased up to 5% additional in next few months. This study suggest that natural disasters effects the food supply badly and these include drought, heavy rain falls and floods and pandemics like COVID-19. During Pandemic the

lockdowns increased unemployment as a consequence of which the poverty and food insecurity enhanced in the country was increased from moderate to high level.

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## Peer Review Process

