

SECURING RURAL FOOD SECURITY DURING COVID-19 IN PAKISTAN: THE ROLE OF SOCIAL SUPPORT PROGRAM

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ABSTRACT

Food security has been the most debatable topic for the last few decades. It plays a very effective role in the economic condition of a country. Food insecurity is the cause of many problems in the health and medical field. Social support plays a very important role in decreasing malnutrition if it is provided according to the needs of people, especially during the pandemic of Covid-19. The initiative was taken by the Pakistani government in the form of the 'Ehsaas Emergency Program' which plays a vital role in decreasing food insecurity and provides brief information about the relationship between food security and social support. To find the relationship between food security and social support and support given by the government we collected data from 246 rural households in districts Jhang and Multan. We collected data using the Dietary Intake Assessment questionnaire, USDA questionnaire, and MSPS scale. We also use a self-generated questionnaire to investigate the role of the 'Ehsaas emergency program' on food security and the financial needs of people. We used Propensity Score Matching (PSM) to find the role of social support in the sustainability of food security. The results of propensity score matching show that there is a strong relationship between social support and food security. Education, family size, age of household head, income, gender, and distance from cities has also had impacts on food security. It is concluded that social support programs are necessary for sustainable food security.

Keywords: Social Support, Food Security, Covid-19, Propensity Score Matching, Income.

INTRODUCTION

Food insecurity is the cause of stress, hardship, and hunger in underprivileged communities, especially in rural households. In order to mitigate this issue, social support agencies provide essential resources (Nagata et al., 2016). Financial problems are the main cause of food insecurity in the low and middle income countries (Na et al., 2019). As

Income, education, and job status are closely tied to food security, and government strategies also participate to improve rural health conditions. Weon and Davidson (2024) also demonstrate an encouraging correlation between improved nutritional outcomes for women and better household status. This emphasizes how crucial it is

to raise household income through micro-savings initiatives to improve the food security of woman and their offspring. Coordinated strategies are necessary at both local and Government level to increase the Income stability, social networks, access to affordable food, transport, and food preparation (Welsh and Macrae, 2011). The impacts of food insecurity are on the all levels of society with health standards declining at each step down the social ladder. As the middle-income people also consider themselves food insecure than the upper.

On March 31, 2020, the FAO, WHO, and WTO notified that uncertainty in food availability during the COVID-19 pandemic could lead to export restrictions, potentially causing global market shortages (Hossain, 2020b). Pakistan's COVID-19 lockdowns have caused major health and livelihood problems by disrupting food supply chains, trapping essential food baskets, and causing harvest failures, particularly in Punjab and Sindh. If the pandemic persists into the vital spring planting season, producing staple crops like wheat, rice, and vegetables could be negatively impacted because of the uncertainty surrounding the timely distribution of farming inputs. (Fan and Si, 2020). In order to slow the spread of COVID-19, Pakistan implemented a partial lockdown for its 222 million citizens in mid-March 2020. But the lockdown quickly sparked worries, particularly for farmers who were having trouble harvesting, processing, and getting grains, fruits, and vegetables to markets. This disturbance affected the nation's food supply and farmers' lives, signalling an impending disaster (Latif and Niazilhttps, 2020). Stricter lockdowns in hotspot locations and more testing are needed to stop the virus's spread. Recurring lockdowns caused shockwaves across the economy and agriculture, resulting in widespread job losses and increasing food insecurity among daily wage earners, even though the original 15-day lockout helped lessen the health problem (Saqlain et al., 2020).

During this emergency and lockdown, thinking about the circumstance of poor, jobless individuals and regular labourers, on April 1, 2020, Pakistan began "Ehsaas Emergency Program". The government started a program to give "small resources" to help poor families in response to the COVID-19 pandemic. This initiative gave 12 million families 12,000 PKR each, or 144 billion rupees. The government is also providing its

residents with free testing and treatment (Akram and Meo 2020). In an attempt to control the pandemic, several government agencies have teamed up to test and treat people. The Emergency Cash application, an enrolment online interface was created to check the qualification. Further unexpected rains in Punjab and Sindh's entire year of labour of farmers were at stake (Khan et al., 2020a). Approximately 07 million are daily wage workers out of this total. So it is vital to take into consideration of the food conditions in the country in the middle of this pandemic (Iftikhar Ahmad, 2020).

People in poverty usually use coping strategies to move to less expensive foods that don't sufficiently meet their nutritional demands when food prices rise or real income declines (Andrianarison 2022). The pandemic's effects on food security differ from nation to nation, and in certain places, the disproportionately high COVID-19 death rate among Black Americans is a result of healthcare quality and economic inequality (Evelyn, 2020). At any rate, concerns have been raised concerning the dangers of human receptiveness to COVID-19 through the utilization of land and water-capable creatures, for example, finfish, shellfish, mollusks, and creatures of land and water (Bondad-Reantaso et al., 2020). COVID-19 has increased the impacts of other creating and present creatures and plant illness dangers, disintegrating well-being results across different regions and affecting the generally underestimated populace (Gortázar and Fuente, 2020). A recommended framework to promote optimal nutrition at the individual and global levels has recently been put forth in an effort to mitigate the impact of COVID-19 on food security and nutrition (Naja and Hamadeh, 2020). Coping strategy choices have a range of effects on food security. If a household has enough assets or resources, or if friends and family help, the effect of a household's income loss on food security may be mitigated or eliminated (Gershon et al. 2021). The main reason why people prefer cash is the independence it gives their households. In other words, individuals can use cash to cover their medical expenses, school fees, and other purchases in addition to the necessities they were given when they received food. Many pointed out that although if the money is only intended to cover food, without the cash transfers, they wouldn't have any other way to cover these extra expenses every

month (Errico et al. 2024). Cash transfer programs are considered

one of the important achievements to alleviate poverty and most likely achieve comprehensive financial development (Durr-E-Nayab and Farooq, 2014). The World Health Organization (WHO) has classified COVID-19 a global epidemic. It is debatable if the pandemic's following rapid spread caught different nations off guard, as the potential consequences of infection on an international level were only speculated upon prior to WHO demand (Udumale et al., 2020).

Pakistan presently faces more awful social and economic emergencies amid the COVID-19 pandemic. The nationwide lockdown, locust attack, and rains have exacerbated the financial emergencies, especially raising food costs, joblessness, poverty, and imperilled food security of the general population. Increased retail food prices and declining livelihoods are also higher risk factors for food security, suggesting that more and more families must reduce the quantity and quality of the food they consume. (Khan, 2021). To address food security during crises, it is critical to diversify agricultural sectors, subsidize food items, and boost healthcare services to prevent viral spread. Furthermore, enhancing food and price monitoring, eliminating rural poverty through equitable employment, and expanding social safety are critical. Collaboration between the formal and informal economies, promotion of workers' rights, and the use of technology and public-private partnerships can all contribute to reduce food insecurity during COVID-19 emergencies (Khan, 2021).

1. Methodology

First, we collected the data from two districts. The first one is district Jhang, and the second one is

district Multan. Both cities have developing rural areas and rural areas far from the main city. We took a sample of 246 people from the rural areas of both districts. Also, data was collected from those people who are getting financial Government support, and from those people who are not getting government support we briefly observed what impacts of financial support on the food security condition during the lockdown condition and the relationship between food security and social support. We collected the data by using useful instruments and used questionnaires of 03 types:

1. DIA Questionnaire
2. MSPSS Scale
3. Self-generated questionnaire for investigation of social support program

In this study, we focus on the food security condition of the people living in rural areas. Also, find the factors that are affecting food security then we find the role of social support especially financial support on food security conditions during pandemic of Covid-19. The role of financial support by the government in the form of the "Ehsaas Emergency Cash Program" should be observed.

We interviewed the participants from two selected districts of Punjab by using multiple sampling techniques. We select the Punjab as the main research area and select the two districts Jhang and Multan. By using stratified random sampling methods, we select 4 villages from two districts keeping in mind the far distance from the city. We use straightforward sampling method to survey the people who are getting support and not.

The location of both districts is shown in the figure below

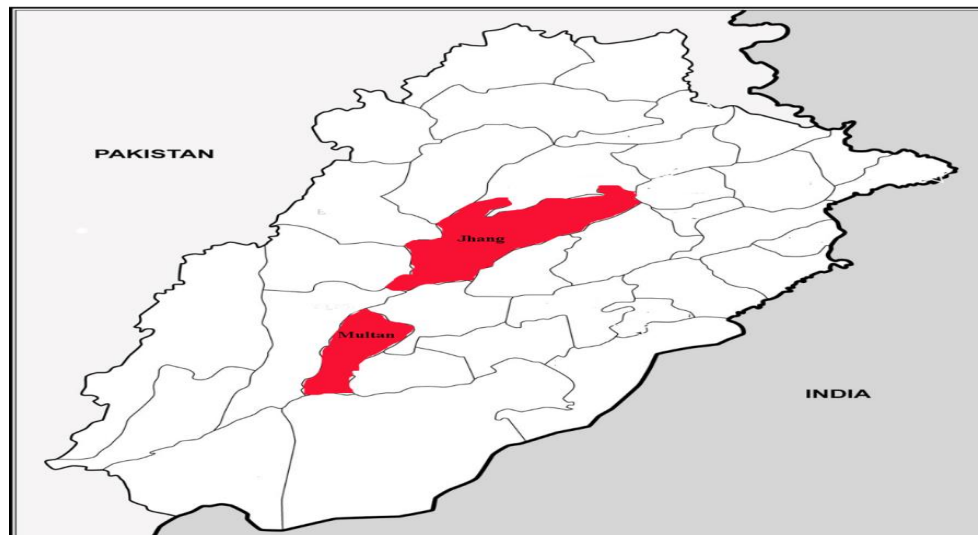


Figure 1. Map of Selected Districts

Source: (Compiled by Author)

To measure the effects of social help on food security we compare individuals who are getting social help to those individuals who are not getting any help. To assess the impact of any mediation in this manner, one must speculate about the outcomes that would have been observed in the absence of program participation. However, let Y_0 be the outcome conditional on non-participation, which is membership in the control group, and let Y_1 be the mean of the outcome conditional, which is membership in the control group. The impacts of participation in the program are changes in the mean outcome caused by participating in the program which is given by:

$$\Delta Y = Y_1 - Y_0 \quad (1)$$

This equation Δ indicates the impacts for a given household.

The fact that only one of the two outcomes Y_1 or Y_0 can be seen for each family and that Y_1 and Y_0 can never be seen for the same home at the same time presents a significant problem for assessing the impact of this single treatment. This results in a problem with missing data, which is the main issue with the evaluation (Smith and Todd, 2005).

2.1 Propensity Score Matching (PSM)

According to Rosenbaum and Rubin (1983), a propensity score is the conditional probability of receiving therapy given a pre-treatment salient characteristic. Let $P = \Pr(Z=1 | X)$ represent the propensity score or the likelihood of enrolling in the EEC program. By comparing observations of Ehsaas Emergency Cash Program (EEC) participants against those of non-participants for

similar propensity score values, PSM creates a statistical assessment group. PSM estimators are based on two assumptions.

The mean outcomes from non-participants are comparable to what members would have produced if they hadn't been given the program. This is in line with a substantial body of evaluation research that focuses on evaluating treatment effects under the assumption that the treatment satisfies some heterogeneity (Imbens, 2003). Thus, testing is important to check if a household's characteristics within its group are similar.

$$E(Y_0 | P, Z = 1) = E(Y_0 | P, Z = 0) \quad (2)$$

The common support assumption states that households with the same Z values have a positive chance of P being both participants and non-participants (Heckman et al., 1998).

$$0 < P < 1 \quad (3)$$

Uncertainly, if the above-mentioned conditions are satisfied, after taking a constant value of P , the Y_0 distribution perceived for the matched (non-participant) group may be replaced by the omitted values of Y_0 distribution for participants. After meeting these assumptions, the value of ATT can also be calculated as:

$$ATT = E(Y_1 - Y_0 | Z =$$

$$\begin{aligned} 1) &= E(Y_1 | Z = 1) - E_{P|Z=1}\{E_Y(Y_0 | Z = 1, P)\} \\ &= E(Y_1 | Z = 1) - E_{P|Z=1}\{E_Y(Y_0 | Z = 0, P)\} \end{aligned} \quad (4)$$

Here, $E(Y_1 | Z = 1)$ the term is estimated from the $E_{P|Z=1}\{E_Y(Y_0 | Z = 1, P)\}$ outcome of the matched comparison groups and the treatment group.

According to Heckman et al., (1998) principle, the Propensity-Score Matching delivers more efficient results of program impact having low-biases because to gather information from beneficiaries and non-beneficiaries, a parallel questionnaire was used. The propensity score was calculated using the sample households' observable characteristics that were pertinent to both program participation and the outcome variable of interest. The dataset originated from farm households with comparable socioeconomic and demographic conditions as well as a similar economic environment. The dataset has a larger sample of non-beneficiaries' households. A broader sample of families that are not beneficiaries is included in the dataset.

To start the propensity score while using the PSM, a precise model needs to be described. We used a logit model to evaluate the propensity score for interest in the EEC program by using identifiable characteristics that recalled the two program investment drivers and factors that affected the result.

After doing some tests to determine which estimator was best, we selected the one that produces covariate means for both statistically

comparable groups (Caliendo and Kopeinig, 2008). According to Moreno-Serra and Rice (2008), an effective matching estimator is predicted to preserve relatively more data for assessing the impact of a program. Using the PSM algorithm and the software package STATA 12, we applied a kernel-matching estimator to determine the program's average impact among EEC households based on the indicators mentioned above.

1. Results and discussion

The results to find the food security in different households are given below in the table. Table 1 shows the sample statistics of different variables we used during data analysis. We take data from people who are taking support and also from those who are not taking support. In Table 1 we measure the impacts of different variables on food security and the impacts of social support on their food condition. We analysed the data in two different parts and then make a comparison. We interviewed 243 households of which 106 households are taking social support and 137 are not taking social support.

3.1 Descriptive Analysis

Table 1: Descriptive Statistics of Variables

Variable	Participants N=106		Non-Participants N=137		Total N=243		Difference in Mean
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
FSS	0.94	0.23	0.86	0.33	0.90	0.29	-0.07*
Age	42.04	8.63	39.97	9.27	40.87	9.03	-2.07*
Edu	4.349	3.79	6.06	5.07	5.31	4.62	1.71***
FS	7.321	1.78	6.67	2.53	6.95	2.25	-0.64**
Inc	25473.27	14554.14	42742.82	30863.18	35209.6	26473.85	17269.55***
Dist.	4.87	3.94	2.36	2.40	3.46	3.40	-2.87***
Gender	0.377	0.48	0.86	0.34	0.65	0.47	0.48***

Source: Author's Calculations

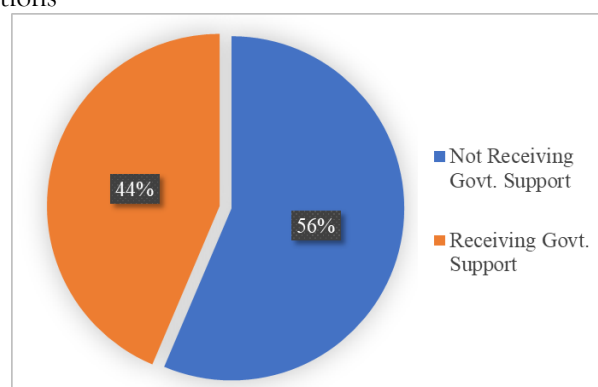


Figure 2: Distribution of Respondents

Source: Author's Calculation

The above flowchart figure shows the distribution of respondents who are getting support and those who are not getting support. The blue part shows the people who are not getting social support, which is 56%. The orange part shows the people who are getting social support which is 44%. From Table 1 we can observe that the food propensity score of people who are getting support is on average 0.94 which is greater than the people who are not getting social support which is on average 0.86. So from that point of view, social support has a positive impact on food security. Wang and Bishop (2019) also show the positive effects impacts of social support on food security. They show that social support plays an important role in decreasing food insecurity. Lee and Frongillo (2001) also show the positive impacts of social support on food security. This research shows that social support directly affects food insecurity and plays a very important role in decreasing food insecurity. Table 1 shows that the age of people who are getting support is on average 42.04 and the age of people who are not getting any support is on average 39.97. So, from this, we can observe that the chances of social support increase with the increase of age. We can say that elderly people need more social support so as age increases food insecurity also increases to cope with this food insecurity, we need social support. From Table 1 we can observe that education is on average 4.34 of the people who are getting social support and on average 6.06 of the people who are not getting support this we can observe that less educated people are more food secure so social support is provided to them. Eicher-miller et al.,

(2020) also demonstrate that the people who are less educated are more food insecure so there is a need for social support to educate them and decrease the vulnerability of food insecurity. With the increase of education, the sense of food increases in people. Table 1 shows that the size of the family of people who are getting support is on average 7.32 and for people who are not getting support is on average 6.67. From this result, we can say that social support is given to those people who have larger families. Larger families are affected badly by food insecurity. As numbers of family members increase food insecurity increases so the people who have larger families are selected for social support programs. The income of people who are getting support is on average is 25473.27. Also, the income of people who are not getting support is on average 42742.82. From this, we can observe that social support is provided to those people who have low incomes. Households with low income are mostly affected by food insecurity. Table 1 shows that the distance between people who are getting support from the main city is on average 4.87 and the distance between people who are not getting social support is on average 2.36. From this, we can observe that people who are living near the city are getting no support and people who are getting support are far from the main city. If the distance from the food market is greater than the chances of food security rise and chances of the need for social support increase. Table 1 shows that the gender frequency of people who are getting support is 0.37 and the gender frequency of people who are not getting social support is 0.86.

Table 2: Logistic Regression

Variable	Coefficient	Std. Err.	Z	p> z	[95% Conf. Interval]	
Age	0.05	0.02	2.53	0.01	0.01	0.09
Edu	-0.06	0.04	-1.49	0.13	-0.14	0.01
FS	-0.002	0.07	-0.03	0.97	-0.15	0.14
Inc	-3.9E-05	8.27E-06	-4.77	0.00	-5.6E-05	-2.3E-05
Dist.	0.30	0.07	3.94	0.00	0.15	0.45
Gender	-2.41	0.41	-5.87	0.00	-3.21	-1.60
Const.	-0.28	1.01	-0.28	0.77	-2.27	1.69
Number of Observations		243				
LR chi2(6)		125.08				
Prob > chi2		0.00				
Pseudo R2		0.37				
Log Likelihood		-103.91				

Source: Author's Calculations

To estimate the propensity score we employed a logistic regression model. For this purpose, we use the STATA and these estimates play an important role as a device in the process of balancing the observed distribution of covariates across the treated and untreated groups. Table 2 gives us results after the regression. In this process, our dependent variable is “Government Support”, and the independent variables are Age, Education, Household income, Family size, Distance from the main City, and Gender. The coefficient of age is 0.05 which get the results that if we increase the age by 1 year then the chances of getting social support increase by 0.05 and our result is supported by the P value which is (0.01) which is significant at a 5% level of significance. So, we can say that with the increase in age, people need more social support. The research of Lee and Frongillo (2001) also shows that as age increases need for social support increases because in this way food insecurity increases. The coefficient value of education is given in Table 2. If education increases by 1 year the chance to get selected for Government support decreases by 0.06 units but the findings are insignificant reflecting that education has less significance in the selection procedure of Government support. Burchi and Muro (2007) also show that education plays an important role in decreasing food insecurity in rural areas the result from this study shows that if we double the attendance at the school level then there will 20% to 25% decrease in food insecurity. The value of the coefficient of family size is given in Table 2. From this, we can conclude that if family size increases by 1 unit, then the chances of government support decrease by 0.002 But an insignificant p-value indicates that family size has less significance in the selection procedure of Government support.

So, from this, we concluded that if family size increases, then chances to get social support increase. With the increase of family size food security decreases.

The co-efficient value of income is given in Table 2 which shows that a 1 rupee increase in income results in decreasing the chance to get selected for government support by 0.00004 units. So, from this observation, we concluded that if income increases the chances of getting support decrease. Because with the income increase resources of food also increases and people having their own money do not need social support anymore. The coefficient of distance from the city is given in Table 2 From this table we can observe that if the distance from the city increases by 1 kilometre, then chances to get social support increase by 0.30 units and it is supported by a highly significant p-value that is significant at 1 % level of significance. As distance from the city increases the distance from the food market also increases which results in lower access to food for people due to larger distances. The people do not want to pay a larger amount as transport expenses for food due to low income so it is necessary to provide them social support. Liu et al., (2020) also demonstrated that social support is needed for rural areas that are far from the city. It shows that signs of depression and food insecurity are more present in rural areas than in urban areas. The coefficient of gender is given in Table 2. The negative value of variable gender indicates that if the person is male then the chance to get government support will decrease by 2.41 and it is supported with a highly significant p-value that is significant at a 1 % level of significance. Our research also shows that females are getting more support than males because females are more food insecure than males.

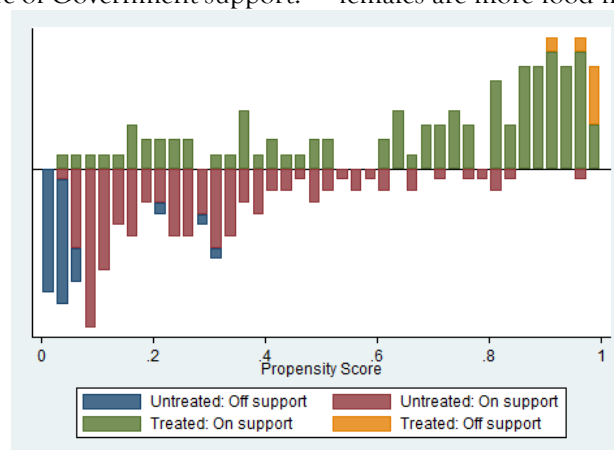


Figure 3: Propensity Score Matching Graph

Source: Author's Calculations

Table 3: Balancing Property

Variable	P-Value		Mean Absolute Bias		Absolute Bias Reduction
	Unmatched	Matched	Unmatched	Matched	
Age	0.07	0.001	23.2	46.8	-101.8
Edu	0.004	0.10	-38.3	-28.0	27.0
FS	0.02	0.06	29.3	20.2	31.1
Inc	0.00	0.42	-71.6	-9.7	86.5
Dist.	0.00	0.00	76.8	-77.6	-1.0
Gender	0.00	0.06	-114.5	-32.4	71.7

Source: Author's Calculations

The descriptive statistics shown in Table 1 have significant differences between the Government support participants which shows the possibility of selection bias in the sample. This would require matching the respondents with analogous traits from the two groups before calculating the effects. Individual respondents with similar covariates have equal chances of diversifying into non-farm activities. Table 3 describes the result of the balancing property, which shows that the matching properties are satisfied. This concludes the distribution of the independent variables (covariate). Among the matched sample of treated and control groups.

Column 3 of the table shows that covariates are non-significant jointly in the after-match regression which implies that there are no pieces of evidence of pretreatment differences between participants and non-participants and self-selection bias has been removed in the sample that allows us to further proceed with computing\calculating

treatment effects. All the matching method yielded coherent estimation of the treatment effects of Government support participation. Various matching logarithms are used to calculate the treatment effects including nearest neighbour matching. Redounds and kernel matching.

Table 4 analyses each matching technique as per nearest neighbour, it shows that Government support positively and significantly contributes to and enhances the food security status of the household. It shows that those who participate in Government support 0.005 units are more secure than the non-participants. The average treatment for treated (ATT) indicates that Government support participation applies significant and positive influence on food security statutes, demonstrating that off-farm work participation existed to increase household income and thus enhance the food security status. The balanced property is satisfied.

Table 4: Treatment effects

Treatment	Outcome	ATT	ATE	Treated		Control	
				On Support	Off Support	On Support	Off Support
<u>Nearest Neighbour Matching</u>							
Govt. Support	Food Security Status	0.005*** (0.09)	0.07	95	11	137	0
<u>Radius Matching</u>							
Govt. Support	Food Security Status	0.26*** (0.66)	0.06	95	11	137	0
<u>Kernel Matching</u>							
Govt. Support	Food Security Status	0.01*** (0.08)	0.06	95	11	137	0

Source: Author's Calculations

2. Conclusions and recommendations

This Research describes the impact of social support on food security and the relationship between food security and social support. We researched on social support program (Ehsaas Emergency Cash Program) by the government of Pakistan and found the advantages of this program on food security of rural households in two districts

Jhang and Multan during lockdown due to COVID-19. Therefore, we employed different econometric approaches to meet our objectives. In this research Government support was our dependent variable and Age, Income, Family size, Distance from the city, Level of Education and Gender were our independent variables. The main purpose of this thesis is to find the effects of

financial support programs on the nutritional needs of people and the role of these social programs in reducing poverty in rural areas. The result of this study shows that there is a positive relationship between food security and social support. Due to the rise in prices of food products due to Covid-19 social support was necessary to cope with this kind of sudden disaster. There is a positive relationship between income and food security, if income increases, the level of food security increases and people do not need any social support.

On the other way, education is also necessary to increase food security. There is positive relationship between food security and education. Also, with the increase in age, the need for social support increases. There is a positive relationship between age and social support so; there is a negative relationship between food security and age with the increase of age food security decreases. As well as with the increase of distance from the city chances of social support increase because people living in far areas do not have easy access to food markets. So, there is a negative relationship between food security and a positive relationship between social support and distance from the city. It is advised that the government maintains and possibly grows social assistance programs like the Ehsaas Emergency Cash Program considering the favourable effects on food security. Given that age and the need for social assistance are positively correlated, governments should design these programs to better meet the requirements of older people who may be more susceptible, especially in times of crisis like the COVID-19 pandemic. Education and skill development initiatives can pay off in the long run since research shows a strong correlation between education and food security. By enabling people to obtain higher-paying employment, these programs can raise their income levels and lessen their dependency on social assistance.

Enhancing market accessibility by investments in infrastructure development, such as transportation networks and roads, might lessen the demand for social support in these areas. Programs for social assistance are essential in times of need, but rural households also need chances for long-term revenue production. This could entail encouraging business, helping small-scale farmers, and making loans and microfinance more accessible. In rural locations, social networks and support systems can

be strengthened by supporting community-based activities. To make sure social support services are accomplishing their intended aims, it's critical to regularly assess and analysed their efficacy. Policymakers in Pakistan can improve the general well-being of rural residents, decrease poverty, and increase food security by putting these recommendations into practice.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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