



## Research Article

# Household Food Security: Determinants and Perceived Challenges in Mountains of Azad Jammu and Kashmir

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**Abstract** | In mountainous areas of the Azad Jammu and Kashmir, people practice subsistence agriculture. As the output from agriculture very low, the mountain zones experience the ill effects of food insecurity. This study scrutinizes food security status in the mountainous territories of Azad Jammu and Kashmir and proposes actions to achieve food security. A contextual investigation of 3 tehsils, situated in all the Haveli area, was led and an all-out number of 351 sampled households were reached through a simple random sampling strategy using a structured questionnaire as a tool for collecting data and used for various factors responsible for food security status and the affect they have on food security at the household level. We used binary regression analysis to identify factors affecting food security in the target area. This investigation discloses that 90 % of the sampled households are suffering from food insecurity. From the exponential values of coefficient binary logistic regression, it is concluded that Gender, Occupation, Landholding, Income, Low income, High population, remoteness, Low landholding, and firing online of control affected food security in the mountain areas. The significant but negative association of low income, low land holding, high population, remoteness, and firing online of control could lead to food insecurity. Also, there was a positive and significant association between food security and household income. An increase in income resulted in improved food security as this justifies the need to focus on educating people on food security, community-based intervention for development, and creating employment opportunities that generate income enough to meet food security requirements along with providing better social and infrastructure facilities to minimize hazards of remoteness.

**Received** | March 15, 2021; **Accepted** | May 15, 2021; **Published** | July 08, 2021

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**Citation** | Wali, M.Q.K., A. Alam and I. Shah. 2021. Household food security: determinants and perceived challenges in mountains of Azad Jammu and Kashmir. *Sarhad Journal of Agriculture*, 37(3): 957-974.

**DOI** | <https://dx.doi.org/10.17582/journal.sja/2021/37.3.957.974>

**Keywords** | Food security, The status of a household, Mountain areas, Remoteness, Poor health facilities

## Introduction

Food Security is at the focal point of the worldwide development talk, both as intended to encourage the accomplishment of wellbeing objectives and as an end in itself. Near 800 million people don't approach enough food, >2 billion people experience key micronutrient lacks, and ~60% of people in low-salary nations are food unreliable (Ahmad *et al.*, 2017). The most frequently used concept is defined

as "food security occurs when everyone, at all times, has physical and economic access to sufficient, safe and nutritious food that fulfill their dietary needs and preferences for active and healthy life (Ali *et al.*, 2003). Food availability means when household units approach adequate amounts of sufficient and essential foods acquired through production at local levels, business imports, gifts, and donations. While access talks about having important assets for the buy or exchange of products with for acquiring a

variety of foods to contain a healthfully sufficient diet. Utilization tends to the sheltered circulation, storage, and forecasting of foodstuffs. The last addition to this definition occurred at the 2009 World Summit on Food Security which included a fourth measurement stability as the transient time indicator of the capacity of food frameworks to withstand shocks, regardless of whether human-induced or natural (Anderson, 2018a).

A study noticed a complex interplay of social and economic drivers which makes it very challenging to feed the population of 10 billion by 2050 (Arene and Anyaeji, 2010). The Universal drivers like climate change, carbon economy, energy, financial crises, and land-use change poses extra challenges (ADB, 2013) and (Babatunde *et al.*, 2007). The impacting drivers for food security on the local level include rural infrastructure, market, gender issues, flood, drought, land degradation, investment by public and policy of subsidy (Babatunde and Qaim, 2010; Bashir *et al.*, 2007, 2012; Bashir and Schilizzi, 2012; Bashir, 2017; Berry *et al.*, 2015; Brück and d'Errico, 2019).

The staggering effect food security has on mankind "the human impact" can't be overlooked and exhibits critical societal difficulties requiring quick global consideration. The figures demonstrate that around 795 million people on the globe somewhat more than one person out of nine was undernourished in the years 2014–16, (Coates *et al.*, 2007) and a usual 805 million people were not ready to get to satisfactory supplies of food someplace in the scope of 2012 and 2014. The FAO as of late announced that about 60% of hungry individuals on the earth are females and pretty much 5 million offspring younger than five dies just because of lack of healthy nutrition connected reasons each year (FAO, 2016). Whereas being a surprising number, it must be limited to the state, a development of 209 million persons juxtaposed with 1990 and 1992, (Coates, 2004). The unmistakable and exasperating truth behind the food security challenge integrates the way that an expected 1 of every 7 Americans is food insecure in the year 2016 (McCarthy *et al.*, 2018). The latest figures in the EU echo that 55 million individuals (11%) in 2013, announced themselves as being not able bear the cost of a feast with meat, chicken, fish (or veggie lover proportional) consistently day. In 2017, 31.7% of Sub-Saharan Africa (SSA's) inhabitants were food shaky. Considerably additionally amazing fact

is that this figure will stay above 20% by 2027. All-inclusive, the Asian territory has the highest figure of food-uncertain individuals in 2017 with several 315.2 million (Desiere *et al.*, 2015). The Asian region is presently the universe's quickest developing region while as of now shelters 56% of the worldwide populace (Asian Advancement Bank, 2013). The second greatest food gap lies in this Asian area were 10.8 million tons of food grain in 2017, altogether underneath the 16.7 million tons for SSA.

Food security at nearby dimensions relies upon the production, acquisition, and distribution of food. It additionally relies upon financial variables, socioeconomic variables, physical foundation, and landscape defenselessness, for example, avalanches, streak floods, barriers, and remoteness (Devenish, 2017). It is supported by (Von Braun, 2003), who argued that the production of food at the global level would be more than enough to meet the everyday caloric needs of an individual if available food is distributed judiciously. Price hikes and inflexible demand from the well-off puts the deprived into a food insecurity situation (OECD– FAO, 2011). Tiwari and Joshi (2012) inspected regular and societal parts impacting food security in the Himalayas. In their views, the situation of food security has been separated, as it were, in progressing and weak countries in the recent time leading demand and supply gap for food. Further, (Fullbrook, 2010) reported that financial retreat that began in 2008 and substantial variation in sustenance costs have likewise unfavorably influenced the status of food security in developing and underdeveloped nations. More, because of environmental variation, both developing and underdeveloped nations, which exercise subsistence agribusiness with vast populace, possibly going to confront extreme food insecurity compared to developed nations (Aase *et al.*, 2009). The Food tragedies extended further in the precipitous territories (Huddleston *et al.*, 2003) because they are extremely rudimentary to food security. This proves to be a direct result of the nearness of numerous components, for example, subsistence markets, rolling territory, tough climatic conditions, and small produce, extraordinary susceptibility to the natural risk, and restricted structure and entry to the free market (Tiwari and Joshi, 2012). Barrett (2010) found over one billion individuals on earth planet don't approach adequate nutritional and around 2 billion individuals are experiencing micronutrient deficiency.

As a Nation, Pakistan is a food secure state. It grabbed food output freedom in the 1980s and effectively held it starting now and into the foreseeable future (Bashir *et al.*, 2007, 2012). Pakistan is considered a key producer of various Agri-products (Bashir and Schilizzi, 2012). Despite these empowering certainties, the level of the undernourished populace stayed at 22% (FAO, 2015). Prior, in 2003 an extensive report synchronized by the Sustainable Development Policy Institute (SDPI) found that 62% of the regions were food insecure. Comparatively as net food accessibility, and food insecurity as for calorie usage at an estimation of 2350 Kcal/per capita/day is concerned. This examination further evaluated food use as some part of the food security subject to appropriate use for safe drinking water, child death rate, and access to medical facilities. The reports uncovered about the portion of the majority had no way to nontoxic, safe drinking water, and about 38% of the areas challenged unbelievably poor food support. The newborn rate was as high as 80% in 20% of the districts. Furthermore, in all cases imbalances were seen among the districts (SDPI, 2003). SDPI (2009) coordinated another examination on 131 areas of Pakistan. It was discovered that in every practical sense half of the model area (48.6%) were food problematic. Punjab was observed to be the top food secure zone among the various locales, while FATA being the most food unreliable (67.8%). Exactly when showed up distinctively in connection to the 2003 examination, the condition had turned horrible in 2009 regarding food availability, access, and absorption (SDPI, 2009). Additionally, 42% of the young people over 5 years were stunted, 14% wasted, and 31% underweight (Sayed and González, 2014). Different examinations, additional time, in various areas have also displayed food insecurity on the higher side (above 20% of the respondents were food flimsy) (see, for instance, (Mahmood *et al.*, 2014; Bashir and Schilizzi, 2012; Mirza *et al.*, 2013; Sultana and Kiani, 2011; Bashir *et al.*, 2007).

Though some studies have shown a positive increasing trend in food security as estimated food production per capita has shown good trends (Ahmed *et al.*, 2017) yet Pakistan has been influenced by food insecurity for the last numerous years. This is obvious from the reports of the Global Hunger Index (GHI) which demonstrates how much these issues have persevered. Pakistan is at 93 positions among 104 countries on GHI, the score reduced from 43.6 to 33.9 amid the

period 1990 to 2015, Yet the condition proceeds as previously, as it still lies in the classification of 'extremely Alarming' (IFPRI, 2016). Putting Punjab separated, the circumstance in different regions is disturbing. Contrasting Punjab with different provinces, it has twenty-one food surplus regions and there are just nine inadequate regions. While Baluchistan, AJK, FATA, and GB have the biggest number of food insecure areas. There are 22 districts in Baluchistan, where food insecurity is extremely high followed by three districts having less deficiency. Coming to the food insecurity situation in AJK, ten districts fall in the group of extremely deficient, and in GB, the number is 6 (SDPI, 2014). Azad Jammu and Kashmir is administered by Pakistan. The AJK has a population of 4.1million with remittance and services as the major income contributing sources. Agriculture is very low in AJK as it is mainly mountainous, and landholding is very low as compare to the rest of the areas in Pakistan. It has 10 districts that are categorized as extremely food deficient by (SDPI, 2014).

Mann *et al.* (2019) analyzed the situation in mountain areas is extremely heterogeneous. For example, in Nepal people living on mountains have to worry about feeding themselves. People in the Australian mountains worry about being overweight. As compared to many food importer mountain regions Mt. Kilimanjaro mountains export food. This is also applicable to quinoa suppliers of the Andes. As mountain areas are not associated with industrial production technologies, these mountains are not gifted for the bulk production of the important staple crop foods. Also, Technical Efficiency (TE) is not there which effects the production of crops (Alam *et al.*, 2020). These challenges are constant for mountain regions so is the case with mountainous areas of the AJK. A vital inquiry might be raised about the adequacy and effectiveness of the assessment of food security in the nation. As per (FAO, 2013) there are multiple measures to separate the component of food security for a population, a system, or an individual. Food security is profoundly unpredictable in that it is dictated by a range of interrelated agro-environment.

There is no generous research done as such so far in the Azad Jammu and Kashmir in general and Haveli particularly, on food security-related issues. The principal target of this examination is to determine food security status in mountainous areas of AJK



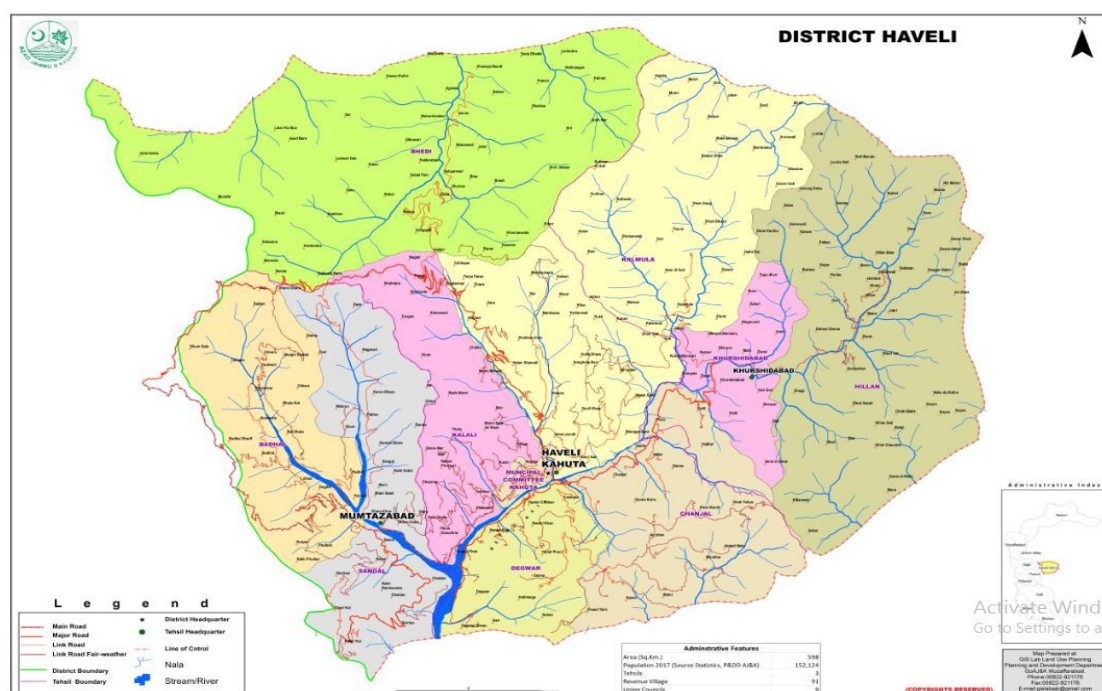
and to explore the perceived challenges faced by its inhabitants for food security. This investigation will be a standard benchmark for further examinations in the local or other similar zones. The core objective of the examination is to explore the food security status and to perceive the crucial components of food security in the investigation region by breaking down food accessibility and significant variables affecting food security. This examination may further provide vital information on food security and may add to the present literature in executing a genuine system against the populace's weakness to food insecurity. As household food security is at risk to transform, it is fundamental to investigate its determinants to envision perceived challenges and factors influencing food security and besides to perceive how the household responds to food insecurity. It further goes for prescribing approach measures to achieve food security in remote and mountainous states.

## Materials and Methods

### Study area

This study was conducted in the district Haveli, AJK, an area found on the line of control with another part of Kashmir held by India. It lies at longitude 73°-75° and latitude of 33°-36° with mainly hilly and mountainous terraces. This region has been put on an extraordinary dimension of food insecurity in AJK and Pakistan by (PFSB, 2014) report. An expected populace of Haveli is 157000 by census held

in 2017. The normal size of a family is 6.8 people. The anticipated male populace is 83799 while females are 72600. The zone under development per family is 1.31 sections of land. The framework demonstrates that reasonable climate streets are 369 Km in locale Haveli (Arranging, AJK 2015). The framework demonstrates that reasonable climate streets are 369 Km in the locale Haveli (Arranging, AJK, 2015). As this region is underdeveloped with no industrial sector, it relies mostly on the labor force working on daily wages, along with government and private jobs. As a resource-poor region, the agricultural sector is also very poor as landholding is very small in a mountain area. The absence of sufficient infrastructure and energy arrangement makes modern industrial development nearly restricted as similar studies of confirming additionally this contention which further added that it prompts high post-harvest losses (Baramburiye *et al.*, 2013). Mountains and rural livelihoods are solidly connected to agriculture as a wellspring of food and income (WFP, 2004). The genuine source of family unit income in study zones are working, livestock raising, private specialist co-ops joined by government occupations and confined agribusiness works out. To diminish income vacillations farmers have contrived strategies by utilizing both farm and non-farm income sources (Niragira *et al.*, 2015), that is because in the case of agricultural failure alternative income sources can be used to sustain (Bundervoet, 2010). Figure 1 shows the details of the study area and villages in AJK.



**Figure 1:** Location and Map of Study Area, Source: AJK at Glance, 2015.

The universe of the study was region Haveli. The purpose for choosing the Haveli region is for the most part because of a few properties, i.e., a higher populace, a higher number of towns with little landholdings. District Haveli has three theses in particular Khurshidabad, Haveli, and Mumtazabad. From these three zones, Tehsil Haveli will be chosen to concentrate because of the higher populace estimate with a more noteworthy number of towns when contrasted with different tastes of the locale and security reasons on the LOC. Working in other tassels is exceptionally dangerous as sporadic terminating over the fringe is hazardous to convey such sort of broad investigation. Three union councils (UCs) will be chosen from tehsil Haveli for data collection. Each UC will be chosen from focus, center, and peripheries for information accumulation. UC from the focus will speak to the fundamental business center where respondents are associated with various employment exercises for many ages. UCs from focal regions will have a blend of respondents, speaking to both semi-urban zone and provincial setup. The peripheries will incorporate the respondents having remote territories with landholding predominantly center around horticulture or domesticated animals. This will give us an adequate portrayal for analysis.

### *Methodology*

For this study mixed-method approached was adopted as this is the best technique to avoid a long debate about what is the most suitable design for research, a suggested by (Tashakkori and Teddlie, 1998; Onweugbuzie, 2009). A mixed-method Process displays blended techniques which inquire about process show contains eight particular advances: (1) Research question determination; (2) chooses if a mixed method is suitable; (3) select this mixed-method or diverse model research structure; (4) collect data; (5) data analysis; (6) data interpretation; (7) legitimate the data; and (8) conclusion (whenever justified) and compose the last report. The information was gathered by a simple random sampling procedure with the help of a planned and pretested questionnaire. The survey was pre-tested with a 50-sample size of households from the study area before the real review. The purpose of the research was conveyed to all the respondents by a cover letter on the questionnaire. Respondents with no literacy or lower literacy rate were conveyed verbally so they could participate in the process with ease and comfort.

### *Data collection tool*

The questionnaire was based on demographic and socioeconomic variables like age, education, occupation, household size, gender, income, landholding size, and family head status.

This survey utilized data from a sample of 351 household units. The study included numerous areas with inquiries identified with household attributes, agriculture production, domesticated animals, keeping, income, and family food utilization, market access, and food security. The examination of gathering data was driven using two different nationalities. The Household Food Insecurity Access Scale (HFIAS) was utilized to assess the food security status among sampled households. This method used agriculturists' perception about food uncertainty, thinking about an extension of pointers, for instance, tension about food supply, limited dietary necessity and quality, and insufficient food access (Coates *et al.*, 2007). The methodology recognizes that food vulnerability causes evident responses that are indistinguishable crosswise over different countries and can be gotten and quantified through an examination. It utilizes a great deal of nine questions covering a wide extent of encounters identified with food security. The households are classified at developing segments of food insecurity when they react in the affirmative to logically genuine conditions just as increased from time to time experience such conditions (Dossier *et al.*, 2015). Therefore, the estimation of HFIAS decides the family food security. In any case, the typical HFIAS score is a fixed factor and increasingly touchy to smaller increases of changes. The markers of Household Food Insecurity Access were associated with assessing the association between the household units' food security and their real determinants including the household socioeconomic and financial elements.

Household food security list having 9 inquiries to decide the status of a family unit food security. Food Insecurity surveys more often than not utilize a progression of 9 addresses that identify the dimension of concern and the absence of access to, variety, or an amount of food. The inquiries reflectively allude to a period of one month to 3 months. They reflect 3 unique areas of food insecurity: (1) Anxiety or vulnerability; (2) Insufficient quantity and (3) is insufficient quality. The techniques used to quantify the degree and status of food security have been depicted in a few examinations like Household Food Insecurity Access Scale (HFIAS) for measurement of

Food Access: Indicator Guide by Jennifer (Coates *et al.*, 2007; Nord, 2008), Household Food Security in the (Coleman-Jensen *et al.*, 2013).

#### *Pretesting of questionnaire*

The adopted tool (questionnaire) was tested before the final application for data collection and was modified in the light of feedback from the respondents before the final survey. For this purpose, 50 respondents were selected. In the light of feedback necessary improvement was done before the application of the final version of the questionnaire.

#### *Data analysis technique*

At first hand, descriptive statistics were used followed by a food security estimation index and logistic regression to analyze the collected data. At first, a lot of brief coefficients comprise given information, which can either be a depiction of the entire population or sample size. Besides, the HFIAS score is a nonstop proportion to the level of food insecurity (access) in the family in the previous month (30 days). First, an HFIAS result variable is calculated for each household by adding up the codes for each frequency-of-occurrence. Before summarizing the occurrence, responses were coded (0=Every time, 1=usually, 2=Frequently, 3=Sometimes, 4= Occasionally, 5= Rarely, 6= Never). The lower the number, the more food insecure (access) a family would be. Contrary higher numbers will represent the less food insecure (access) a family unit would be (Coates *et al.*, 2007).

Coates *et al.* (2007) utilized The Household Food Insecurity Access Prevalence (HFIAP) Status pointer to report household food insecurity (get to) predominance. This marker classifies households into four dimensions: Food secure, mild, moderate, and severely food insecure. The household was arranged as progressively food unreliable as they react positively to increasingly serious conditions or additionally experience those conditions all the more now and again (Coates *et al.*, 2007). Thirdly, the logistic regression was becoming accustomed to decide the effects of demographic and socioeconomic attributes of the household on their food security status. At last Pearson correlation was used to view the relationship between different variables and their role in determining food security.

#### *Model specification*

This study used a logistic regression technique to

shape a relationship between dichotomous dependent variables, what's more, a lot of autonomous factors hypothesized to influence the result. The model as given by Wooldridge (2010) is written as:

$$\ln = \left[ \frac{p_i}{1-p_i} \right] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} \dots (1)$$

The  $\left[ \frac{p_i}{1-p_i} \right]$  is the odds ratio and it shows the probability of a household to be food secure or not.  $\beta_0$  is the intercept of the model. Independent variables are shown by  $X_1, X_2, X_3, \dots, X_n$  (Explanatory variables). The +ive coefficient shows that the odds ratio increases with the increase in independent variables and it will decrease as the independent variable decreases. It was hypothesized in this model that food security is affected by socioeconomic, demographic, and other factors mentioned in Table 3 because literature suggested that the state of food security varies from one state to another as reported by (Bartfeld and Dunifon, 2006; Coleman-Jensen *et al.*, 2011).

## **Results and Discussion**

#### *Descriptive results*

Table 1 showed that 25.4 % of the respondents are female and 74.6 % are male. Most of the respondents, 42.7 % are jobless and a reasonably high percentage of 30.8 % are doing private jobs. The age of the respondents is also given to around 63.5 % respondents are between 20 to 40 years of age. The household size of the respondents is 45 % with 1-7 members and 49 % having 8 to 14 members per household. A Major chunk of the respondents is falling in the range of matriculating and intermediate putting up a high show around 62% of the sample size. This shows that people in the study area have a high literacy ratio. Around 71% of the respondents have 1-50 Kanals of lands which is not very high in terms of agricultural land as most of the area is hilly and mountainous which is not suitable for agriculture production. The income category shows that 36.5 % of the respondents are earning less than 10K per month, which depicts the lack of jobs and low income in the study area.

#### *Food security status of sampled households*

This section embodies the statistical part of the study. In the first portion status of the household in the target area was discussed. The second part discussed the challenges faced by the respondents for food



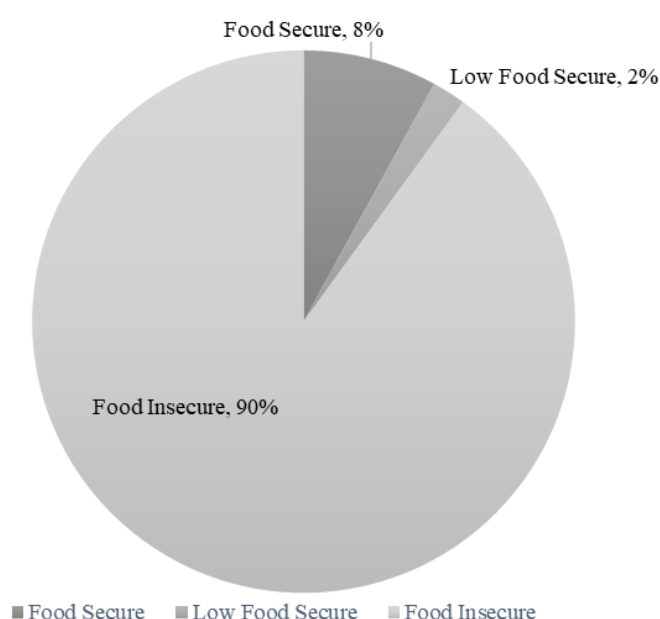
security. Finally, regression analysis was discussed in the last part. Three categories were made i.e., food secure, low food secure and food insecure based on conditions investigated through a structured questionnaire of The Household Food Insecurity Access Prevalence (HFIAP) Status pointer to report household food insecurity (get to) predominance. This marker classifies households into four dimensions: food secure, mild, moderate, and severely food insecure.

**Table 1:** Socio-economic characteristics of respondents.

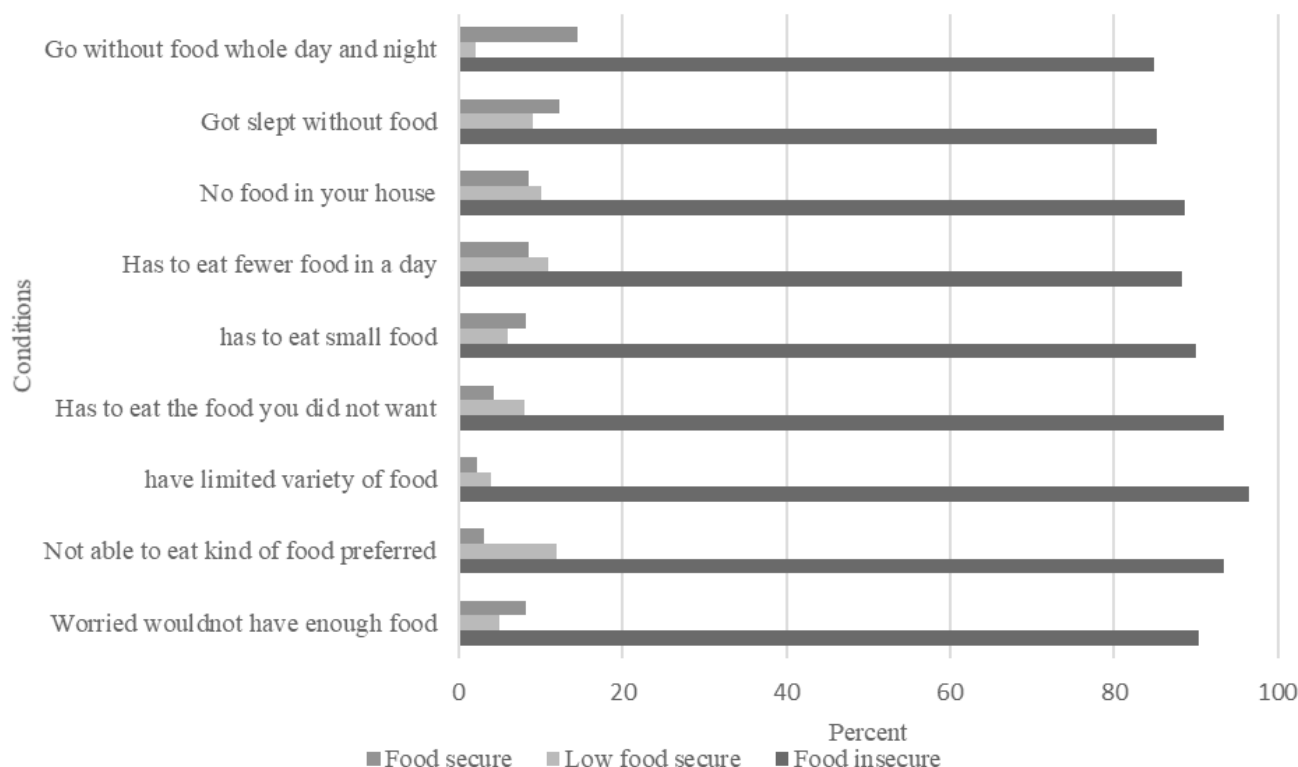
| Variables                   | Frequency | %    |
|-----------------------------|-----------|------|
| <b>Gender</b>               |           |      |
| Female                      | 89        | 25.4 |
| Male                        | 262       | 74.6 |
| <b>Occupation</b>           |           |      |
| No job                      | 150       | 42.7 |
| Govt job                    | 20        | 5.7  |
| Farmer                      | 73        | 20.8 |
| Private Job                 | 108       | 30.8 |
| <b>Status as Head</b>       |           |      |
| No                          | 194       | 55.3 |
| Yes                         | 157       | 44.7 |
| <b>Age</b>                  |           |      |
| 20                          | 13        | 3.7  |
| 40                          | 223       | 63.5 |
| 41 and above                | 115       | 32.8 |
| <b>Household Size</b>       |           |      |
| 7                           | 158       | 45   |
| 8-14                        | 172       | 49   |
| 15-21                       | 17        | 4.8  |
| 22 and above                | 4         | 1.1  |
| <b>Education background</b> |           |      |
| Illiterate                  | 33        | 9.4  |
| Matriculation               | 99        | 28   |
| Intermediate                | 118       | 34   |
| Graduation                  | 101       | 29   |
| <b>Landholding (Kanals)</b> |           |      |
| Less than 1 or 0            | 62        | 18   |
| 1 to 50                     | 250       | 71   |
| 51 to 100                   | 13        | 3.7  |
| Above 100                   | 26        | 7.4  |
| <b>Income (PKR)</b>         |           |      |
| >10,000                     | 128       | 36.5 |
| 11,000-20,000               | 86        | 24.5 |
| 21,000-30,000               | 57        | 16.2 |
| 31,000-40,000               | 35        | 10   |
| <40,000                     | 45        | 12.8 |

In our study, we merged mild and moderated to low food security and make three categories like food secure, low food secure, and food insecure(sever). This was done based on the frequency of conditions in food accessibility as lower frequency leads to food security and higher the frequency will go for lower food security (Coates *et al.*, 2007).

In Figure 2, 8 % of the respondents are categorized as food secured facing none of the extreme conditions. The respondents who are food insecure amounts to 90 % of the sample size while 2% accounts for low food secure households in the study area as respondents facing any of the nine conditions are categorized as food insecure. Low and very low food security vary in the degree and character of the modifications the family makes to its eating arrangements and food consumption. Households having low food security have announced multiple signs of food accessibility issues and low-quality diet, but typically have revealed scarcely any, signs of decreased food consumption. Those delegated were very low food security revealed different signs of decreased food consumption and upset eating patterns because of lacking assets for food. In most, yet not all families with very low food security, the overview respondent detailed that the person in question was hungry sooner or later amid the year, however, did not eat because there was insufficient cash for food (Coleman-Jensen *et al.*, 2011). Figure 3 depicted the percentage of households reporting each indicator for the food security of households.



**Figure 2:** The Household Food Insecurity Access Prevalence (HFIAP).



**Figure 3:** Indicator of Household Food Insecurity.

Figure 3 shows that around 90 percent of the respondents having stressed that their food would not have enough food to eat 93 percent announced that they would not have the option to eat the sort of food they liked. 97 percent announced that they have constrained variety of food. 93 percent announced that they needed to eat food they didn't want. 90 percent detailed that they needed to eat a little amount of food. 88 percent revealed that they needed to eat less food in multi-day. 88% detailed that there was no food in their home. 85 percent revealed that they slept without food. While 85% announced that they needed to abandon food the entire day. 2 percent detailed this had happened on more than one occasion per month. 8 percent detailed no conditions so in most recent one month.

#### *Food insecurity and causes*

Food insecurity at the household level suggests that people either do not have approached to food or they don't have access to it. In either case, they expected to encounter the evil impacts of the adversities of yearning and poverty. The food security issue has been chit-chatted for an extensive time allotment. It is an unpredictable and multidimensional marvel. There are no general reasons for food security yet move with according to its target country and the society it hits.

food security join poverty and nonattendance of satisfactory gainful resources (Barrett, 2010), education of the family unit, populace size of the family, livestock possession, market access, and remittances (Mango *et al.*, 2014). Food security needs to increment over the coming a very long time at testing rates, while confronting issues of degradation and decreased accessibility of natural resources for production, for example, soil and water, and confronting expanding difficulties from climatic change (Friedrich and Kassam, 2016). Additionally, low salary is a fundamental reason behind family unit food insecurity since they don't have enough money to meet their food necessities (Asghar and Muhammad, 2013). Moreover, the action of beneficial assets, for example, green development change impacts the execution of cultivating (Kassie *et al.*, 2011). Developing headway can diminish food insecurity. For instance, example, updated seeds driving towards higher viability (Kassie *et al.*, 2012), while the peril of harvest failure can be diminished with the assistance of the water framework (Hagos *et al.*, 2012). By driving the examination this examination perceived different essential challenges for food insecurity in the study region as given underneath. Table 1 explains the descriptive statistics for socioeconomic and demographic of the sampled households.



The most important factor affecting food security is low income as 196 (57%) of the respondents answered strongly agree depicting that low income is the most important factor affecting food security. This factor is also reported by other studies, like (Asghar and Muhammad, 2013) and (Jabo *et al.*, 2017). Also, (Sell and Minot, 2018) reported that without any income source, a household headed by a woman is more likely to suffer in case of food shortages, especially in rural areas. The second most important factor is the lack of interest from the government to improve the food security of the people in mountainous areas. The percentage is 56.7% of the respondents clicking strongly agreed option. This reflects that institutions don't take an interest to boost the food security condition. This result conforms to a study conducted by (and Eme, 2014) who reported that apparent inconsistency in government targeted policy intervention and implementation strategies make the problem of food security more complicated. The third important factor is low education as 55.8 % of the respondents strongly agreed with the fact that education strongly affects food security. With the rise in education, food security increases as this result is in line with the studies conducted by (Amaza *et al.*, 2006; Asghar and Muhammad, 2013; Bashir *et al.*, 2013a, 2012; Gebre, 2012; Idrisa *et al.*, 2008; Kaiser *et al.*, 2003; Makombe *et al.*, 2010). Low openings for work or joblessness is considered as a critical factor affecting food security as 54.7% of respondents decidedly agreed that at some point or another the respondents may be unfit to confirm control of their own decision or jobless for various reasons which lead to food insecurity since the nuclear family would not have enough cash to buy food. These results are as per disclosures of (Makombe *et al.*, 2010; Abu, 2012; FAO, 2012) who nitty-gritty that joblessness is one of the central factors impacting food security as people are unfit to verify positions which thwarts the purchasing power and deflects access to food.

Table 2 is a descriptive analysis of the causes of food insecurity in target areas. The joined impact of population growth (42.2%), soil degradation (34.5%), along climate conditions (29.3%) is the essential driver of food insecurity in the study area as findings are in line with concluding remarks by (Premanandh, 2011). The low landholding is also a key element as it is around 33.3 %. This is in line with a study conducted by (Lugman *et al.*, 2018) and Oluwatayo (2019) who concluded that smallholder agriculture is very

important for achieving food security and especially they are important for poverty reduction and food availability in poor and developing countries.

### Empirical results

**Correlation: Factors affecting food security:** We found a correlation between different factors that are affecting the food security of households in mountain areas and they are producing great challenges for the people in the study area. The present study used the Pearson Correlation method for establishing a correlation (significant at 0.05 level, 2-tailed) between different variables. Table 3 is a Pearson correlation matrix showing significant and non-significant correlations among different factors affecting food security.

**Table 2:** Responses of the respondents on perceived challenges in the study area.

| Perceived challenges       | Frequency | Percentage |
|----------------------------|-----------|------------|
| Low Education              | 196       | 55.8       |
| Low Income                 | 200       | 57.0       |
| High Population            | 148       | 42.2       |
| Remoteness                 | 123       | 35.0       |
| Poor Infrastructure        | 154       | 43.9       |
| Low land Holding           | 117       | 33.3       |
| Harsh Climate              | 103       | 29.3       |
| Low job opportunities      | 192       | 54.7       |
| Poor health facilities     | 149       | 42.5       |
| Soil degradation           | 121       | 34.5       |
| Deforestation              | 101       | 28.8       |
| Low govt. interest         | 199       | 56.7       |
| Low quality Food           | 162       | 46.2       |
| Unavailability of Markets  | 140       | 39.9       |
| Low agriculture production | 122       | 34.8       |
| Firing on LOC              | 153       | 43.6       |

It was hypothesized that the higher the challenges lower will be the food security. There is a positive correlation between gender and occupation as male is the dominant source of earning in these areas which are reflected in the correlation matrix that, as occupation increases, it employs more males for livelihood earning. This is due to the ability of men to work for longer hours as this has also been reported by Stickney and Konrad (2007) who found that one who has more earnings due to long working hours has more edge on his counterpart. Income was positively linked with occupation. The occupation of

**Table 3:** Relationship among the factors affecting food security.

| Variables           | Gen-der | Occupation | Low Land-holding | In-come | Low Income | H. Popu-lation | Remot-ness | Pr. Infra-structure | Low Land-holding | Firing LOC |
|---------------------|---------|------------|------------------|---------|------------|----------------|------------|---------------------|------------------|------------|
| Gender              | 1       |            |                  |         |            |                |            |                     |                  |            |
| Occupation          | 0.00    | 1          |                  |         |            |                |            |                     |                  |            |
| Landholding         | 0.20    | 0.90       | 1                |         |            |                |            |                     |                  |            |
| Income              | 0.20    | .000***    | 0.30             | 1       |            |                |            |                     |                  |            |
| Low Income          | 0.10    | .000***    | 0.70             | 0.2     | 1          |                |            |                     |                  |            |
| High Population     | 0.50    | 0.10       | 0.50             | 0.8     | .009**     | 1              |            |                     |                  |            |
| Remoteness          | 0.40    | 0.00       | 0.60             | .009**  | 0.20       | 0.10           | 1          |                     |                  |            |
| Poor Infrastructure | 0.60    | .000***    | 0.80             | 0.9     | .001**     | 0.30           | 0.30       | 1                   |                  |            |
| Low Landholding     | 0.20    | 0.00       | 0.60             | 0.9     | .000***    | 0.20           | 0.00       | 0.70                | 1                |            |
| Firing LOC          | 0.70    | .000***    | 0.80             | .000*** | .000***    | 0.00           | .000***    | .000***             | 0.80             | 1          |

Note: \*\* significant at the 0.05 level (2- tailed) and \*\*\* highly significant at 0.05 level.

household rises, income, resulting in improvement of food security. There was a negative correlation between occupation and low income as occupation decreases low-income rises. Similarly, a positive correlation established between high population and low income as population increases low income also increases due to lesser working opportunities for the higher population. Remoteness is negatively correlated with income. People living in remote mountain areas have fewer income-generating opportunities as compared to rural areas. Poor infrastructure is negatively correlated to occupation as occupation gets a negative impact with poor infrastructure while it is positively correlated with low income. This is in line with the findings by Ernesto (2006) who found that rural infrastructure speculations can prompt higher farm and non-farm profitability, income and employment openings, and expanded accessibility of income products, along these lines decreasing poverty by raising mean income and utilization. Low-income level increases with increase in poor infrastructure. Income level decreases further with low land landholding as correlation matrix established in Table 3. The most important correlation was established among firing on LOC, income, remoteness, and poor infrastructure. With the increase in incidents of firing on the line of control, income level goes down with fewer working opportunities. While infrastructure gets damaged by fire and people become less secure and they are cut off from main cities and markets. This is in line with the results of Iqbal (2006) who found intra and interstate conflict negatively influences the health attainment of states and, therefore, the human security of their populations.

#### Factors affecting food security

The study used logit regression to explore the effect of independent factors on food security. The chi-square is (33.167;  $p < 0.01$ ). The illustrative variables or factors that were discovered huge are Gender, Occupation, Landholding, Income, Low salary, High populace, remoteness, Low landholding, and terminating on the line of control (LOC).

**Table 4:** Results of logistic regression analysis determining the factors affecting household food insecurity.

|                           | B       | S.E.  | Wald   | Sig.      | Exp (B) |
|---------------------------|---------|-------|--------|-----------|---------|
| Gender                    | 1.183   | 0.346 | 11.680 | 0.001 *** | 3.263   |
| Occupation                | 0.467   | 0.166 | 7.940  | 0.005 *** | 1.595   |
| Family Head               | (0.284) | 0.427 | 0.441  | 0.507     | 0.753   |
| Age                       | 0.016   | 0.014 | 1.244  | 0.265     | 1.016   |
| HH Size                   | (0.054) | 0.053 | 1.043  | 0.307     | 0.948   |
| Education                 | 0.060   | 0.052 | 1.346  | 0.246     | 1.062   |
| Landholding               | 0.030   | 0.011 | 7.793  | 0.005 *** | 1.031   |
| Income                    | 0.436   | 0.139 | 9.842  | 0.002 *** | 0.647   |
| Low-Income                | (0.320) | 0.120 | 7.110  | 0.008 *** | 1.378   |
| High Population           | (0.335) | 0.162 | 4.265  | 0.039 **  | 0.715   |
| Remoteness                | (0.550) | 0.193 | 8.121  | 0.004 *** | 0.577   |
| Poor Infrastructure       | (0.022) | 0.362 | 0.004  | 0.951     | 0.978   |
| Low Landholding           | (0.262) | 0.120 | 4.747  | 0.029 **  | 0.770   |
| Firing on LOC             | (0.613) | 0.288 | 4.525  | 0.033 **  | 0.542   |
| Constant                  | (0.650) | 0.956 | 0.462  | 0.497     | 0.522   |
| R-Square                  | 0.665   |       |        |           |         |
| F-Value and Sig-nificance | 12.4    |       |        |           |         |

Note: \*  $P < 0.10$ . \*\*  $P < 0.05$ . \*\*\*  $P < 0.01$

We found a noteworthy positive connection between the gender orientation of the leader of the household

and food security. Male-headed family units are more food secure contrasted with female-headed families. The normal odd proportion of sexual orientation is equivalent to 1.183%, which demonstrates that the male-headed family units have 100% opportunity to be food secure contrasted with female headed families. This is in line with the finding of [Felker-Kantor and Wood \(2012\)](#) in an investigation completed on female headed families and food insecurity in Brazil. The examination uncovered that the likelihood of being food unreliable is higher among female headed females contrasted with their male partners. [Table 4](#) is regression analysis for the factor affecting food security in the study area.

The results also revealed a positive and significant association between income and food security (odd ratio=. 436,  $p=. 0021$ ) depicting that with every unit increase in income the probability of food security increases by 43.6%. This confirms the results of [Arene and Anyaeji \(2010\)](#) who concluded that the more profitably employed a household head is, the greater are the chances of his or her being food secure. Adding to this ([Babatunde and Qaim, 2010](#)) concluded that off-farm income contributes to improved calorie supply at the household level. Also, ([Ersado, 2006](#)) found that relatively better-off households have a more diversified income and they are less vulnerable to shocks as compared to poor with fewer income sources. The results also revealed a positive and significant association between occupation and food security. In the study area, around 43% of respondents are jobless which is significantly associated with food insecurity as one unit increase in the jobless index decreases the food security by 46.7%. This is consistent with the study conducted by ([Floro and Swain, 2013](#)) who concluded that occupational choice is very important to mitigate the risk of food insecurity through the selection of income-generating activities. This is also supported by the findings of [Arene and Anyaeji \(2010\)](#) who concluded, if a household is engaged in gainful employment, the chance of his being food secure improves. The landholding is confidently linked to food security with odd ratios of 0.030,  $p=. 005$  while Low landholding is significant, but negatively associated with food security with (odd ratio=-0.613,  $p=. 029$ ). The coefficient indicates that for every additional unit increase in low landholding food security will decrease by 61.3%. This result is consistent with the finding of ([Maharjan and Joshi, 2011](#); [Joshi and Joshi, 2016](#)) who conclude

that a bigger landholding size leads to improved food secured households. Remoteness is one of the important factors in determining food security for a household. The table shows that remoteness is significant but negatively associated with food security having (odd ratio=-0.550,  $p=.004$ ). One unit rise in remoteness will decrease food security by 55%. This is by the discoveries of ([Headey et al., 2018](#)) who presumed that children in increasingly remote rural communities face just a little healthful punishment contrasted with children from less remote networks as the unsafe impact of remoteness vanishes by controlling social and infrastructure administrations. This is also in line with findings of those who concluded that disintegrated and disorganized communities continue to breed challenges to food security ([Kick et al., 2017](#)). One significant factor which is critical in this examination is firing on the line of control (LOC) which is huge yet contrarily connected with food security at (odds ratio=-. 613,  $p=. 033$ ). With one-unit increments in firing on the line of control diminishes food security by 61.3 %. This is following a finding of ([Brück and D'Errico, 2019](#)) who announced that Higher-force clashes, regarding fight-related fatalities, and clashes, including issues about government power might be increasingly troublesome, as outlined by bigger decreases in the normal food supply.

This paper tried to break down the factors that affect the food security status of a household in the mountainous region of AJK. This was accomplished by first assessing the food security status of households in the study area. Our analysis suggested that Gender, occupation, income, higher population, remoteness, landholding, and firing on LOC are significantly affecting food security at the household level in mountain areas. A high percentage of 90% of the sample population are food insecure. Income, occupation, and landholding were the strongest predictors of food security in the regression analysis.

In the present examination, households have a high rate (59%) with an income of more than 31k which is sensible pay to buy the food. This is by our earlier desire for ([Mannaf and Uddin, 2012](#); [Sekhampu, 2013](#); [Nord et al., 2014](#)) that expanding the income of a family would improve the likelihood of a household to be food secure as it assembles capacity to purchase food. The outcomes demonstrated that a more prominent level of respondents isn't winning great



income which prompts a decrease in food security as recommended by different past examinations also. In mountain zones, farming profitability is low as respondents have marsh holding because of land fracture as bolstered by (Yen *et al.*, 2013) who inferred that agribusiness efficiency is obstructed because of low landholding bringing about lower creation. Around 30% of respondents are occupied with cultivating in the study region to help their business. As landholding is low their production is subsistence, and this altogether adds to bring down food security in the investigation region. An expanded population causes food insecurity as the number of individuals living in a household influences food distribution. The lower the populace, the lower will be food insecurity.

Age, household size, and education are revealed as important determinants in previous studies, but we did not find any significant, association between these factors and food security in the present study. This may be because the study was cross-sectional, which is susceptible to bias due to low response and misclassification due to recall bias. Remoteness is one factor that is significant with a negative association with food security is unusual as previous studies supported this result that the effect of remoteness could be minimized by improving social and infrastructural facilities as supported by (Headey *et al.*, 2018). This is very important in the case of study areas as poor infrastructure is sighted by 43% of the respondents as one of the causes of food insecurity. Thus, improving landholding, income and education could overcome remoteness to achieve food security. Firing across the border is a very important factor affecting the food security of people living on both sides of the line of control between Indian-occupied Kashmir and Azad Kashmir. The people were greatly affected by firing from forces on both sides. The recent conflict between India and Pakistan resulted in a great loss of property, houses, and livestock along with human loss. This leads to shortages of food and hence results in the population shift to safer places. This is in line with the finding of (Zhang *et al.*, 2007) who revealed that the growing population was badly impacted by both war recurrence and food supply per capita significantly dropped to negative qualities. (Brück and D'Errico, 2019) assumed that the food security-rough clash nexus won't be broken except if powerful intercessions handling the two sides of the condition can be found as there is a solid nexus between food security and conflict.

## Conclusions and Recommendations

The point of the investigation was to decide the status of food security of the examination regions while distinguishing the factors influencing food security and saw difficulties looked at by individuals living in the mountain territories. A cross-sectional examination was led, and logit regression was utilized to accomplish the goals. The results of descriptive analysis affirm that food security circumstance isn't great in the study area with 92% of the respondents are food insecure with a low and very low dimension of food insecurity. The oddity about being food secure was dictated by the variables like income, population, occupation, landholding, remoteness, low landholding, and firing on the LOC. The important factors found to be significant resulting in improving household food security are low income, higher population, remoteness, and firing on LOC which are negatively correlated with household food security. The finding of the study highlighted the importance of factors significantly associated with household food security in mountainous areas. This study strengthens the importance of income, occupation, and landholding for attaining food security status for a household. It was also concluded from the study that impacts of remoteness could be tackled and minimized by providing social and infrastructural facilities to the people living in remote areas.

### *Practical implication*

The findings of this study suggest some crucial implications for the concerned departments and the government to improve the household food security status of the people living in remote mountain areas. The food security could be accomplished by spending on income-generating activities despite some discussion in regards to the viability of expanding income in reducing food insecurity (Subramanian and Deaton, 1996; Bouis and Haddad, 1992; Behrman and Deolalikar, 1987), income generation is significant for improving food security of a family in remote and mountainous territories. Further, introducing cost-effective technology for agriculture production, improving infrastructure, peaceful settlement of the dispute between two countries could add to food security in the study area.

### *Limitation*

Although this study contributes to the literature, the certain limitation must be mentioned here. Due to



resource constraints, cross-sectional data was used. The characteristics are measured at the same point in time and respondents are not measured repeatedly over time, an outcome of interest can't be achieved. This issue requires longitudinal study that allows examining the change in individual household's food security status over time. Another limitation that this study faced is the lack of interest from respondents which reflected the lack of trust people usually holds for this kind of effort as is not fruitful to them.

#### *Future research direction*

To the best of my knowledge, this study was the first of its kind in mountain areas of AJK, which gives way to further studies, particularly focusing on educating people and about food security and community-based intervention on the line of control to improve food security in mountain areas.

### Acknowledgments

The authors would like to thank the respondents who actively participated in this research and spared time to provide the requisite information. This research did not receive any grant from any funding agencies in the public, commercial or non-profit organizations.

### Novelty Statement

The study of food security in terms of its constraints is first time studied with relation to its status along the line of control between Pakistan and India. No data is previously available on food security and the impact of firing on line of control found. The present study concluded that firing on line of control adversely affects the food security of the people living on both sides of the border.

### Author's Contribution

**Muhammad Qaddafi Khan Wali:** Study design, questionnaire development, data collection and analysis, write up.

**Arif Alam:** Study design, data analysis and interpretation.

**Ikram Shah:** Questionnaire development, data tabulation.

#### *Conflict of interest*

The authors have declared no conflict of interest.

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