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Natural and Socio-economics Factors Affecting the Household Food Security in Rural Area of Paktia Province, Afghanistan

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Authors' contributions

This study was done in collaboration between both authors. Author WKA designed the study, analyzed the data, and wrote the first draft of the manuscript. Author HGA supervised the study and revised the final manuscript. Both of the authors managed the literature search writing of the final manuscript.

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ABSTRACT

This study aimed to explore the factors affecting food security in the rural area of Paktia province, Afghanistan. The study was based on household-level data collected from rural areas of all districts of the province. The data were collected from randomly selected 154 households. The respondents were both males and females. A face-to-face interview with a structured questionnaire was done with both male and female household heads. The study recorded 59.1% of households were food insecure, and on average, 48.1% of the household had poor food consumption, while, 38.3% had borderline and 13.6% had acceptable food consumption. Study also calculated food consumption scores and examined the correlation between different factors determining food security. The regression result showed lower-income, farm size, household size, flood, food price, and internal displacement factors determined the food insecurity.

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1. INTRODUCTION

Food shortage is a critical problem in most developing counties including Afghanistan [1]. According to FAO 2016, a food security is "a circumstance that exists when all people, at all times, have physical, social, as well as economic access to sufficient, safe, and nutritive food that meets their dietary needs and food preferences for an active and healthy life". Food security is related to obtainability, stability, accessibility, and utilization aspects [2]. It is not only related to quantity but also nutritional quality. Local food security is considered more concerning uses in the world including Afghanistan. Presently, 842 million of the world population (12% of the total population) are living under food insecurity, and most of them are from developing countries. South Asia has too much vulnerability, so 294.7 million people only in South Asia are critically food insecure, which makes up 35 % of the total food insecure population [2]. Afghanistan is also located in South of the Asia. Between November 2019 and March 2020, around 11.29 million of the Afghanistan population (37% of the total population) was afflicting severe food insecurity, out of which 8.6 million people likely to be in crisis, nearly 2.7 million people be in an emergency, and around 9.45 million people under stress, which was needed urgent humanitarian action [3]. An understanding on the factors determining food security would help policymakers to make an informed decision.

Previous studies investigated the roles of several factors determining food security. The factors include low wages, lack of job opportunities, household income, education, refugee status and IDP migration [4]. Some studies found gender, age, and disabilities [2,5]. Other studies identified social norms, natural disasters, civil conflicts, and climate change, household assets, homeownership [6-8]. Some other studies determined access to market information, none-farm work, family size, irrigation access, farm size, land quality (soil fertility) and household head sex [9-13]. However, roles of these factors on food security varies with time and local context. There is no study at the current time and specific to the context of Paktia province. This study aimed to explore updating current situation in the local context.

2. METHODS AND ANALYTICAL TECHNIQUES

2.1 Study Area

Paktia is located in the southeast of Afghanistan, Gardiz is the provincial capital. Fig. 1 illustrates the geographical location of the study sites. It has a total population of 590,668 that consists of 301,873 males and 288,795 females. Out of this population, 563,685 live in rural areas the rural population contains 288,351 males and 275,334 females [14]. Paktia is in the third phase of food insecurity, which is facing with food insecurity crisis [3]. Between November 2019 and March 2020, Around 230,290 people (38.98% of the total population) of the Paktia province were in minimal food insecurity. Around 180,179 people (30.50% of the total population) were afflicted with the stress of food insecurity. Nearly 120,076 people (20.32% of the total population) were in the food insecurity crisis, and around 60,123 (10.17% of the total population) were in the emergency of food insecurity, which needs urgent humanitarian action. Fortunately, no one of the Paktia indigenous inhabitants is in the catastrophe of food insecurity, but they are in the crisis stage of food insecurity [3].

2.2 Data Collection and Analysis

The data obtained from the primary source through a well-structured questionnaire administrated to the household within the rural area of all districts, Paktia, Afghanistan. Random sampling techniques were performed to select 154 respondents in 13 districts of Paktia Province. Data were collected on face-to-face interviews in the local language (Pashto) with household heads both male and female. The respondents were asked questions regarding to the dependent variable on the natural and socio-economic variables and as well as the types and quantities of food consumed in a week for the food consumption score analysis (FCS). The data of this study was analyzed in R platform.

2.3 Empirical Modules

This study analyzed the data in various ways: descriptively, score calculation and regression. Descriptive statistics have been used to summarize the main characteristics of the

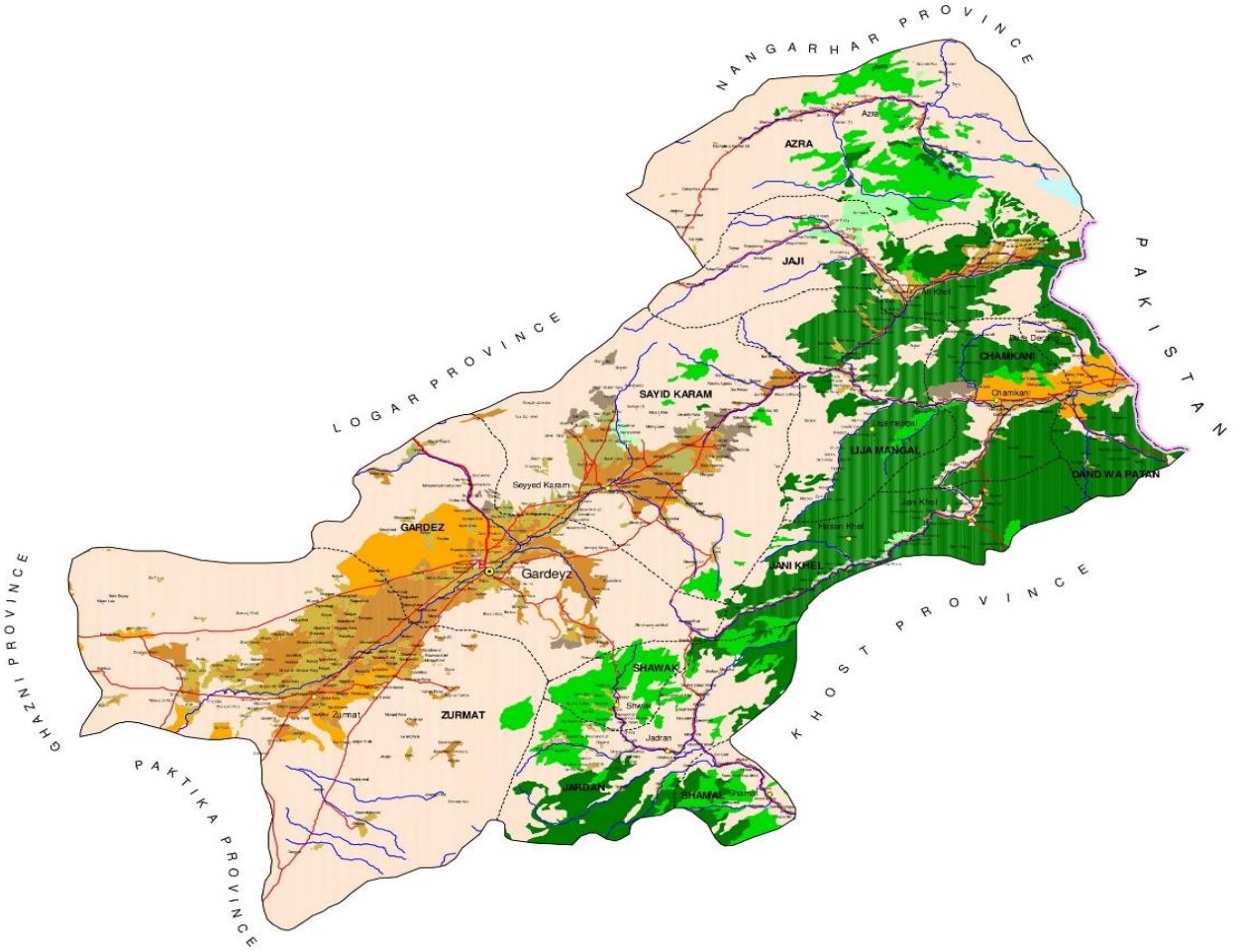

Fig. 1. Geographical location of Paktia province, Afghanistan

respondents in terms of frequencies and percentages, purposively. Furthermore, the food Consumption score was analyzed by using the seven days' recall approach (FCS). A binary logistic regression technique was used to determine the factors that influence household food insecurity.

The Food Consumption score is analyzed using the following formula, or we can say that the Food Consumption Score (frequency*diversity) of foods of a household in seven days.

$$FCS = (starches^{*}2) + (Plses^{*}3) + (meat^{*}4) + (dairy^{*}4) + (fats^{*}0.5) + (sugar^{*}0.5)$$

3. STUDY RESULT AND DISCUSSION

3.1 Descriptive Results

This study was conducted to find out the factors that affect food security on a household level in the rural area. Table 3 shows the summary statistics of those natural and socio-economics factors. This study revealed that 59.09% of the resident in the rural area of Paktia Province are food insecure while 40.91% is food secure. According to this study, more than half of the people are food insecure; also, another study shows that about one-third of the Afghan population suffered from food insecurity [7]. This high rate of food insecurity is due to low household income, lack of education and health services, household size, internal displacement, spending a huge amount of their income on food because of high prices, flood, and insufficient cultivable land. Moreover, Table 2 shows the demographic characteristics of the study area, which is described below. There were only 5.2 percent household headed by female; 10.4 over 65 years of age, 19.5 percent non-married, 38.3 illiterate, 66.2 totally farm dependent. Over 61 % households had greater than 17 family members and only 42.9 % farmers had income greater than 30 thousand Afghani rupees.

3.2 Correlation of Potential Factors Determining Food Security

a. Require to illustrating the correlation result Table that you presented in the original version of this manuscript, not that you presented in 3.8 section of this version. b. discussion on the correlation results. c. Conclude that the high correlation between some factors might be resulted variance inflation and multi-collinearity problems in regression result. Then state that you select the factors which will have more policy intervention importance.

3.3 Regression Results

Table 3 illustrates the results of regression. The signs of the coefficient of the determining factors are consistent to theory and our expectation. {Please report R square or Pseudo r square value and say that} the r square value also indicates the estimated model is reasonable. Therefore, the result of this regression analysis are valid).

3.3.1 Gender and marital status

Generally, Afghanistan is a male dominant society, in this kind of society males are responsible to provide all the basic requirements of a household such as food, clothes, and shelter. In some cases, females also lead the family, more precisely in the case of separation, divorce, and widowed, but it is a rare case across the country. According to this study, 98.81% of households are male-headed, and 2.19% of households are female-headed. Female-headed households are two-fold food insecure in comparison to that of the male-headed household [15]. The probable reason is that female-headed households' food insecurity is due to was lack of working opportunities, which lead to either lower or zero income. Table 2 shows that there is 80.52% of household heads are married, and roughly 19.48% of the respondents are single, divorced, or separated.

3.3.2 Age

Generally, the person who leads the family is more senior than other members of a family, because the household head is the decision-maker of a family. According to decision-making principles, age is very important in socioeconomics decision making [16]. According to this study, Table 2 shows that 1.30% of household heads are under 18 years old. While, 88.31% of them are between 18 to 64, which is very common and very frequent. Also, 10.39% are above 65 years old. Under 18 and above 65 groups are more food insecure than other groups, because of lower-income and limited employment opportunities.

Table 1. Description of the variables used in the study

Variables	Symbol	Description and measurement
Food Security	Y	1= if the HH is food secure; 0 = otherwise
Gender	β_1	1 = if the household head is male; 0 = otherwise
Age	β_2	Age of HH head by years
Marital Status	β_3	1 = if the household is married; 0 = otherwise
Education	β_4	D = 1 if HH head is literate; 0 = otherwise
Occupation	β_5	D = 1 if the HH head is farmer; 0 = otherwise
Household Size	β_6	Number of household members
Unemployment	β_7	1 = if food insecurity is caused by unemployment; 0 = otherwise
Disability	β_8	Number of HH members, which have a disability
IDP	β_9	1 = if the HH is migrated; 0 = otherwise
Distance from Road	β_{10}	Distance from main road number of kilometers
Market Access	β_{11}	Distance from the market where they can sell their products (Kilometer)
Income	β_{12}	Monthly income of household (AFN)
Spent on Food	β_{13}	The amount of money spent on food per month (AFN)
Treatment	β_{14}	The amount of money spent on treatment per month (AFN)
Food Aid	β_{15}	1 = if HH receive food aid; 0 = otherwise
Food Price	β_{16}	If HH food insecurity is caused by food price
Credit	β_{17}	1 = if HH has access to credit; 0 = otherwise
Farm Size	β_{18}	Size of cultivated land by Hectare
Wheat Production	β_{19}	Quantity of wheat production of Tons
Flood	β_{20}	1 = if food insecurity is caused by flood; 0 = otherwise

Table 2. Socioeconomics characteristics of household in the rural area of Paktia province, Afghanistan

Variables	Category	Frequency(154)	Percentage(%)
Gender of the household head	Male	146	94.81
	Female	8	5.19
Age of household head	<18	2	1.30
	18-64	136	88.31
	>65	16	10.39
Marital Status of the household head	Married	124	80.52
	Otherwise	30	19.48
Educational Status of the household head	Literate	95	61.69
	Illiterate	59	38.31
Occupation of the household head	Farmer	102	66.23
	Otherwise	52	33.77
Household size	< 9	11	7.14
	10 - 14	49	31.82
	> 15	94	61.04
The income of a household	≤ 10,000	27.00	17.53
	10,001 – 19,999	27.00	17.53
	20000 – 29,999	34.00	22.08
	≥ 30,000	66.00	42.86

3.3.3 Education

This study showed that increased household education attainment was associated with an increased probability of being food secure. Other studies showed food security to be associated with the level of education [17-19] and in contrast to those of Garrett and Ruel [20] who stated no significant association between education and urban and rural food security in Mozambique. In this study, Table 2 showed that 61.69% of household heads are educated, and 38.31% are uneducated. Besides, investment in the education of a household in long term contributes to a reduction in the prevalence of food security [21].

3.3.4 Household size

The average household size in Afghanistan is 8 members [21]. Whereas, the result showed the average member of a household is 19 in the studied area. The size of the household was another socio characteristics of this study that was classified into three categories. There is 7.14% under the 9 members, 31.82% were between 10 to 14, and 61.04% were more than 15 members. Moreover, most of the families which live in the rural area are nucleus families. This study found that household size is a significant factor in food security, so a family with fewer members were more food secure than those families which have more members. As it is reported in several research that households with a larger number of members are more likely to be food insecure. Besides, another study concludes with the same results that large family size has a negative impact on house food security [22].

3.4 Income, Credit and Spent on Food

The most important factor which directly affects food security is Income. Table 2 states that 17.53% of households had less than 10,000 Afg monthly income, while 42.86% of the households had more than 30,000 monthly incomes, but due to the more members of the households that amount of income was not sufficient for most households. Also, as the income was not satisfactory for their daily life, the current credit system was not effective as well, which result is similar [5] In the study area, 40.9% of the household had not accessed to credit system whereas 59.1% had access to credit. There are several sources of credit, but in this studied area 2.2% was from the formal organization, 76.9 from relatives, 12.1% from local lenders, and 8.8% from other sources. It had different proposes, where 28.6% was for farming and livestock, 50.5% for food, and 20.9% for other purposes. Moreover, 39.6% were unsatisfied with the current system of credit, while 60.4% were satisfied, and 2.2% of the credit was with interest and 98.8% was without interest. Moreover, the result shows that the household spent 60% of the total income on food due to the high prices and

low production, and 11% of their income on medicine and treatment. Also, another study stated that Afghanistan is a lower-income country, on an average, 56-77% of the household's total income is spent on food [5]. Not only has the household food security influenced by total household income but the proportion of income controlled by women had a positive and significant influence on household caloric intake [10].

3.5 Occupation, Unemployment, Disabilities and IDP

In the landlocked developing countries, agriculture and raising livestock are the backbone of the rural economy [23]; hence in the study area, 66.23% of household heads' main occupation was farming, and most of them were small farming. Besides, 33.77% were working rather than in the agricultural sector. Also, unemployment was another determiner which was studied in this survey, so it is found that 62.34% of the household had 1-2 unemployed member in their families, who was eligible for the job and the had attention to work, but they could not find jobs. Also, 29.22% of household had 3-4 unemployed members, and 8.44% of the household had 5 or more than 5 unemployed members in their families. Due to the ongoing war, there were 1.30% of the household had 3 disabled members; 2.60% of the household had 2 disabled members; 12.99% of the household had 1 disabled member, and fortunately, 83.12% of the household had no disabled member in their families. In the studied area residency type were classified into two groups permanent residency and IDPs (internal displaced). According to this study, 31.17% of households were internally displaced, and 68.83% were not displaced. More common causes of displacement are conflicts, violence, and disasters. Another study showed IDPs are most vulnerable and worst affected by food insecurity in Afghanistan, due to the lack of sanitation and health facilities and access to food [1].

3.6 Farm Size

Farm size is the total area of land cultivated for food and cash crops by a household mastered in hectares [24]. According to this study, another significant factor was farm size that shows that the larger the farm size of the household, the higher the expected level of food production, it is, therefore, expected of a household with a larger farm size to be more food secure than a household with smaller farm size. Also, according to this study the minimum land size was zero, the average was 2.33 hectares, and the maximum land size per household was 24 hectares.

3.7 Food Price and Food Aids

The rising food prices have an immediate impact on household food security because millions of people in developing countries are already in food insecurity. Also, it has a huge impact on wealthy countries' consumer's food quality as well, so consumers are scaling down on quality and scaling up on quantity to contain their food costs. According to this study, high food prices were directly affected by 67.53% of respondent's food security, which is a vast number. Additionally, the study found that flood was another significant factor, so 15.58% of the respondents have experienced a mild and severe flood. Another study shows a similar result that climate and price variability adversely affect the income and food security of households [25].

Table 3. Impact of natural and socioeconomic determinants on household food security

Food security	Coefficient	Std. Err	T	P-value	[95% Conf. Interval]	
Marital Status	0.195987	0.1236874	1.58	0.115	-0.0486617	0.4406362
Household Size	-0.01037	0.0042491	-2.44	0.016**	-0.018774	-0.0019647
IDP	-0.14428	0.0827033	-1.74	0.083*	-0.3078657	0.019302
Income	6.29E-06	2.29E-06	2.74	0.007***	1.75E-06	0.0000108
Food Price	-0.17744	0.0816381	-2.17	0.032**	-0.3389163	-0.0159622
Farm Size	0.031249	0.0116132	2.69	0.008***	0.0082787	0.0542196
Wheat Production	0.008695	0.0064313	1.35	0.179	-0.0040264	0.0214153
Flood	-0.18446	0.0792523	-2.33	0.021**	-0.3412154	-0.0276993
_cons	0.37831	0.221634	1.71	0.09*	-0.0600733	0.8166936

*Significance is indicated by *** p<0.01, ** p<0.05, * p<0.1. Source: own composition based on this study*

3.8 Distance from Main Road

Usually, people in the rural area live far than the main road, according to this study, 5.72 Kilometers were the average distance from the main road, and in the study area 24% of the roads were paved and 76% were unpaved, which is a big problem to the transportation of agricultural products. In contrast, 10.43 Kilometers was the average distance to the nearby market where they could buy food and other necessities for their life, and sell their products.

Some factors were closely correlated with others and were not significant have been removed from the study, like drought, disease, and livestock. One of those factors was livestock which studied separately, so it is found that 126 households equivalent to 81.8 % of total households had livestock, and 28 households equivalent to 18.2 % of the total household had no livestock in their houses. Of those 126 households which had livestock 86.5 % were kept for their use while 13.5 % were keeping for sale. Lower productivity and old system of livestock was the only reason which decreased the animal's product that was sufficient neither for their use nor for sale, so it could not play a vital role on household's food security.

Finally, some factors were not significant in this research which must be significant such as food price, and unemployment rate, this factor may need long term of study and specific research, which future researchers are suggested to study it.

4. FOOD CONSUMPTION SCORE

For measuring the food consumption analysis a 7-day recall approach was used. This is a proxy indicator for assessing the degree of a household's current food security. FCS or Food Consumption Score means the frequency of food in one week for each type of food such as (sugar, oil, meat, pulses, cereal, fruits, and vegetable) their coefficient is determined based on the nutritional importance of food which calculated in this formula:

$$FCS = (starches^{*}2) + (Plses^{*}3) + (meat^{*}4) + (dairy^{*}4) + (fats^{*}0.5) + (sugar^{*}0.5)$$

In contrast, we can say that the Food Consumption Score is the (frequency*diversity) of a household in seven days. Dietary Diversity (DD) is the number of different consumed food in the past seven days [26]. Moreover, Food Frequency (FF) is the specific item of consumed food in the past seven days [27]. Household Food Consumption Score (HFSC) means the seven days' recall of food on a household level. The maximum score for FCS is 112, which means all types of food groups are consumed in the past seven days. while 1-28 is a poor category of FCS, 28.01-42 is the borderline and >42 is the acceptable category for FCS analysis [26].

According to this survey, on average, 48.1% of the household had poor food consumption, while, 38.3% had borderline and 13.6% had acceptable food consumption in study areas (Fig. 2). On the other hand, another result was reported by SFSA in 2014; stating that on average 5.7% of the households has poor food consumption, and 25.9% had borderline which was slightly lower than the finding of this study area, however, 68.5% of the households has acceptable food consumption in Afghanistan. So we can say that food insecurity is increased dramatically over the last six years due to the current war, unemployment, and lower-income.

Table 4. Correlation of factors affecting household food security

Variables	Food security	Marital status	Household size	IDP	Income	Food price	Wheat production
Marital Status	0.1091	1					
Household Size	0.1094	0.0868	1				
IDP	-0.1607	-0.1292	-0.044	1			
Income	0.3612	0.1521	0.5797	-0.0392	1		
Food Price	-0.2692	0.0791	-0.153	0.0774	-0.2216	1	
Wheat Production	0.1604	0.0725	0.0602	-0.0752	0.0356	-0.1716	1
Flood	-0.1834	0.0778	0.0657	0.0845	0.0315	-0.0048	0.1325

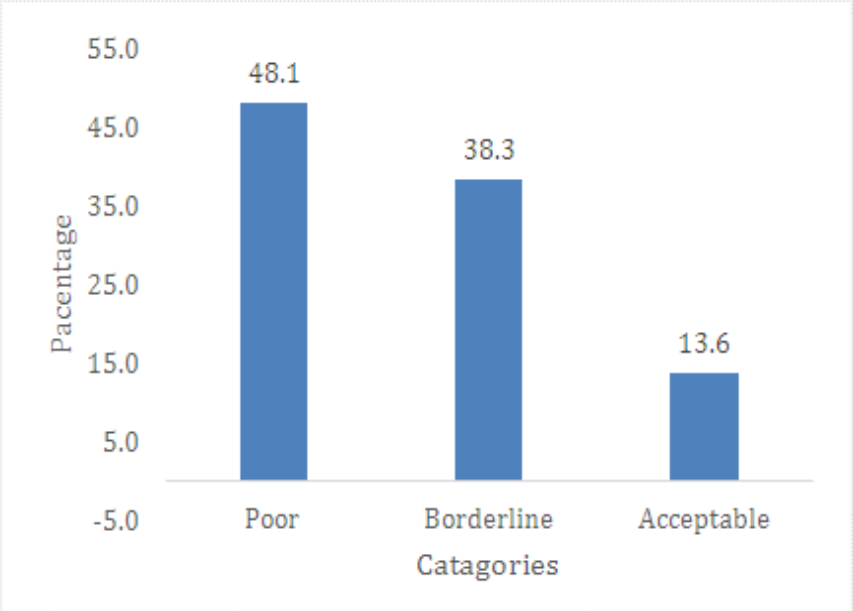

Fig. 2. Overall food consumption score

5. CONCLUSION

A number of policy implications can be drawn from this study. This study determined high food scarcity households have large family size, low income, smaller land holding capacity. The high food scarcity with large household size implies that Government and other development agencies require providing more supports to those household groups.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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