

Production of agricultural goods and ensuring food security

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Key words: food security, agrarian police, households, farms, food production, rural areas, productive livestock, natural and financial resource, indicators, observation, price, factors, families, employed, forecasting, classification, regression, population.

Annotation

Currently, one of the most pressing issues is to identify opportunities to food security in most countries. The level of food security of the population and the security of existing food stocks depend directly on the agrarian policy of the government. If we pay attention to the high share of household farms in the production and delivery of food products on agriculture of the country, it is significantly more difficult to scientifically predict the current state of food security. This is because the fact that many farms operate independently without legal entity status limits their access to official statistics. According to the results of the study, several mathematical models can be used to predict the current state of food security in the country. This mathematical model has been developed because of surveys and statistics, and can be used in the development of long-term plans for food security.

INTRODUCTION.

It is known that each country prioritizes the provision of a healthy lifestyle and quality food to its population¹ because providing population health is one of the biggest problems for all countries government. Further economic processes can only be developed when each state achieves a quality and safe food supply. Most researchers pay attention great emphasis on two major components in ensuring food safety. The first component is that the process of production, transportation and storage of quality food and raw materials in agriculture. The second component is that the use of products grown in different agricultural entities, i.e. processing, consumption in the form of complete and semi-finished food products. Accordingly, we can say that the volume of food production, losses during transportation, storage, sale and processing are the main factors determining food security². In general, we can consider the processes of food production and

¹ World Bank (1986), “Poverty and Hunger: Issues and Options for Food Security in Developing Countries”. Washington, D.C: The International Bank for Reconstruction and Development/The World Bank.

² Johnson, U. (1986), *Nutrition, Household Food Security and Women: Experience from Tanzania*, Dar es Salaam, UNICEF

providing its safety as a large system. Because food goes through a number of stages, from agricultural production to industrial processing, so this process is including many stages. However, in this system, it covers all industries that provide resources to agriculture and the agrarian sector, as well as transport services, trade system and processing processes.

Simply put, ensuring food security is the responsibility of all sectors in the country, not just a specific network. Given the large number of small-scale farms in the country, it is significantly degree composite to determine the total volume of crops grown and forecast in the future. This is because a certain part of the products cultivated in households can be taken for domestic consumption, and some part of them might be sold at the market, besides that some households saved their products in indefinitely. Of course, some factors are directly influencing on these situation such as fluctuations ensuring resources, demographic changes in the population and consumers incomes.

According to research, it is difficult to say that even the most developed countries have achieved complete food security. Because, no any countries to develop without economic integration therefore all countries are inextricably linked. If somehow country has an economic problem it is directly influence to its partner which countries are economic corporate with its. This phenomenon seemed obviously at pandemic time in 2019. However, in the agriculture of the republic of Uzbekistan there is an opportunity to produce quality food products and thus ensure food security. According to a study by international organization FAO, more 760 million people globally are undernourished around the world in 2020-2021 years³. This number showed that the roughly one in seven people are not able to eat health food in the world. According to the FAO report that many countries of the African continent are going to face very serious challenges to ensuring food security due to the lack of a clear system in place. In concordance with to our research, the average income of farms in the country in 2015-2020 will be \$ 200 USA, while more 98 % of the population will be provided with full meals. In this regard, we can say that the support of the agricultural sector and the implementation of ongoing reforms are able to provide the population of the country with full high quality food and increase export potential of agricultural products. For example, although do not enough natural resources Japanese farms not only provide in their country to high quality food but they are able to rice export to some countries⁴. If we pay attention to the ongoing reforms in the country that reforms of agriculture is one of the main pillars of the economy.

In general, we can see that since the first years of independence, large-scale reforms have been carried out in the agricultural sector. In there have seemed structural change that all government agricultural state farm have turned into private farms. The fact that in our country about more 50 percent of the population lives in rural areas, at the same time approximately 32 percent of total exports are agricultural products reflects the importance of agriculture. The fact that a large proportion of food products grown in agriculture is accounted for by farmers, as well as the complexity of direct economic relations with processing enterprises, is significantly problematic in ensuring food security. In our research showed that we can see that 10% of the population of the country is not fully provided with food. Ensuring employment of the rural population and providing the population with adequate food is a key criterion of food security.

³ <https://www.fao.org/state-of-food-security-nutrition>

⁴ <https://www.trademap.org/>

Accordingly, in order to meet the basic food needs of the underemployed population that various programs are being developed and implemented by the government. In general, surveys were conducted in several districts to determine the results and prospects of ongoing reforms to ensure food security. It is noteworthy that the situation in most districts and villages is very close to each other, and the research was conducted mainly based on the following questions:

- Number of people living on the studied farms: the number of family members in a farm is a key factor in determining the volume of domestic consumption or sales of products produced. This is because population growth in rural areas has a direct impact on the availability of food products grown on farms. In the studied farms, the population is divided into age groups. Considering that most farmers now produce based on more experience, we can say that the age of the females leads to a relative reduction in production costs and an increase in productivity. In addition, experienced farmers can use the land more efficiently.

Gender: The sex of the population has a significant impact on the production of nutritious food products in agriculture. This is because while the main seasonal work relies heavily on the labor of women, men play a major role in planting and harvesting. Accordingly, the study focused on the gender of each population. However, although the division of labor is evenly distributed on farms, more men are thought to be responsible for ensuring food security in the studied areas.

Social capital: the existing economic and social capital of the peasant economy is one of the main factors determining the efficiency of production. That is, the availability of sufficient labor in the family, on the one hand, reduces overhead and, on the other hand, ensures the employment of family members. Therefore, the social capital of farms plays an important role in ensuring food security.

Material capital of producers: we can add to this capital the number of more available machinery, productive livestock, and the size of the farmland. In general, since livestock also has a direct impact on food security, it is advisable to take into account the total number of livestock in the rural population. At the same time, for most rural residents, keeping livestock is seen as a retention of additional capital. It should be borne in mind that in most rural areas productivity is increased by more extensive methods, i.e. by expanding the area under cultivation or increasing the number of livestock. However, it should be borne in mind that the increase in the area of land used in agriculture is not considered a factor that fully ensures food security.

Financial capital: it is advisable to pay more attention to more government subsidies and grants or soft loans of banks. Due to the direct dependence of agriculture on seasonality, it is possible to use insurance capital in part. However, it is also possible to raise funds through government programs through farmers associations.

Employment: Given that food security depends directly on financial resources, it is very important to provide permanent employment. As mentioned above, the modernization of the processing system of agricultural products will create the basis for the creation of permanent new jobs in the industry. namely, the ability to form food stocks is achieved by improving the processing and storage chain. This makes it possible to provide the population with food at a steady pace, even in times of a sharp decline in income. However, seasonal employment in most rural areas is leading to labor migration.

According to FAO research, the introduction of technologies for processing and storage of agricultural products in their areas will, on the one hand, support employment and, on the other hand, reduce the cost of food production. At the same time, it increases the chances of the rural

population to be constantly engaged in seasonal work, rather than seasonal work. Studies show that seasonally employed workers are not always able to fully meet their food needs. Accordingly, our study included seasonal, fully employed, and generally unemployed.

The obtained indicators and their evaluation model:

The study was conducted on the example of the oasis regions of the country, mainly in the districts of Syrdarya, Jizzakh and Samarkand regions, and is based on the assessment of food security in these areas. The demographic situation of the population, changes in farm incomes and financial opportunities were collected through surveys. Initially, surveys were conducted to select different socially similar families. A total of 280 households were surveyed, the results obtained were statistically analyzed, and the outlook was developed using regression analysis. For this, the Y-binary variable was obtained using the Bernoulli distribution.

$\pi = P(Y = 1)$, is $P - \text{by } x_1, x_2, x_3, x_4, \dots, x_k$, which represents the level of food security of the studied families. These results were calculated according to the logistic regression analysis:

$$\ln \frac{\pi_i}{1-\pi_i} = \beta_0 + \sum_{j=1}^k \beta_j X_{ij} \quad i=1,2,3\dots n., j=1,2,\dots,k^5$$

In this case $0 \leq \pi_i \leq 1$ accordingly, in $\ln \frac{\pi_i}{1-\pi_i}$

Here π_i represents the probability of current food security in the farms studied; X_{ij} studied i is a factor determining the state of food security to farms.

This research work is intended to be calculated by the method of binary logistic regression, and Table 1 obtained several parameters collected as a result of observation.

The data obtained for logistic regression analysis.

№	Name	Contents
1.	Age of the population which are studied farms	Age changes are recorded during follow-up
2	Sex	The gender of the surveyed farm manager was set at 1 for males and 2 for females.
3	education level	Higher education, secondary-special and secondary education
4	Family size	All family members which are living together
5	an informal family fund	Informal forms of the fund
6	Official Population Fund	Statistically recorded material fund, deposits in bank accounts
7	Family debt	Loans from official banks, informal material debts.
8	The status of the dechkan farms	Legal, physical

On the one hand, this study provides an opportunity to assess the current state of food security and forecast the future. It should be noted that any forecast does not give a 100% result, the results obtained only reflect the analysis of data collected through monographic observation and their dependence on certain rules. Hence, according to monographic observations, each agricultural producer spends the full amount of available resources at his disposal. When they statistically analyzed their efforts to ensure food security, it was determined how much of all

⁵ Justine Mbukwa. *International Journal of Development and Sustainability Online* ISSN: 2168-8662 – www.isdsnet.com/ijds Volume 2 Number 2 (2013): Pages 544-555 ISDS Article ID: IJDS12112503. Kamugisha, C.A. (2001), *Household Coping Strategies for Food Security in Hazardous areas of rural in Kagera rural Tanzania*. Un published PhD Thesis, University of Dar es Salaam, Tanzania

spending was spent on food security. The data on social and financial resources obtained because of the observations are summarized in Table 2.

Table 2. The relationship between food insecurity and financial capital.

Food safety status x² P value					
	Number of households	Total %	food security is not ensured	food security is ensured	
Bank account number					
Available in practice	69	18,1	15	3,1	13,37 0,035
Not available in practice	313	81,9	46	35,9	
Debt					
Official	38	9,9	6,5	3,4	287,1
Nonofficial	344	90,1	54,5	35,5	0,75

The average age of the population in the studied households as a result of monographic observations, the number of people living in the family, the statistical relationship of the level of education of the family Table 3.

Table 3. Household level of education

Food safety status					x² P value
Variables	Number of households studied	Total %	Food security is not ensured	Food security is ensured	
Sex					138,2 0,361
Male	124	32	13	19	
Female	258	68	27	31	
Number of people living in the family					122,0 0,319
from 1 to 5	110	29	17	12	
More 6	272	71	49	22	
Age of studied families					50,68 0,132
Up to 25 years	51	13,4	7,6	5,8	
26-30	81	21,2	16,8	4,4	
31-35	51	13,4	9,2	4,2	
36-40	64	16,8	11,8	5	
41-60	94	24,6	11,8	12,8	
61 +	41	10,7	3,9	6,8	

In order to draw more accurate conclusions from these results, which were analyzed statistically (x squared), it is also necessary to analyze the method of logistic regression. With logistic regression, the extent to which the status of each variable depends on food security is analyzed separately. In order to obtain clear conclusions, the level of food security and the probabilities that hinder food security are determined. The results obtained are considered greater than or less than 1 (one), i.e., less than one indicates a negative probability.

In this case, the probabilities are calculated using the following $\frac{\pi}{\pi-1}$.

The above formula can be expressed as the dependence of the given factors on each odd variable. That is, the dependence of factors such as the level of information, formal and informal financial status of the studied households on food security.

Table 4 shows the interdependence of each factor in ensuring food security, as well as its specific contribution. The probability of all variables was calculated based on Valda's statistics. In this case, the larger the values, the higher their significance. The data given in Table 4 have a maximum probability of 95 percent, as it should be remembered that the data in Table 2-3 are calculated with an error of 5 percent. In fact, the probability can be as low or as high as 95 percent, as not all factors can be fully taken into account.

In general, the main criterion of human capital in the family is the level of education of family members, but given that farming in our country is based on more years of experience, this figure is always difficult to fully justify. However, according to the analysis of the obtained results, when analyzing the data level of households, it was found that $P = 0.012$. At the same time, we can see that the level of education of the population affects almost 95% of food security. Hence, the increase in the level of education of the population has a direct positive impact on food security.

The extremely low level of provision of households with official financial resources, i.e. 3.5%, indicates a very negative effect on food security. This is because research shows that there are relatively large incentives for households to receive financial support through banks, but it is observed that most producers receive their primary supplies mainly from unofficial sources.

The probabilities of the variables given in Table 4 and their importance in ensuring food safety provide an opportunity to obtain accurate information. Wald's statistics were used to calculate the significance of these variables, and the higher the value, the higher its significance. All probabilities in the table are basically derived at 95 percent accuracy, but in logarithmic regression, this figure may also be higher or lower than 95 percent. Simply put, it is a value obtained because of a 95 percent probability.

It is known that the level of education of each head of the family is the main criterion of human capital. That is, the information of the head of the family in the study areas will definitely affect the family income. From the results obtained, the level of human capital in the studied areas was determined and its correlation with food security was studied (95% probability that the P-value was 0.012 and the logarithmic regression was 1.201 to 4.489). An increase in the scientific level of the population in the studied households will ensure an increase in their food security. This means that a high level of education of a household head has been found to provide 2,322 times more food than an uneducated bee.

The impact of the survey on the safety of farms operating as legal entities / individuals and using bank accounts was identified. Studies have shown that the use of bank accounts by at least one person in the field has increased the chances of producing a relatively high level of product. The family operated efficiently while producing more products using official financial channels. If the family does not have access to banking services, it uses financial channels offered by informal intermediaries or operates on credit. As a result, they are forced to sell their produce at a lower price.

When the age of the studied households was analyzed, the average age of the family breadwinner was 26-30 years, which is more likely to be a problem in ensuring food security of

these households. Because young family leaders do not have, enough experience and skills related to farming.

Table 4. Logistic regression analysis of factors determining food security in the studied households.

Variables	B	S.E	Wald statistics	Sig	EXP (B)	95 % C.I For EXP (B)
Education level				0.059		
Primary	RC	-	-	-	-	-
Medium	-0.213	0.416	0.262	0.609	0.808	0.357-1.828
Medium special	0.494	0.494	0.893	0.345	1.639	0.588-4.570
Higher	0.843	0.336	6.276	0.012	2.322	1.201-4.489
Banking services						
Not available	RC					
Available	-1.105	0.398	7.701	0.006	0.331	0.152-0.723
Population age						
41-60	RC					
26-30	-1.313	0.394	11.115	0.001	0.269	0.124-0.582
31-35	-0.521	0.411	1.603	0.205	0.594	0.265-1.330
36-40	-0.838	0.377	4.957	0.026	0.432	0.207-0.905
25 дан кичик	-0.186	0.399	0.217	0.641	0.83	0.380-1.815
More 61 years old	0.07	0.455	0.024	0.877	1.073	0.440-2.615
Family members						
6 or more	RC					
1-5	0.474	0.286	2.734	0.040	1.606	0.916-2.816
Employment						
Self-employment	RC			0.006		
Government/private	-0.863	0.505	2.914	0.028	0.422	0.570-1.136
Seasonal	-0.899	0.649	1.915	0.166	0.407	0.140-1.454
Unemployed	-.0225	0.507	0.196	0.658	0.799	0.296-2.158

Statistically significant and insignificant levels $\alpha=5\%$,

The number of people living in households is one of the important factors determining food security. According to the study, the larger the number of people living in a household, the higher the level of food production in these households, but it should be borne in mind that the use of resources in these households is also relatively large. Studies have shown that a household is average if the number of people living in the household is around 1-5 people, but the fact that more than 6 people live means a large farm. A lower number of family members means more food security than large families that is; small families have 1,606 times more food security than large families.

In terms of employment levels, those who are permanently employed in the public / private sector are more likely to have a higher level of food security than others are. However, the food security of private owners, i.e. large farmers and ranchers, is much higher. Some of the surveyed families have a permanent income and run a farm at the same time, so the results of those engaged in farming and the private sector are much higher.

It is important to forecast the future based on the results obtained in the study, so forecasting using the logistics model is the optimal option. The classified table was used to verify the suitability or non-compliance of the collected data with the model. The number and status of

observations are given in full in this classification table. This table lists households with and without food security. These results are presented in Table 5.

Table 5. Classification of observation results.

		Food safety status.		
Number of observations.		Food security is not ensured	Food security is ensured	
Food safety status	Food security is not ensured	244	78	75.7
	Food security is ensured	103	141	42.2
Overall average percentage				58.95

(Results obtained in 2 districts / regions)

The food security coverage for all households surveyed in this table averaged 59.95 percent. The probability of error is relatively high, ie 41.01%. This is because the rural population's limited income and informal economic activities are highly limited. However, from the results obtained, we can say that food security in rural areas specializing only in agriculture is more seasonal.

Conclusion. Logistic regression was analyzed in the studied households using factors such as age and number of inhabitants. It was found that the low number of people living on farms was 1,606 times higher than the level of food security. However, the analysis showed that in the studied villages, the older the population, the better the food supply, i.e., if the head of the family is 26-30 years old, these families are provided with food security 3,717 times less than families with a head of 41-60 years. At the same time, heads of families aged 36-40 also provided their families with 2.31 times more food security than young people (26-30 years old). The study also examined the knowledge of the head of the family, and the high level of knowledge of the head of the family also plays an important role in ensuring food security for the family. That is, a high level of education increases the food security of the family. The high level of education of the head of the family ensures that he increases his knowledge in the field of agriculture and makes rational use of resources. Incomplete access to banking services in rural areas is forcing the population to use informal financial sources. This can lead to farms buying resources more expensively and selling their products relatively cheaply. This, in turn, has a negative impact on the food security of the population, which means that farms that use banking services are provided with almost 3.02 times more food security than others. It was found that such families could provide 2.37 times more food than those who were self-employed if the rural population was permanently employed in the public / private sector as well as on farms. Accordingly, we can make the following suggestions as a result of the study, in determining food safety it is important to study not only farms but also urban and suburban areas while identifying factors that are equal for all regions. Second, it is necessary to analyze how food security changes as a result of climate change, while taking practical measures to expand indoor crops and minimize the impact of climate change. It should be noted that today the agricultural production of the Republic depends almost entirely on climatic conditions. This is because the fact that our agriculture is mainly dependent on rain and snow water creates serious problems for food security in the future.

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