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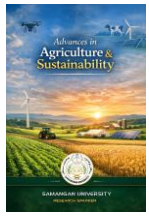

Examining Factors Affecting Food Security of Farming Households in Baghlan Province: A Case Study of Doshi District

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Abstract

This study assesses the food security status and identifies its key determinants among farming households in Doshi District, Baghlan Province. It focuses on the gap between subsistence production and access to a diverse diet in a transitioning rural economy. Using a descriptive-analytical approach, data were collected through structured questionnaires stratified random sampling from 200 households out of a population of 8,100. Food security was measured using the Household Dietary Diversity Score (HDDS) and the Household Food Insecurity Access Scale (HFIAS). Results reveal a critical situation, with 75.5% and 83.5% of households classified as food insecure under HDDS and HFIAS, respectively. Regression analysis shows that farm size, livestock ownership, cooperative membership, and access to credit significantly improve food security, while large household size and market distance worsen it. The findings highlight the need for structural, market-oriented policy interventions.

1. Introduction

Food security means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996). As a cornerstone of sustainable development and the foundation of public health, this concept plays a vital role in improving quality of life, reducing poverty, and enhancing livelihoods (Jamini, 2017). From a public health perspective, food insecurity directly endangers both physical and mental health by weakening the immune system and increasing vulnerability to communicable and non-communicable diseases, particularly in areas with limited health infrastructure, ensuring food security can act as a preventive strategy (Bickel, 2000).

According to projections by the Food and Agriculture Organization of the United Nations, agricultural production must double to meet the needs of a global population of nine billion by 2050. However, achieving this target faces structural challenges, including limitations of water and soil resources, energy price volatility, declining investment in agricultural research, and high rates of food loss and waste (Zaratkish & Kamali, 2017).

In the rural development literature, food security is inextricably linked to the agricultural sector (Norouzi et al., 2013). The paradox in this area shows that despite rural communities' key role in food production, they are among the most food-insecure groups due to heavy livelihood dependence on natural resources and economic fluctuations; international reports indicate that approximately 75 percent of the world's chronically hungry population lives in rural areas (Asgharian-Dastnaee et al., 2013).

Afghanistan, as a developing country, faces complex, multidimensional food security challenges. Statistics indicate multidimensional poverty among 65 percent of the population and acute food insecurity for 12.6 million people in 2025 (OCHA, 2025; IPC, 2025). This situation has been exacerbated by multiple intervening factors, including decades of conflict, economic instability, pressures from returning refugees, climate change, and prolonged droughts. Although the agricultural sector accounts for roughly 26 percent of Afghanistan's gross domestic product (GDP) and is the primary livelihood source for 70 percent of the population, low productivity and infrastructure constraints have hindered achieving sustainable household food security (Samim et al., 2021).

In this context, Baghlan province, and particularly Doshi district, is no exception to this rule, and farming households in this area face serious challenges in accessing sufficient food (MoE, 2019; IPC, 2021). Accurately identifying the factors that determine vulnerability in this region is a prerequisite for formulating supportive policies and effective intervention strategies. Accordingly, the present study is designed to analyse the food security situation and identify influencing factors among farming households in Doshi district, to provide practical solutions to improve livelihoods and enhance food security in the region using scientific frameworks.

Given the strategic nature of food security, numerous studies at the national and international levels have examined its dimensions and determinants. In the following section, a concise review of key findings from previous studies is presented. Through a critical assessment of existing perspectives, identified research gaps will be highlighted, and the position of the present study in explaining the food security situation in Doshi district will be articulated within these theoretical frameworks.

Zarathkish and Zhila (2017) examined determinants of food security among rural farming households in Kohgiluyeh and Boyer-Ahmad Province, Iran, and reported notable findings. Their study found that 46 percent of households were food insecure, and 43 percent of those households (equivalent to 2,400 households) experienced food insecurity due to shocks. Moreover, according to climatic conditions, roughly 69 percent of lost food opportunities were attributable to severe shocks. The study's results emphasize that geographical, economic, and social factors significantly affect food insecurity.

Hosseini et al. (2024) investigated determinants of food insecurity among farming households in Amol County (rural areas) using the Coping Strategy Index. They found that the mean coping strategy index was 82.2 (32.2 percent), indicating poor food security in the study area. Regression analysis showed that variables such as private ownership of agricultural land and a vehicle, cooperation among smallholders, and reverse migration had significant negative effects on food insecurity (i.e., they reduced insecurity). In contrast, increased frequency of machinery use and implementation of biological pest control were associated with increased food insecurity. Based on these findings, the authors recommended improving rural facilities, reducing transportation costs to urban centers, and strengthening cooperative collaboration among smallholders to enhance household food security.

Mango et al. (2014), in a study entitled 'Examining the Factors Affecting Food Security among 120 Smallholder Farming Households in the Mazowe Area of Zimbabwe' using linear regression analysis, found that household food security, measured by two indicators (HDDS) and (HFIAS), is primarily influenced by factors such as the age and education of the household head, labor force and household size, livestock ownership, non-agricultural income, and access to market information. They recommended implementing policies such as promoting technological adoption, reducing labor costs, facilitating access to market information, and strengthening remittance flows to improve food security in these areas.

Zhao et al. (2019) analyzed the factors affecting food insecurity using a binary logistic regression model. The results showed that factors such as age, education, assets, unemployment, inflation, and illness are major determinants. The sex of the household head was identified as a dominant factor: households headed by women were significantly more food insecure. To improve the situation, the study emphasized the need for policies that promote education, give special attention to supporting female-headed households, and encourage the receipt of foreign remittances.

Ariyad (2021) focused on food security among 90 farming households in the Sidorejo area of Salatiga, Indonesia. He used the share of expenditure on food greater than 60% (indicating food insecurity) as the index. Linear regression analysis showed that income, education, and the number of family members had significant effects on food security, whereas the farmer's age did not. The main findings indicated that 55.56% of the sample households were food insecure. The researcher recommended that to improve food security, farmers' incomes should be increased by providing necessary skills and training and by implementing policies for sustainable home food systems.

Samim et al. (2021) examined food insecurity and its associated factors among farming households in Takhar province, Afghanistan, using the HFIAS. Results showed that 66.79% of farming households were food insecure, with 30.53% being severely food insecure. The household head’s education, dependency ratio, farm income, access to non-farm income, livestock ownership, group membership, borrowing, farm diseases, floods, and war significantly affected food insecurity among the farming households in the study area.

Salman et al. (2023) examined pathways for sustainably improving food security and measured household food insecurity among rural farming households in Bangladesh using the HFIAS. The results show that only 18% of rural farming households were fully food secure, while the remainder experienced varying degrees of food insecurity. The study also found that factors such as the household head's level of education, having a savings account, land ownership, receiving financial support from abroad, and larger farm size significantly reduce household food insecurity.

Moradi and Zamani (2022), in their study titled "Examining the factors affecting food insecurity among farming households in Balkh province, Afghanistan," found that policy and regulatory factors had the greatest impact on household food security in Balkh. Economic, educational, informational, geographic, and household factors also had significant effects on food security in the region, in that order.

Yazdanpanah and Fathi (2024), in their analysis of the determinants of food security among nomadic Qashqai households in Fars province, Iran, using the Food Consumption Score (FCS), reported that only 33.6% of households had high food security, 29.2% had low food security, and 37.2% were food insecure. Their findings also show that variables such as income, income diversity, education, and access to transportation are positively associated with household food security.

The synthesis of domestic and international findings indicates that farm household food security is a multidimensional phenomenon influenced by the intersection of human-capital variables (such as the education and age of the household head), economic components (such as income diversification, livestock, and land ownership), and environmental-structural factors (including climate shocks, conflict, and market access). While most studies emphasize the key role of education and diversification of non-farm incomes in reducing food insecurity, in the specific context of Afghanistan (as shown by studies in Takhar and Balkh), exogenous factors such as floods, droughts, and political insecurity are particularly prominent in undermining food sustainability. However, despite the significance of these factors in the existing literature, there is currently little empirical evidence that specifically addresses how these drivers operate within Doshi district. This study aims to clarify this research gap by applying standard methodologies such as HFIAS and HDDS to develop a comprehensive model that explains how these variables affect the livelihood resilience of farming households in Doshi district.

2. Research method

2.1 Study area

Doshi district, as a second-level administrative unit and the fourth-largest district of Baghlan province, covers approximately 1,806 square kilometers and lies along the strategic Kabul-North highway. Located at the confluence of the Doshi and Andarab rivers and adjacent to the provincial center (Pul-e Khumri) and key districts such as Khanajan and Dahna-e Ghori, the district plays a central role in transit and in the geographic linkage of northern Afghanistan (MoE, 2019). According to 2024-2025 statistics, Doshi has a population of 80,992 (11,570 households) and a population density of 44 persons per square kilometer, making it the fourth most populous district in Baghlan. Its population distribution is consistent with the area's environmental features (NSIA, 2024).

Climatically, the Doshi district has a temperate, humid climate, with an average annual temperature of approximately 15°C and an average annual precipitation of around 698 mm, providing ideal conditions for agricultural activities. The district contains roughly 10,166 hectares of irrigated land and 3,200 hectares of rainfed land. The presence of fertile valley soils and access to reliable water sources have turned Doshi into a production hub for strategic crops such as rice, wheat, barley, and vegetables. It has linked the livelihoods of more than 70% of its residents (about 8,100 households) to agriculture and related complementary activities (MoE, 2019).

Figure 1. Geographic location of the Doshi district (IOM, 2024)

2.2 Population and sample determination

The study population comprises all farming households residing in Doshi District, Baghlan Province, which, according to official estimates and local surveys, is estimated to be approximately 8,100 households. Given the size of the population, time, and logistical constraints, stratified random sampling was used. To determine the sample size, a 95% confidence level and an acceptable margin of error were considered, and 200 households were selected as the final sample. This sample size was chosen to ensure external validity and to increase the generalizability of the findings to the wider population of farming households in the area (Krejcie & Morgan, 1970).

2.3 Data collection instrument

The primary instrument in this study is a standardized, structured questionnaire whose validity was confirmed by agricultural economics experts and whose reliability was verified through a pretest. In addition to capturing demographic and socioeconomic characteristics, the questionnaire employs two complementary international indicators—selected for their widespread use and proven ability to capture both dietary diversity and experiential aspects of food access—to measure food security accurately:

2.3.1 Household Dietary Diversity Score (HDDS):

The HDDS is a key tool for assessing a household's economic ability to access dietary diversity (FAO, 2011). This index is based on a 24-hour food recall. In the present study, in accordance with FAO protocols, 12 main food groups were assessed. Each food group received a score of 1 if consumed and 0 if not consumed, yielding a total score ranging from 0 to 12. For qualitative analysis, scores were classified into three levels following the methodology of Dersso et al. (2021):

- Score 0–3: Poor dietary diversity (indicative of severe food insecurity).
- Score 4–6: Medium dietary diversity (transitory food insecurity).
- Score 7–12: Adequate dietary diversity (stable condition or food security).

2.3.2 Household Food Insecurity Access Scale (HFIAS):

Unlike calorie-based indicators, the HFIAS focuses on the psychological and experiential dimensions of food insecurity (such as anxiety about food running out or reductions in meal quality) over a 30-day recall period (Coates et al., 2007). The questionnaire comprises 9 core questions, each with a 4-point

frequency scale (never, rarely, sometimes, and often). The final HFIAS score ranges from 0 to 27, with higher scores indicating greater depth of food insecurity (Burchi, 2021). Although the original FANTA model uses a four-level classification, in this study, the results were redefined and analyzed at three levels—"food secure," "moderate food insecurity," and "severe food insecurity"—to align with the HDDS and improve comparability across indicators.

3. Results and discussion

3.1 Respondent characteristics

The descriptive analysis in Table 1 shows that the demographic profile of farmers in Doshi district leans toward middle age: an average age of 44.29 years, combined with 15 years of farming experience, indicates a workforce that is experienced yet traditional. While this long experience preserves local agricultural knowledge, the very low average contact with extension agents (less than once per year) suggests that farmers are isolated from modern and improved farming methods. On the other hand, household demographic indicators, with an average of about 8 members compared to only 2 active workers, indicate a high dependency ratio in these families, which itself is considered a serious risk factor for food insecurity, since the livelihood burden of a large number of people falls on a small number of producers. This imbalance constitutes a serious risk factor for food insecurity, since the livelihood burden of many dependents falls on a small number of producers.

Table 1. Descriptive results of quantitative variables examined

Variable	Min	Max	Mean	Std.
Age (years)	22	75	44.29	12.280
Number of household members	3	17	7.93	2.994
Number of active laborers	1	5	2.12	1.166
Average monthly household agricultural income (AFN)	2,000	25,000	5,520.00	2,648.751
Years of farming experience	3	45	15.02	8.636
Farm size (Acre)	1	40	5.87	5.291
Distance to market (km)	1	33	15.29	9.878
Number of contacts with extension agents (per year)	0	5	0.99	0.830
Times plowed in the past year	1	8	2.50	1.080
Times harrowed in the past year	1	8	2.71	1.388
The number of times fertilizer was applied in the past year	1	10	2.69	1.708
The number of times pesticides were applied in the past year	1	10	2.72	1.937

Total Livestock Units (TLU)	1	51	9.55	7.700323

Source: Research Findings

From the perspective of productive resources, the predominance of smallholdings, with an average landholding of 5.87 Jeribs, poses a serious obstacle to mechanization and economic efficiency. The dispersed farm-size distribution, ranging from 1 to 40 Jeribs, reflects inequality in access to basic production resources across the area, which in turn limits the potential for aggregate agricultural productivity growth. Nevertheless, the relatively high mean livestock holding of 9.55 TLU suggests that Doshi farmers have adopted livestock husbandry as a risk management strategy, diversifying their production base to buffer against crop failures and market fluctuations.

This interdependence between cropping and livestock production constitutes a core survival strategy that helps mitigate vulnerability at the household level. However, a mean monthly income of 5,520 AFN for large households still reveals a substantial gap between livelihood costs and earned income, highlighting the persistent threat of food insecurity and underscoring the need for policy interventions targeting resource distribution and income generation.

Finally, an examination of farming operations and access to infrastructure shows that, despite the long distance to markets (mean 15.29 km), farmers still exert considerable effort to manage their land. The repeated tillage, harrowing, and use of inputs such as fertilizer and pesticides at similar frequencies (about 2.5–2.7 times per year) reflect a relatively intensive cropping pattern that, due to traditional practices and remoteness from trading centers, has not translated into substantial wealth generation. The high standard deviations in variables such as income and farm size demonstrate significant disparities among social strata in Doshi; support policies should therefore be refocused on poorer and more remote farmers to ensure food-security sustainability across the district.

3.2 Descriptive results of qualitative variables

The study's qualitative findings in Doshi district reveal important aspects of the social and economic structure of farming households that directly affect their food security. In terms of human capital and knowledge level, the results show that over 70% of household heads fall into the "illiterate" or "primary education" categories. This high concentration of low literacy is a serious barrier to the transfer of modern agricultural knowledge and the adoption of technological innovations. However, the fact that

52% have access to localized climate information is encouraging, although there is a large gap between "receiving information" and receiving "specialized training": only 26% of the study population participated in training workshops. This finding highlights the need to revise extension programs and convert raw climate information into practical skills for smallholder farmers.

Table 2. Descriptive results of the investigated qualitative variables

Variable	Options	Freq.	Perc.
Education level of the household head	Illiterate	71	35.5
	Primary	70	35
	Secondary	48	24
	University	11	5.5
Source of income	Sale of agricultural products	93	46.5
	Sale of livestock	52	26
	Sale of agricultural by-products (e.g., straw)	10	5
	Sale of wood/timber	7	3.5
	Other agricultural income	38	19
Membership in cooperatives	Yes	40	20
	No	160	80
Access to market facilities	Yes	65	32.5
	No	135	67.5
Access to climate information	Yes	104	52
	No	96	48
Attending workshops on climate issues	Yes	52	26
	No	148	74
Access to credit/loans	Yes	31	15.5
	No	169	84.5
Access to foreign aid	Yes	32	16
	No	168	84
Contribution of own agricultural production to family food supply (past month)	Yes	182	91
	No	18	9

Source: Research Findings

In the realm of economics and livelihoods, a heavy reliance on traditional agricultural sectors is highly evident. The sale of agricultural products (46.5%) and livestock (26%) constitute the region's primary sources of income. A concerning finding is the institutional and financial isolation of farmers; specifically, 80% are not members of any agricultural cooperatives, and 84.5% lack access to credit facilities. This lack of a support network and financial infrastructure limits farmers' investment capacity, leaving them vulnerable to market fluctuations and economic shocks. Furthermore, the 67.5% lack of

access to marketing facilities skews the distribution cycle in favor of intermediaries, drastically reducing producers' net profit.

Ultimately, the results emphasize the vital role of household production self-sufficiency as a defensive shield against hunger. The fact that 91% of households stated that their own production was the primary source of their food supply in the past month indicates a subsistence economy in which the family's diet is directly linked to its agricultural land. This heavy reliance on domestic production, although it helps households survive in the short term, poses a serious threat to the region's long-term food security due to limited access to external aid (16%) and financial resources in the event of unforeseen climatic events or pest infestations.

3.3 Food Security Status of Households in Doshi District Using the HDDS Method

The findings presented in Table 3, compiled using the standard Household Dietary Diversity Score (HDDS), paint a concerning picture of economic and qualitative access to food in Doshi District. According to the extracted data, only 24.5% of farming households are classified as "food secure." This indicates that fewer than a quarter of the studied population has achieved an optimal diversity of food groups (i.e., consuming more than 7 out of 12 food groups). This group likely consists of households that, in addition to farming, benefit from diversified income sources or higher livestock ownership, enabling them to purchase protein-rich foods and fruits.

In contrast, a significant portion of the statistical population (45%) falls into the "moderate food insecurity" category. While these households generally meet their basic caloric requirements, their diet lacks the necessary diversity and is predominantly carbohydrate-based (cereals). The persistence of this condition in the long term could lead to "hidden hunger" or micronutrient deficiencies among family members, particularly children and pregnant women in Doshi District.

The most critical aspect of the findings is the identification of 30.5% of households in "severe food insecurity." This figure reveals that approximately one in three farming families in Doshi faces acute limitations in dietary diversity (consuming fewer than 3 food groups per day). This situation often stems from absolute poverty, a sole reliance on bread and tea, and an inability to meet basic biological needs, which directly threatens the health and resilience of the rural community.

Overall, aggregating the two insecure categories shows that 75.5% of farmers in Doshi District experience varying degrees of food insecurity. Given that Doshi is an agricultural region, these results confirm a bitter paradox: "The food producers themselves have the least access to a diverse and healthy diet." This phenomenon is rooted in meager agricultural incomes (as noted in previous tables) and the necessity of converting high-value products into cash to settle debts or purchase agricultural inputs, which ultimately impoverishes the farmer's own table.

Table 3. Food Security Status of Farming Households in Doshi (HDDS)

Food Security Status	Frequency	Percentage
Severe Food Insecurity	61	30.5
Moderate Food Insecurity	90	45.0
Food Secure	49	24.5
Total	200	100

Source: Research Findings

3.4 Food Security Status of Farming Households in Doshi District Using the HFIAS Method

The results obtained from the Household Food Insecurity Access Scale (HFIAS) assessment in Doshi District present a distinct yet complementary perspective on the food security situation. While other indicators might focus on dietary diversity, the HFIAS results delve into the psychological and behavioral dimensions of food access, including anxiety over food shortages and adjustments in consumption patterns.

Table 4. Food Security Status of Farming Households in Doshi (HFIAS)

Food Security Status	Frequency	Percentage
Severe Food Insecurity	45	22.5
Moderate Food Insecurity	122	61.0
Food Secure	33	16.5
Total	200	100.0

Source: Research findings

Analysis of the findings from Table 4, derived from the standard Household Food Insecurity Access Scale (HFIAS), elucidates the psychological and experiential dimensions of food poverty among farming households in Doshi District. Unlike dietary diversity indicators, this scale focuses directly on the anxiety caused by food shortages and the resulting shifts in nutritional behaviours.

The results indicate that only 16.5% of households are classified as "Food Secure." This implies that a vast majority of the studied population (83.5%) has experienced at least one level of food insecurity—

ranging from psychological distress to physical hunger—within the past month. Compared with the HDDS index (24.5%), this figure suggests that even households with relative dietary diversity still face concerns about the stability and sustainability of their food access.

The highest prevalence, at 61%, belongs to the "Moderate Food Insecurity" category. This level of insecurity implies that the majority of Doshi's farmers have been forced to adopt adverse coping strategies, such as reducing meal quality, eliminating expensive food items (such as meat and dairy), or sacrificing dietary preferences due to financial constraints. This situation indicates a "hidden livelihood crisis" in which households sacrifice nutritional quality for basic survival.

Furthermore, 22.5% of households are classified under "Severe Food Insecurity." Being in this category means facing distressing experiences such as the total depletion of food stocks, going to bed hungry, or spending an entire day and night without eating. The presence of nearly a quarter of Doshi's farming population in this tier is a red flag for aid and development agencies; it signals the total collapse of household defense mechanisms against economic and climatic shocks.

In conclusion, a comparison of these results with previous income and infrastructural data reveals that food security in Doshi District is grappling with a structural challenge. High dependence on meager agricultural incomes, coupled with limited access to external assistance, has left a large portion of the region's food producers uncertain about their next meal. This uncertainty poses a severe threat to social stability and the health of future generations.

3.5 Comparison of HDDS and HFIAS Results and the Importance of a Comprehensive Approach

The comparative analysis of the Household Dietary Diversity Score (HDDS) and the Household Food Insecurity Access Scale (HFIAS) in Doshi District reveals a significant overlap between "dietary quality poverty" and "psychological instability in food access." The prevalence of 75.5% food insecurity according to the diversity index (HDDS), alongside a 83.5% insecurity rate in the access experience index (HFIAS), indicates that the food crisis in this region has transcended mere caloric deficiency. It has reached deeper layers of livelihood anxiety and the forced elimination of fundamental food groups.

The discrepancy in food security rates between these two metrics (24.5% versus 16.5%) indicates that a segment of farming households, despite a temporary capacity to maintain dietary diversity, still

perceives itself as seriously at risk of hunger. This is due to the absence of social safety nets, a lack of financial reserves, and absolute dependence on climatic fluctuations. This statistical divergence underscores the scientific reality that, in Doshi's economic geography, "physical access" to food (via home production) does not necessarily equate to "psychological security and economic stability." Instead, households exist in a state of permanent fragility, where even the slightest production shock could plunge them from moderate to acute food insecurity.

3.6 Factors Affecting Household Food Security Based on the HFIAS Index

The results of the regression analysis presented in Table 5 identify the primary determinants of food security (as measured by the HFIAS index) among farming households in Doshi District. For a scientific interpretation of these results, the direction of the coefficients and the significance levels (P-values) must be carefully considered. It is noteworthy that, in this analysis of the HFIAS index, improvements in food security are indicated by positive coefficients, while negative coefficients indicate declines.

The variable "distance to market," with a coefficient of -0.270 and a very high significance level ($p < 0.001$), stands as the strongest negative factor affecting food security. This implies that as the distance from trading centers increases, household food security significantly deteriorates due to rising transit costs and the lack of timely access to diverse food items. Conversely, the variables "farm size" (0.236) and "family labor" (0.071) exert a positive and significant effect ($p = 0.006$). This indicates that in Doshi's subsistence economy, larger landholdings and a greater labor force act as a "defensive shield" against food insecurity by enhancing the potential for home production.

In terms of economic and social capital, the variables "income" (0.013) and "membership in cooperatives" (0.168) have shown a positive and significant impact on promoting food security. Membership in cooperative groups has specifically improved farmers' nutritional status by establishing support networks and facilitating access to agricultural inputs. A point of reflection is the negative and significant effect of "age" (-0.024), which may reflect older household heads reduced physical capacity to manage farms, leading to decreased income and food access. Furthermore, the variables "education" and "Tropical Livestock Units (TLU)", while only significant at the 10% level, indicate a positive trend toward food security.

Finally, the lack of statistical significance for variables such as "foreign aid," "contact with extension agents," and "participation in workshops" points to fundamental limitations in existing interventions. These findings imply that not only are current programs either insufficient in scale or poorly targeted, but also that they may not align with the actual needs and structural realities faced by farmers in Doshi District. Possible reasons include a lack of sustainable funding, ineffective outreach strategies, or a failure to integrate local knowledge and socio-economic conditions into intervention design. This critical insight highlights that, without addressing underlying structural challenges—such as inadequate land access, market isolation, and weak cooperative institutions—even well-intentioned interventions are unlikely to generate meaningful improvements in food security. Consequently, policy approaches should move beyond ad hoc external assistance and prioritize systemic reforms focused on strengthening market linkages and local organizational capacity.

Table 5. Factors Affecting Food Security (HFIAS)

Variable	Coefficient	T-Stat.	P Value
Age	-0.024	-2.266	0.004**
Education	0.131	1.818	0.071*
Household Size	0.006	0.070	0.944
Household Labor Force	0.071	3.731	0.006**
Income	0.013	3.158	0.015**
Farm Size	0.236	2.800	0.006**
Distance to Market	-0.270	-3.979	0.000***
Extension Agent Contact	-0.056	-0.787	0.433
Cooperative Membership	0.168	2.346	0.020**
Market Access	0.051	0.663	0.508
Workshop Participation	0.045	0.536	0.593
Access to Credit	-0.014	-1.996	0.075*
Foreign Aid	-0.036	-0.533	0.594
Agricultural Aid (One Month)	0.093	1.292	0.198
TLU (Tropical Livestock Units)	0.130	1.818	0.071*

Source: Research Findings
Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

3.7 Factors Affecting Household Food Security Based on the HDDS Index

The regression analysis results presented in Table 6 elucidate the key drivers influencing the Household Dietary Diversity Score (HDDS) in Doshi District. Since the HDDS index serves as a proxy for purchasing power and economic access to various food groups, positive coefficients in this model indicate improvements in dietary quality and increased variety of food items consumed.

Among the demographic variables, the household head's education level ($\beta = 0.146$, $p = 0.040$) is significantly associated with dietary diversity. This suggests that higher awareness leads to more informed nutritional choices and optimal management of the household budget for purchasing diverse food items. Conversely, household size ($\beta = -0.011$, $p = 0.041$) exerts an inverse effect; as family size increases, per capita expenditures rise, forcing households to prioritize caloric intake through staples (cheaper calories) while sacrificing expensive food groups such as meat and fruits. Additionally, the age variable ($\beta = -0.162$) was significant at the 10% level, indicating a decline in dietary quality among households headed by older individuals.

In terms of productive and technical factors, farm size ($\beta = 0.231$, $p = 0.006$) and Tropical Livestock Units (TLU) ($\beta = 0.043$, $p = 0.031$) both show highly significant positive impacts on dietary diversity. These results confirm that larger landholdings and livestock ownership not only provide direct access to diverse products (such as milk, meat, and vegetables) but also generate the necessary liquidity to purchase other food groups through the sale of surplus production. Another noteworthy finding is the positive and significant impact of participation in training workshops ($\beta = 0.053$), demonstrating that agricultural extension services have directly improved nutritional knowledge and diversified home-based production.

From the perspective of financial and support resources, access to credit ($\beta = 0.175$, $p = 0.015$) was identified as one of the strongest drivers of dietary diversity. This finding shows that access to financial facilities enables households to maintain dietary quality during lean seasons. Furthermore, cooperative membership ($\beta = 0.014$) also showed a positive effect at the 10% significance level. Finally, the statistical insignificance of variables such as distance to market (contrary to the HFIAS model) and foreign aid suggests that dietary diversity in Doshi District is less dependent on geographical location or external donations and more reliant on internal household capabilities, including literacy, land and livestock ownership, and access to credit.

Table 6: Determinants of Household Food Security based on HDDS Index

Variable	Coefficient	T-Stat.	P Value
Age of Household Head	-0.162	-1.855	0.065*
Education Level	0.146	2.068	0.040**
Household Size	-0.011	-2.125	0.041**
Household Labor Force	0.099	1.936	0.052*
Household Income	-0.141	-1.892	0.075*
Farm Size	0.231	2.773	0.006***
Distance to Market	-0.026	-0.382	0.703
Extension Agent Contact	-0.010	-0.141	0.888
Cooperative Membership	0.014	2.184	0.065*
Market Access	0.036	0.433	0.665
Workshop Participation	0.053	2.726	0.019**
Access to Credit	0.175	2.447	0.015**
Foreign Aid	0.022	0.338	0.736
Agricultural Aid (Monthly)	0.075	1.052	0.294
TLU (Livestock Holding)	0.043	2.612	0.031**

Source: Research Findings
Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

4. Conclusion

This study was conducted to investigate the determinants of food security among farming households in a strategic region of northern Afghanistan (Doshi District). The statistical population consisted of 8,100 farming households, from which 200 households were selected using random sampling based on standard sample size formulas. The primary assessment tool was a combined application of two internationally recognized indices: the Household Dietary Diversity Score (HDDS) to measure dietary variety, and the Household Food Insecurity Access Scale (HFIAS) to evaluate psychological experiences and food access. This dual approach aimed to provide a multidimensional perspective on food poverty and household coping mechanisms.

The results indicate a structural and persistent crisis in the study area; the HDDS index shows 75.5% food insecurity, while the HFIAS index reveals an even higher rate of 83.5%. This statistical divergence underscores the scientific reality that, even when minimum caloric requirements are met, anxiety stemming from unstable food access continues to dominate the atmosphere in farming households. Descriptive findings revealed that parameters such as large household size (average of 8 members) versus a limited labor force (2 members), the dominance of smallholder systems (5.87 Jeribs), and means agricultural income have created a chain of constraints trapping farmers in a "livelihood poverty

trap." Furthermore, the 91% dependence on home production for monthly needs, while serving as a short-term survival strategy, creates extreme vulnerability to climatic shocks and pests.

Regression modelling for both HDDS and HFIAS identified key determinants of food security within structural and institutional variables. Distance to market was confirmed as the most significant negative factor, while farm size and Tropical Livestock Units (TLU) emerged as the most vital positive factors. This suggests that in Doshi District, food security is primarily a function of "physical assets" and "infrastructural access." Additionally, the statistical significance of variables such as education, cooperative membership, and access to credit demonstrates that institutional and financial empowerment can mitigate the negative effects of low literacy and liquidity poverty, thereby improving dietary quality through increased purchasing power and production diversification.

Finally, the lack of statistical significance for variables such as "foreign aid" and "routine extension agent contacts" in both models carries a crucial implication for agricultural policymakers in Afghanistan. This finding demonstrates that existing intervention models—primarily oriented toward aid distribution or theoretical training without financial support—have not succeeded in improving farmers' livelihood conditions. Based on this evidence, it is essential that future policies move beyond ad hoc assistance and instead focus on several specific strategies: (1) strengthening agricultural value chains to enhance producers' bargaining power; (2) investing in road and market infrastructure to shorten the distance between farms and markets; (3) promoting and expanding access to credit cooperatives to improve financial inclusion; and (4) implementing skill-based Climate-Smart Agriculture (CSA) workshops tailored to local conditions. Achieving food security in this region will require coordinated investments in human capital development and comprehensive reform of market linkages, ensuring that food producers are empowered rather than relegated to persistent food insecurity.

5. Statements and Declarations

5.1 Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

5.2 Data availability

Data will be made available on request.

5.3 Acknowledgments

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5.4 Disclosure statement

We have no conflict of interest.

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5.6 Ethics Approval

Not Applicable

5.7 Consent to participate/Consent to publish

Not Applicable

5.7 Author Contributions

Conceptualization, H. R. and Z. R.; methodology, H. R., Z. R. and H. RD.; investigation, H. R., Z. R. and H. RD.; writing—original draft, H. R. and Z. R.; writing—review & editing,H. R. and H. RD.; supervision, H. R.

6. References

Ariyadi, W. (2021). Empirical analysis of farmers' household food security levels in Salatiga, Indonesia. Research Horizon, 1(1), 39–46. https://doi.org/10.54518/rh.1.1.39-46

Asgharian Dastenaei, A., Karami, E., & Keshavarz, M. (2013). Determinants of food security among rural households. *Journal of Agricultural Economics*, 7(1), 1-15. [In Persian].

Burchi, F. (2006). Identifying the role of education in socioeconomic development. In Proceedings of the International Conference on Human and Economic Resources, Izmir University of Economics, Izmir, Turkey, 193–206.

Coates, J., Swindale, A., & Bilinsky, P. (2007). Household Food Insecurity Access Scale (HFIAS) for measurement of food access: Indicator guide (Version 3). Food and Nutrition Technical Assistance Project (FANTA), Academy for Educational Development (AED).

Derso, D., Tolossa, D., & Seyoum, T. (2021). Household dietary diversity in rural households of Oromia Regional State, Ethiopia: A cross-sectional study. Journal of Development and Agricultural Economics, 13(4), 304–313. https://doi.org/10.5897/JDAE2021.1265

FAO. (2011). Guidelines for measuring household and individual dietary diversity. Food and Agriculture Organization of the United Nations (FAO), Nutrition and Consumer Protection Division. Rome, Italy.

Hosseini, S. H., Rezaei, R., Shirani Bidabadi, F., Abedi Sarvestani, A., & Keramatzadeh, A. (2024). Investigating the factors affecting food insecurity of farming households in rural areas of Amol County. *Village Development Strategies*, 11(3), 364-378. [In Persian].

IPC. (2021). Afghanistan: Integrated Food Security Phase Classification 2021. Integrated Food Security Phase Classification (IPC). Ministry of Agriculture, Irrigation and Livestock (MAIL). [www.ipcinfo.org]

IPC. (2024). Afghanistan: Integrated Food Security Phase Classification 2024 - Acute Food Insecurity Analysis. Integrated Food Security Phase Classification (IPC). [https://www.ipcinfo.org]

Jamini, D., Amini, A., Ghadermarzi, H., & Tavakoli, J. (2017). Assessing food security and analyzing its challenges in rural areas (Case study: Badr Village, Ravansar County). Journal of Regional Planning, 7(27), 87–102. [In Persian].

Mango, N., Zamasiya, B., Makate, C., Nyikahadzoi, K., & Siziba, S. (2014). Factors influencing household food security among smallholder farmers in the Mudzi district of Zimbabwe. Development Southern Africa, 31(4), 625–640. https://doi.org/10.1080/0376835X.2014.918140

Ministry of Economy. (2018). Profile of Baghlan Province: The perspective of economic and social development. Directorate of Economy of Baghlan Province, Kabul, Afghanistan. [Available at: https://moec.gov.af]. [In Persian].

Moradi, B. A., & Zamani, S. (2022). Investigating the factors affecting food security in agricultural households in Balkh Province. *Journal of Contemporary Research in Management and Accounting Sciences*, 4(13), 134-139. [In Persian/Dari].

Niazi, R., Liu, A., Han, J., Hassan, S., Elham, H., & Osewe, M. (2025). Household income diversification and food insecurity: A case study of Afghanistan. Foods, 14(12), 20–48. https://doi.org/10.3390/foods14122048

Norouzi, N., Moghaddasi, R., & Shamseddini, S. (2013). Investigating poverty and food insecurity, and their associated factors, in rural households of Khuzestan Province. *The First National Electronic Conference on the Outlook of Iran's Economy with an Approach to Supporting National Production*, Khorasgan, 1-16. [In Persian].

NSIA. (2024). Estimated population of Afghanistan 2023-24. National Statistics and Information Authority (NSIA). Kabul, Afghanistan. https://nsia.gov.af

OCHA. (2025). Afghanistan: Humanitarian Needs and Response Plan 2026 (December 2025). United Nations Office for the Coordination of Humanitarian Affairs. [https://www.unocha.org/afghanistan].

Radmand, H., Akbai, S. M., Akbari, J., & Rezaei, H. (2023). Assessing the Efficiency of Wheat Producers in Dihdadi District. *Journal of Humanities and Social Sciences Studies*, *5*(12), 09-18. https://doi.org/10.32996/jhsss.2023.5.12.2

Radmand, H., Rezaei, H. & Joolaie, R. Analysing Technical, Pure Technical, Scale, and Economic Efficiency: A Case Study of Potato Producers in Khinjan District. *Potato Res.* **68**, 1641–1658 (2025). https://doi.org/10.1007/s11540-024-09798-x

Rezaei, H., Rezaee, A., Radmand, H. *et al.* Evaluating Agricultural Sustainability in Afghanistan (Case Study: Nijrab District). *Process Integr Optim Sustain* **8**, 873–887 (2024). https://doi.org/10.1007/s41660-024-00397-4

Salman, M., Haque, S., Hossain, M. E., Zaman, N., & Hira, F. T. Z. (2023). Pathways toward the sustainable improvement of food security: Adopting the household food insecurity access scale

in rural farming households in Bangladesh. Research in Globalization, 7, 100172. https://doi.org/10.1016/j.resglo.2023.100172

Samim, S. A., Hu, Z., Stepien, S., Amini, S. Y., Rayee, R., Niu, K., & Mgendi, G. (2021). Food insecurity and related factors among farming families in Takhar region, Afghanistan. Sustainability, 13(18), 10211. https://doi.org/10.3390/su131810211

Yazdanpanah, S., & Fathi, F. (2024). Determinants of food security among Qashqai nomadic households in Fars Province. *Iranian Journal of Agricultural Economics and Development Research*, 55(4), 719-738. [In Persian].

Zeraatkish, S. Y. (2017). [Food security of] rural areas in Kohgiluyeh and Boyer-Ahmad Province. *Agricultural Economics*, Science and Research Branch, Islamic Azad University, Tehran, Iran, 16(2), 77-86. [In Persian].

Zhao, J., Cao, Y., Yu, L., Liu, X., Yang, R., & Gong, P. (2022). Future global conflict risk hotspots between biodiversity conservation and food security: 10 countries and 7 biodiversity hotspots. Global Ecology and Conservation, 34, e02036. https://doi.org/10.1016/j.gecco.2022.e02036