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Food security of impoverished households in Tuong Duong district, Nghe An province: The HFIAS measurement

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Abstract:

While Vietnam demonstrates overall national food security, many households, particularly in challenging areas such as Tuong Duong district, Nghe An province, continue to grapple with food insecurity. This article explores the food security status of impoverished households in Tuong Duong district, employing the Household Food Insecurity and Access Scale (HFIAS) for assessment. A survey of 125 households across two communes within the district provided insights into the prevalence of household behaviours indicating insufficient quality and quantity of food, as well as anxiety and uncertainty regarding insecure access to food supplies. The majority of respondents were categorised as "moderately food insecure" or "mildly food insecure". Key determinants of food security for this impoverished population, such as human, natural, physical, social, and financial capital, were identified. The findings suggest that policy priorities should focus on: (1) Expanding the scale of agricultural production and irrigation systems; (2) Enhancing support activities related to agricultural production for households; (3) Broadening the livelihood framework; (4) Developing infrastructure to improve market accessibility for the impoverished population in the district.

Keywords: **extremely difficult communes, food security, Household Food Insecurity and Access Scale (HFIAS), impoverished households, the poor.**

Classification numbers: **4.1, 7**

1. Introduction

The persistent challenges of food insecurity, poverty, and malnutrition represent critical impediments to human welfare in both developing and developed nations. These challenges encompass increasing food availability, feeding burgeoning populations, enhancing nutritional status, and alleviating poverty, all of which continue to pose complex dilemmas for policymakers [1].

In the 1970s, the concept of food security primarily focused on the national food supply, questioning whether a country possessed sufficient resources to meet its population's dietary energy requirements [2]. Some interpreted national food security as synonymous with self-sufficiency, implying a nation's ability to produce the food needed by its populace [3]. However, the paradigm has recently shifted to emphasise access to food at both the household and individual levels [4-7]. Hence, food security is now defined as the condition where all individuals have consistent physical, social, and economic access to adequate, safe, and nutritious food, satisfying their dietary needs and preferences for an active and healthy life [5, 6]. This definition was later expanded by the Food and Agriculture Organization (FAO) to encompass considerations of nutritional value and food preferences. The extent to which individual food security contributes to optimal nutrition is influenced by various non-food factors, including sanitation, water quality, prevalence of infectious diseases, and access to primary healthcare. This underscores the intricate interplay between food security and nutrition security, considering both the quality and quantity of food access.

In Vietnam, the literature on food security has predominantly concentrated on the national perspective, as evidenced by studies cited in [8-10]. Research focusing on food security at the individual or household level remains relatively scarce [7, 11]. Notably, Tuong Duong district - one of the three poorest districts in Nghe An province and ranking among the fifty-six most impoverished districts nationwide, has received limited attention in this context [4]. Fifteen of the district's eighteen administrative communes are categorised as exceptionally poor, falling under Program 135 - a socio-

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economic development initiative targeting extremely challenging communes in ethnic minority and mountainous regions of Vietnam. Similar to other developing nations, policies prioritizing poverty alleviation are emphasized due to their relationship with environmental degradation [5].Consequently, food insecurity has emerged as a significant challenge, particularly in the context of protecting the Reserve area. Despite the crucial importance of addressing food security in safeguarding this area, prior research has often neglected this aspect. Therefore, there is an urgent need for studies focusing on food security among the impoverished population in the district.

Among various measures of food security, the Household Food Insecurity and Access Scale (HFIAS) is a prominent tool, to identifyaspects of food insecurity, including diminished access to both the quantity and quality of food. It further investigates the psychosocial implications of anxiety and uncertainty surrounding food security, which negatively affect health and wellbeing. Owing to its proven effectiveness and applicability in various contexts, particularly impoverished regions [6], this study employs the HFIAS measurement to assess the food security of poor households in Tuong Duong district. The study objective is to derive insights from the findings to bolster food security in the district.

2. Methodology

2.1. Description of study areas

Tuong Duong is a mountainous district located in the western part of Nghe an province. It is also among the districts listed within the Western Nghe An Biosphere Reserve by UNESCO. The district is situated approximately 200 km from Vinh City and 90 km from the Nam Can border gate. It shares a 58 km border with the Lao People's Democratic Republic.

Tuong Duong encompasses a natural land area of 281,129.37 hectares, accounting for 17% of Nghe An province, of which only 901.09 ha (0.32% of the district's natural area) is agricultural land, with the remainder being forest land and other land types. As of 2019, the district had a total population of 77,830, comprising over six ethnic groups, including Thai, Kinh, Kho Mu, H'Mong, Tay Poong, and O Du. In 2019, poor households and near poor households accounted for 47.41% of the total households in the district [7].

In 2017, the Prime Minister issued Decision 900/QD-TTg, approving the list of extremely difficult communes for investment under Program 135 for 2017-2020. This list included 2,139 extremely difficult communes across 46 provinces in Vietnam. Nghe An province, with 99 communes, is among the eight provinces having the highest number of extremely difficult communes in the country. Tuong Duong district, one of Nghe An province's three poorest districts, includes 16 communes classified as extremely difficult under Program 135 (2017-2020). Despite its gradually increasing economic growth rate, the district still faces significant challenges. Local authorities are particularly focused on ensuring food security, especially for the poor. Hence, Tuong Duong district was selected for this study.

Due to time and budget constraints, the study selected two communes, Xieng My and Xa Luong, from the 16 extremely difficult communes of Tuong Duong district. Xieng My is one of the poorest communes in the district, whereas Xa Luong has a relatively better economic condition.

2.2. Data collection

The total number of poor households in Tuong Duong district is 8,586, with both Xieng My and Xa Luong communes having a high proportion of poor households. Table 1 presents the number of poor households in these two communes. Xieng My has 56.11% poor households, while Xa Luong commune has 24.24%.

Table 1. Number of poor households in Xieng My and Xa Luong communes.

Number of households	Xieng My	Percentage	Xa Luong	Percentage
Poor households	404	56.11	297	24.24
Total households	720	100.00	1225	100.00

Source: People's Committee of Xieng My and Xa Luong communes (2019).

To calculate the sample size, the study applied the following formula:

$$n = \frac{n_0}{1+\frac{(n_0-1)}{N}}$$

where n is the sample size; N is the population size (number of poor households in the commune); and n_0 is calculated by:

$$n_0 = \frac{Z^2 pq}{e^2}$$

where Z^2 is the abscissa of the normal curve that cuts off an area α at the tails (Z=1.96 used here); p is the estimated proportion of an attribute in the population (p=0.95); q is 1-p; and e is the desired level of precision (±5%) [8].

Following the calculation, the sample size was determined as approximately 62 households for Xieng My commune and 59 households for Xa Luong

commune. Therefore, the study decided to survey 65 poor households in Xieng My and 60 in Xa Luong, totalling 125 poor households in Tuong Duong district. The households were randomly selected according to the list of poor households provided by the local government. Data was collected through a household survey using a questionnaire.

2.3. Measurement indicator

The HFIAS was developed between 2001 and 2006 by the USAID-funded Food and Nutrition Technical Assistance II (FANTA) project. The HFIAS comprises nine items that measure both occurrence and frequency, representing the universal domains associated with household food insecurity access, utilising a recall period of 30 days [9]. The HFIAS is constructed from a concise questionnaire that captures households' behavioural and psychological manifestations of insecure food security, such as having to reduce the number of meals consumed or compromising the quality of food due to a lack of resources. Responses to the questionnaire allow the household to be classified on a spectrum indicating the severity of insecure food security.

The scale includes four categories: none, rarely (1-2 times), sometimes (3-10 times), and often (more than 10 times), which has been applied in numerous pieces of literature [9-13]. A low HFIAS score signifies a high level of food security for the household. The nine questions are: Q1 (Worry about food), Q2 (Unable to eat preferred foods), Q3 (Eat just a few kinds of foods), Q4 (Eat foods they really do not want to eat), Q5 (Eat a smaller meal), Q6 (Eat fewer meals in a day), Q7 (No food of any kind in the household), Q8 (Go to sleep hungry), and Q9 (Go the whole day and night without eating).

Initially, a HFIAS score variable is calculated for each household by summing the codes for each frequency-of-occurrence question. Before summing these codes, frequency-of-occurrence is coded as 0 for all cases where the answer to the corresponding occurrence question was "no" (e.g., if Q1=0 then Q1a=0, if Q2=0 then Q2a=0, etc.). The maximum score for a household is 27 (the household's response to all nine frequency-of-occurrence questions was "often," coded with a response code of 3); the minimum score is 0 (the household responded "no" to all occurrence questions, these were skipped by the interviewer, and subsequently coded as 0 by the data analyst). After calculating the HFIAS score, the estimation of HFIAP is conducted, categorising HFIAP into four levels: food secure, mildly food insecure, moderately food insecure, and severely food insecure.

3. Results and discussion

3.1. Food security situation in Tuong Duong district, Nghe An province

The HFIAS score for each household was calculated by summing the codes for each frequency-of-occurrence question. A low HFIAS score indicates a high level of food security for the household. The maximum HFIAS score is 27, where all nine frequency-of-occurrence questions were answered as "often", and the minimum score is 0, where the household responded "no" to all occurrence questions.

According to Table 2, the average HFIAS score for poor households in Xieng My commune was 7.55, while it was lower for poor households in Xa Luong commune, with a score of 6.00. For the entire sample, the average HFIAS score was 6.81. The data provide insights into household behaviours indicative of insufficient quality and quantity of food, as well as anxiety and uncertainty related to insecure access to food. The findings also indicate that poor households in Xieng My commune face greater challenges regarding food security compared to those in Xa Luong commune.

Table 2. The HFIAS score of poor households in Tuong Duong district.

	Number of poor households	HFIAS score
Xieng My commune	65	7.55
Xa Luong commune	60	6.00
Whole sample	125	6.81

Source: Data survey (2020).

Table 3 and Fig. 1 demonstrate how the HFIAS indicator categorises households in Tuong Duong district into four levels of household food insecurity (access): food secure, mildly food insecure, moderately food insecure, and severely food insecure. A significant portion of responding households falls into the "moderately food insecure" and "mildly food insecure" categories, comprising 33.07% and 31.10% of respondents, respectively. A "moderately food insecure" household often compromises on food quality more frequently by consuming a monotonous or undesirable diet and may begin to reduce quantity by shrinking meal sizes or frequency, occasionally or regularly. About 23.03% of poor households are classified as severely food insecure, while only 12.80% are categorised as food secure. This highlights the low level of food security among poor households in the district.

Table 3. Distribution of responses from poor households to nine HFIAS-related questions in the study areas.

Question	Frequency		
	Rarely	*Sometimes*	*Often*
Q1	52.0	22.4	16.0
Q2	32.0	19.2	12.8
Q3	16.0	12.0	9.6
Q4	8.0	16.0	8.0
Q5	12.8	32.0	12.0
Q6	20.0	24.0	4.0
Q7	20.0	16.0	4.0
Q8	37.6	0	0
Q9	0	0	0

Source: Data survey (2020). Unit: %, n=125.

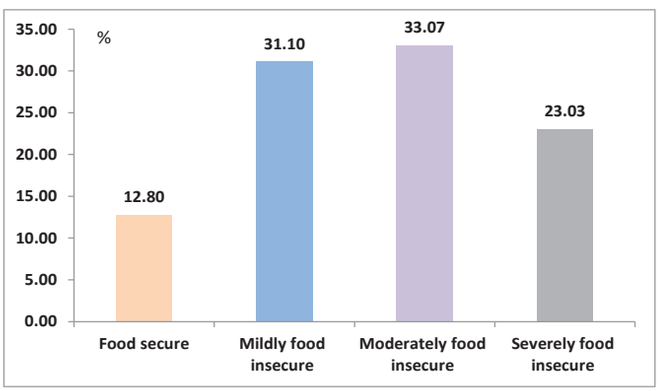

Fig. 1. Household food insecurity and access status in Tuong Duong district. Source: Data survey (2020).

3.2. Factors influencing food security in Tuong Duong district, Nghe An province

The factors influencing food security investigated include human capital, social capital, natural capital, physical capital, and financial capital. Human capital refers to education, age, household size, and ethnicity of individuals. Social capital represents relationships, networks, and social structures. It can be represented by access to supportive policies as well as information accessibility. Natural capital refers to the natural resources available in an area, including cultivated land area, weather (seasonality), natural disruptions, distance to central markets, and irrigation systems. Physical capital comprises tools, equipment, and other physical assets that individuals and households use to enhance food security. Financial capital consists of the financial resources and assets available to individuals and households, including financial accessibility and the ability to generate income [14-17].

3.2.1. Human capital

Fig. 2. Proportion of family members in activities of poor households in Tuong Duong district. Source: Data survey (2020). Unit: %, n=125.

Wives predominantly engage in all six activities, including decision-making regarding child rearing, family spending, market visits, food selection, the quantity of food per meal, and daily menu planning (Fig. 2). Notably, wives play a significant role in all activities except for deciding the type of crops to raise in the next season, where men account for over 51.2%, compared to under 43.2% for wives. However, in other decision-making aspects, wives' involvement ranges from about 57.6% to just under 90%, indicating their substantial influence. Other family members, such as children, contribute minimally to decision-making, with approximately 5% involvement.

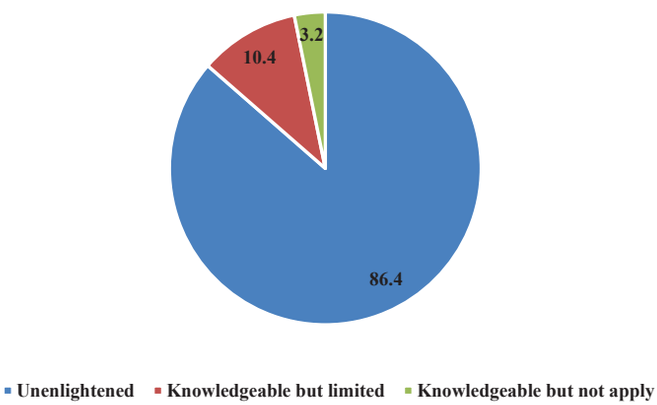

Fig. 3. Percentage of households understanding the situation of food security of poor households in Tuong Duong district. Source: Data survey (2020). Unit: %, n=125.

Figure 3 illustrates the distribution of households across three statuses regarding their understanding of food security: unenlightened, knowledgeable with limitations,

and knowledgeable but not applying the information in the lives of poor households in Tuong Duong district (Fig. 3). Approximately 86.4% of households lack awareness about access to food and its preservation, while 13.6% possess some knowledge but either face limitations or do not apply this knowledge in their daily life.

The survey data indicate that the average age of the household head in Tuong Duong district is approximately 42.71 years, with a standard deviation of 17.77 (Table 4).

Table 4. General information of surveyed poor households in Tuong Duong district.

Characteristics	Unit	Xieng My commune		Xa Luong commune		Entire sample	
		Average	*Standard Deviation*	*Average*	*Standard Deviation*	*Average*	*Standard Deviation*
Age of HHH	Year	42.16	15.71	43.25	19.23	42.71	17.77
Education of HHH	Year	5.52	3.26	7.12	3.75	6.32	3.59
Household size	Person	3.76	0.98	4.06	0.58	3.91	0.83
Ethnic							
- Kinh	%	6.03		9.06		7.55	
- Thai	%	86.2		76.25		81.23	
- Mong	%	0		6.04		3.02	
- Kho Mu	%	7.77		8.65		8.21	

Sources: Survey data (2020).

Furthermore, the educational attainment of the household head is relatively low, averaging around 6.32 years, with a standard deviation of 3.59. The average household size in the study area is 3.91 (standard deviation of 0.83), with a range of 1 to 6 members per family. The number of family members directly influences the process of food utilisation and the frequency of household food consumption.

The Thai ethnic group constitutes a significant majority in Tuong Duong, comprising 81.23% of the population. Other ethnic minorities, including Mong and Kho Mu, account for 11.23% of the total population, while the Kinh people form a smaller proportion, at 7.55%.

3.2.2. Social capital

Several policies are in place to support the poor in addressing food security issues.

Table 5. Perception of poor households about support policies in Tuong Duong district.

Name of policy support	Xieng My commune (n=65)	Xa Luong commune (n=60)	Overall (n=125)
Infrastructure	56.10	72.50	63.97
Vocational and educational training	70.20	72.50	71.30
Training for farmer and local officers	75.60	80.03	77.73
Preferential credit program	65.14	78.12	71.37
Information dissemination for poverty reduction	70.18	75.20	72.60
Cash support	89.85	58.16	74.64
Rice support	91.15	46.24	69.59

Sources: Survey data (2020). Unit: %.

Table 5 shows that respondents in both Xieng My and Xa Luong communes exhibit a high perception of support policies. This high awareness is attributed to the extreme difficulties these communes face, benefitting from various support programmes. Notably, the awareness of poor household heads in Xa Luong commune surpasses that in Xieng My commune, likely due to Xa Luong's better economic condition. For instance, recent improvements in infrastructure, such as roads in Xa Luong commune, have contributed to its enhanced economic standing, while Xieng My commune continues to struggle with numerous low-quality roads.

Differences also emerge in terms of cash and rice support between the two communes. Poor households in Xieng My commune report a higher perception of cash and rice support compared to those in Xa Luong commune. Local authorities attribute this to Xieng My commune's success in garnering support for forest protection. According to Decision 2345/2016/QD-TTg, aimed at promoting forest protection, a rice support programme is provided for ethnic communities and those in need who voluntarily participate in planting and safeguarding forests. Furthermore, Decision 377/QD-UBND, issued on 9 February 2021, approved a project extending rice support to impoverished households engaged in establishing and protecting forests within Tuong Duong district. Each household receives a monthly allocation of 10 kg of rice per person, effectively alleviating food scarcity issues. The government also provides financial support of VND

500,000 per hectare annually for households participating in forest protection programmes. The survey reveals that approximately 90% of poor households in Xieng My are aware of these cash and rice support programmes, acknowledging their significant contribution to addressing food security concerns.

Social resources manifest through social connections, often established by participating in local associations and societies. The accompanying bar chart illustrates the frequency of Tuong Duong households utilising various methods for gathering information: television, mobile phone, newspaper, internet, neighbour, relative, and group/organisation.

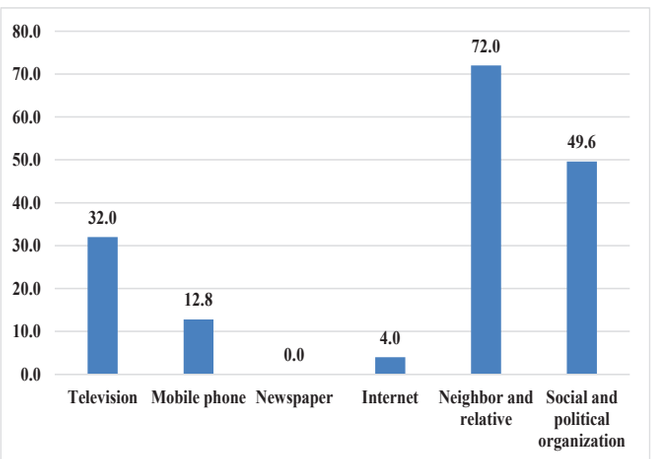

Fig. 4. Households' access to information through various methods. Source: Data survey (2020). Unit: %, n=125.

The Fig. 4 reveals an intriguing pattern: no households reported access to information through newspapers or groups (0%). In contrast, word-of-mouth channels, such as information from neighbours and relatives, are favoured, with 72% of households utilising this method. Additionally, a significant number of people rely on information from television and phones. The internet accounts for a small percentage of the total household population. Notably, none of the respondents used newspapers as a source of information regarding food security.

3.2.3. Natural capital

Cultivated land area: Based on the 2019 report by the district committee, the total agricultural land area was insufficient to meet the demands of agricultural production for the people in the communes, especially in terms of paddy rice cultivation [7]. For instance, the total paddy rice area in Xieng My commune was 61.9 hectares in 2019, representing approximately 3.2% of the overall agricultural land area in the commune. The ratio of productive land per capita was exceptionally low in Xieng My commune, amounting to only 0.03 hectares [7].

Seasonality: The table presents information on the cultivation schedule for agricultural crops in households within the research areas, focusing on three different crops in the year 2019 as provided by farmers. The units are measured in months.

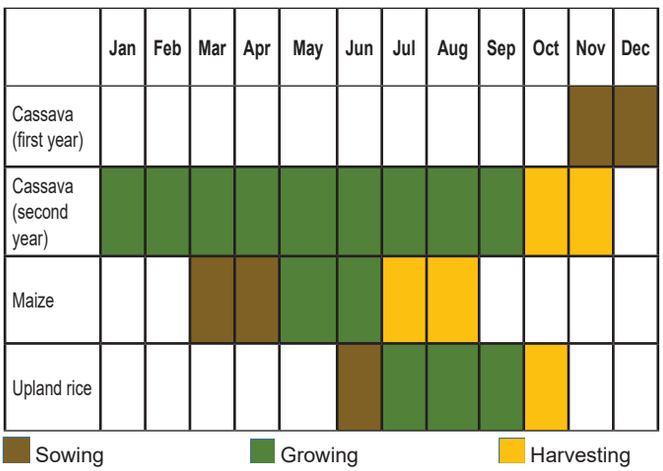

Fig. 5. Agriculture crop calendar of households in the research areas in 2019. Source: Data survey (2019).

From an overall perspective, a notable disparity exists in the processing period for three types of crops: upland rice, maize, and cassava (Fig. 5). Upland rice, for instance, experiences a singular annual season lasting five to six months. Typically commencing in May or June, farmers initiate the process through sowing and transplanting. The growth period spans 2-3 months, extending from late June to early September. Subsequently, harvesting begins, usually lasting 14 days, although the duration may vary based on rice variety and planting time, allowing some households to harvest earlier or later. The culmination of this cycle occurs in October.

Remarkably, households engaged in maize cultivation typically initiate the season in March or April, with harvesting extending into July or August of the following year. The distinctive water requirements for maize play a pivotal role in shaping the agricultural crop calendar. The concentration of rainfall from May to October, with the rainiest months being July and August, aligns with the critical period when maize demands an increased water supply. Consequently, productivity suffers due to insufficient water availability. Conversely, the duration for cassava's growth appears to be the longest among the

three main crops, spanning from November of one year to the next.

Rice and maize, primarily cultivated along the stream, faced severe consequences during floods, as water for agricultural production relied heavily on stream water. Presently, only two dams in the areas have the capacity to supply water for a total of 16.5 hectares out of the 61.9 hectares dedicated to paddy rice. The limited water availability has resulted in lower productivity.

Hence, addressing the challenge of low productivity in agricultural production, it is widely acknowledged that agricultural water usage stands out as the primary factor directly influencing crop production in Xieng My commune. Advanced solutions are imperative to ensure the fulfilment of household needs in the agricultural sector.

Natural disruption: Table 6 illustrates the impact level of disruptions on agricultural production that households experienced in 2019 and 2020. Broadly, the factors contributing to increased food prices, drought, and storms and floods emerged as the most substantial challenges, causing damage exceeding 50%. Another significant concern is the rise in production costs, coupled with the addition of family members, directly affecting the food accessibility of impoverished households.

Table 6. The impact of disruptions on agricultural production faced by households in Tuong Duong district in 2019 and 2020.

Disruption	None	<50%	>50%
Drought	5.60	14.40	80.00
Storm, flood	15.20	32.80	52.00
Adding family member	12.00	64.00	24.00
Increasing production costs	15.20	36.00	47.20
Increasing food price	0.00	12.80	87.20

Source: Data survey (2020). Unit: %, n=125.

Distance to central market: Geographical location plays a crucial role in determining households' access to food, assessed by the distance between their residence and the nearest market. Currently, Xieng My and its neighbouring communes lack a local market, posing a significant challenge to food trading. The primary market is situated in the district centre, approximately 80 km away, prompting households to purchase food from there or from local hawkers (Box 1).

Box 1. Household opinions on the absence of a market in Xieng My commune.

"At present, there is no market within the commune. Residents who wish to visit a market must travel to the district market or other districts. For everyday food needs, they primarily rely on local hawkers, through the available food selection is limited to basics such as sea fish, meat, and vegetables. Purchasing from street vendors tends to be more expensive compared to market prices, and the freshness of the food is compromised".

"Along the 48C highway from Hoa Binh town to Xieng My commune, which encompasses four communes (Yen Thang, Yen Hoa, Yen Na, Xieng My), there is a notable absence of trading markets. Residents resort to purchasing goods through itinerant vendors or making the journey to the town centre, which is more than 80 km away by car, for their food needs."

Mr. Bui Van A- A resident of Xieng My commune.

Irrigation system: It is well-documented that an increasing number of households in Tuong Duong district recognise the pivotal role of irrigation systems in the development of agricultural production in this study area. The absence of irrigation systems directly impacts the economic efficiency of crops, leading to significantly lower productivity than crops with a sufficient water supply.

Primarily, the low productivity of crops arises from insufficient water use in the agricultural sector. Water is a critical factor affecting the productivity of crops such as paddy rice and maize. According to the 2020 survey data, approximately 80% of non-poor households actively engage in water usage for agriculture, with proportions ranging from almost 30% to nearly 60%. Conversely, for poor households, the rate is approximately 5%, with the proportion of agricultural land area utilising proactive water just under 30%. Additionally, while rainwater contributes partly to agricultural water usage, communes like Xieng My and Xa Luong face frequent prolonged droughts with limited rainfall, typically occurring over three months of the year. This constrains people's ability to rely on rainwater for agricultural production.

Secondly, to address the aforementioned issue, constructing irrigation systems becomes essential for the agricultural production of the local population.

3.2.4. Physical capital

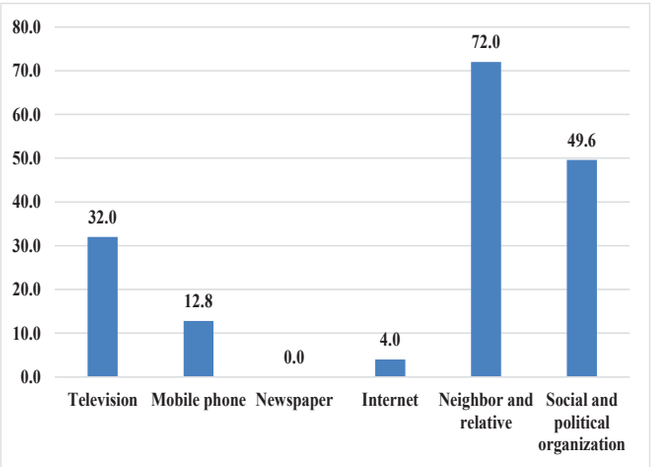

Fig. 6. Physical capital of poor households in Tuong Duong district. Source: Data survey (2020). Unit: %, n=125.

Physical capital encompasses fundamental infrastructure and producer goods essential for sustaining livelihoods, including affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy, and access to information. Fig. 6 demonstrates information on the number of basic household equipment in Tuong Duong district for the years 2019 and 2020. Notably, 82.4% of poor households can access information through smartphones.

3.2.5. Financial capital

From an overall perspective, a notable characteristic is the similarity in the number of loan borrowers and non-borrowers.

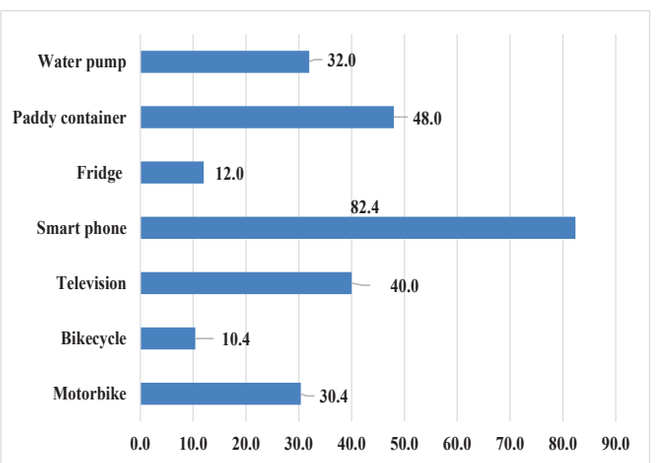

Fig. 7. Financial situation of poor households in Tuong Duong district. Source: Data survey (2020). Unit: %, n=125.

Regarding loans, 41.6% of total poor households have access to loans, primarily utilised for agricultural production or home construction (Fig. 7). Notably, non-borrowing households predominantly fall within the category of poor households, with total incomes ranging from 5-10 million VND, indicating the lowest income levels in the study. Despite preferential policies, reasons for non-borrowing include an apparent lack of need, inability to meet repayment obligations, and the absence of collateral.

Figure 8 elucidates the reasons for not borrowing money among poor households in Tuong Duong district. The primary reason cited is the absence of a need for a loan (32%), signalling a distinguishing factor between poor and non-poor households. Other reasons for abstaining from borrowing money include high interest rates, cumbersome procedures, lack of collateral, and various other factors.

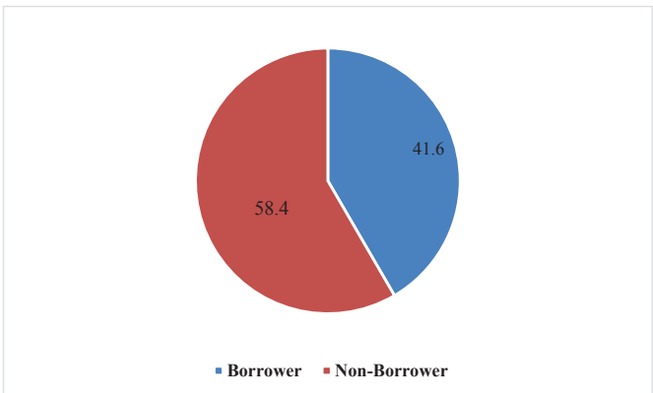

Fig. 8. Reasons for not borrowing money among the poor in Tuong Duong district. Source: Data survey (2020). Unit: %, n=125.

The ability to create income: The primary source of income for most households in Tuong Duong district is derived from various agricultural activities, including livestock such as pigs, buffaloes, cows, and chickens, as well as the cultivation of rice, cassava, and maize. Additionally, a significant number of households benefit from support programs like the 135 Program and 30A Program. Some households also generate income through labour wages, retail trade, and afforestation. Consequently, their income is heavily reliant on agriculture, resulting in limited livelihood diversity and susceptibility to external factors.

An overarching observation reveals a significant disparity in the income and loan patterns between two distinct types of households in Tuong Duong district in 2019. Non-poor households, with an average income

of approximately 54 million VND, significantly outpace their poor counterparts, who exhibit the lowest average household income at around 11 million VND. Compared to the overall sample's average income of 20 million VND, it is noteworthy that the average income of the entire sample is considerably lower than that of non-poor households, being half of the latter, and twice as high as that of poor households.

3.3. Recommendations for enhancing food security in Tuong Duong district, Nghe An province

Firstly, increasing the cultivation coefficient is identified as an effective method for enhancing crop yield in Tuong Duong district. Encouraging individuals to adopt intensive cultivation techniques can significantly boost productivity and agricultural output by improving soil nutrition. The local government should promote greater investment in both capital and advanced cultivation techniques. Moreover, multi-cropping has proven to be an efficient method, aiding in pest and disease control while simultaneously increasing agricultural output for farmers.

Secondly, inadequate water usage in agriculture has led to low plant productivity, adversely affecting the quality of paddy rice and maize. This shortfall fails to meet household demands, especially during peak seasons. To address this, the local government should prioritise constructing an irrigation system to support cultivation activities, playing a pivotal role in promoting agricultural production and enhancing household development in the district.

Thirdly, to enhance support activities for agricultural production at the household level, several initiatives are proposed. Organising timely training courses is essential to equip individuals with necessary skills for cultivation and husbandry, based on specific seasonal requirements. Training content should include aspects of farm work, seed selection, plant care, harvesting, farming techniques for livestock, and basic diagnosis and treatment of diseases. Comprehensive training for extension workers and veterinary staff at the grassroots level is also imperative, focusing on effective collaboration with farmers and acquiring professional skills in disease prevention and treatment for plants and animals.

Moreover, the expansion of the livelihood framework encompasses a variety of strategies. A primary focus is on diversifying production activities, which is crucial for generating income for impoverished households and boosting the effectiveness of cultivation and animal husbandry practices. In cooperation with poverty reduction organisations, the local government has the opportunity to establish demonstration plots for rice, maize, and peanuts in less affluent communes. This initiative is designed to aid individuals in enhancing plant varieties, improving fertiliser utilisation and adopting more suitable farming techniques to increase efficiency. Additionally, support can be offered to poor households by subsidising either partially or fully the cost of purchasing livestock breeds such as buffaloes, cows, pigs, and chickens. This would empower them to expand their herd size and overall livestock numbers. Furthermore, assistance in pig and chicken breeding can be provided, focusing on local breed selection and fostering potential collaborations with households.

Finally, constructing roads and improving market accessibility for impoverished households is a pressing concern. The limited availability of markets, particularly in Xieng My commune, has led to deficiencies in the variety and nutritional content of household diets. Establishing roads and markets in this region is a fundamental strategy to address food security issues. Additionally, the local government should boost market activities to facilitate the buying, selling, and exchanging of goods upon market opening, contributing significantly to the economic development of households within the district.

4. Conclusions

Despite Vietnam's overall national food security, many households, particularly in challenging areas like Tuong Duong district, Nghe An province, continue to experience food insecurity. This study investigates the food security situation of impoverished households in the district using the HFIAS measurement.

The research, involving a survey of 125 households across two communes, revealed behaviours indicating insufficient quality and quantity of food, as well as concerns and uncertainties regarding access to an adequate food supply. A majority of surveyed households fell into the categories of 'moderately food insecure' and 'mildly food insecure'.

The study identified various determinants of food security for the impoverished population in Tuong Duong district, including human capital, natural capital, physical capital, social capital, and financial capital. The results emphasise the need for policies focusing on expanding agricultural production and irrigation systems, enhancing support activities for household agricultural production, diversifying livelihood opportunities, and enhancing road infrastructure and market accessibility for the district's population.

CRediT author statement

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COMPETING INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

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