Analysing the determinants of food security among farm households in northern upland Vietnam

Khanh Pham Nguyen

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Supervisor: **Thi Thanh Mai Ha**
                     Department of Economics; Agricultural and Food Economics

Examiner: Rob Hart, Swedish University of agricultural sciences,
                     Department of Economics; Environmental and Natural Resource
                     Economics

Swedish University of Agricultural Sciences

Economics

Department of business and economics

Abstract

The objective of this study is to analyse food security status and the factors affecting food security in Son La, a province in northern upland of Vietnam. The results suggest that 90% of the observed households experience food insecurity, in different levels including mild, moderate, and severe. Furthermore, the results from logistic regression analysis show that age, education, household size, and the number of livelihood related activities have a positive effect on food security. All the results above are consistent with those from previous similar studies. The findings from the study can provide relevant information to the development of food and agriculture policies in Son La and other mountainous provinces in Vietnam.

Keywords: food security, poverty, Vietnam, food insecurity experience scale

Table of contents

List of tables

Abbreviations

FAO	Food and Agriculture Organization
FIES	Food Insecurity Experience Scale
SDG	Sustainable Development Goals
UN	United Nations

1. Introduction

All over the world, humans share the common need of food. In 1996 the World Food Summit specifically declared that access to decent quantities and nutritious food was a human right with the incentive to end hunger worldwide. Yet today, hunger is affecting people all over the world despite the declaration of basic human rights. Food insecurity is rooted in social inequalities - from the household to an international extent. Global warming adds problems such as climate change and food price are also playing a key factor that makes it harder to prevent malnourishment (Ballard et al., 2013). By 2030 the UN aims for zero hunger as goal number out of the seventeen Sustainable Development Goals (SDGs).

According to the UN (2022) the number of people in hunger from 2014 to 2019 remained closely but since the COVID-19 outbreak in 2019 the prevalence of undernourishment has gone from 8.4 % up to around 9.9 % in just a year, this has made the gap to zero hunger even larger than before. In 2019 the estimated number of people facing hunger was 768 million, in 2020 the number grew with another 118 million. If this trend continues, the goal of zero hunger by 2030 is not possible to meet. By the end of 2020 it was estimated that 135 million people suffered from acute hunger due to conflicts created by humans, climate change and economic turndowns and COVID-19 is estimated to double these numbers. With the numbers growing at this speed, immediate actions are to be made to prevent hunger to increase, such as providing food and humanitarian help to the people at most risk. The agriculture sector is facing the fact of providing food to 690 million people and another 2 billion people by 2050.

An individual that is lacking enough, safe, and nutritious food on a day-to-day basis is defined as food insecure. The experience of food insecurity can be on different levels, ranging from mild to severe. People suffering from severe food insecurity might have to sacrifice basic needs only to be able to eat and will eat what is available and cheap not necessarily nutritious or healthy. Consequently, undernutrition and obesity are commonly coexisting (FAO, 2022)

The poverty situation has overall improved in Vietnam over the last decades (Nguyen, 2012). However, a large group of ethnicities in mountainous regions in Vietnam still suffers notably from poverty and food insecurity. Among the ethnicities, Hmong and Dao are one the groups that in comparison to the other groups have significantly lower income and higher rate of poverty according to

Nguyen (2022). To enhance food security for upland households, it is important to understand their current food insecurity status collecting information regarding food insecurity and the factors causing it to give policy makers insight, spread awareness regarding the matter on a political level to create a will for change and to know how to allocate resources (Ballard et al., 2013). Noticeably, food insecurity is measured by a food insecurity experience scale (FIES) and this is how the study contributes to gap in the literature. The study's findings will be useful for future agricultural and food policies for mountainous areas of Vietnam. It could also be important for future policy making and development of the country's welfare which could also be broken down to province or district level.

1.1 Research question

To measure food insecurity status in the upland households in Vietnam FIES (Food Insecurity Experience Scale) is used a measurement and is based on experiential measures of household representatives.

This study aims to answer the following question: what are the determinants of food security for farmers in northern upland Vietnam?

2. Background

From being one of the poorest nations in the world, Vietnam has now become a middle-income economy in just one generation. The economic reform started in 1986, from 2002 to 2021 the GDP per capita grew 3.6 times and the poverty has decreased from 32% in 2011 to just under 2% (World Bank, 2022).

The definition of a middle-income country is divided into two different categories, lower-middle and upper-middle. The two different categories differ regarding the value of the gross national income (GNI) per capita. For the lower-middle the GNI falls between $1036 - $4045 and for the upper-middle $4046 - $12 535. 75% of the world's population resides in middle-income countries, apart from that it is also estimated to be the home for 62% of the poor people in the world. Middle-income countries play a key role in the global economy as they in fact make up about one third of the global gross domestic product (GDP) and therefore have an important role for the economy worldwide (World Bank, 2022)

The economy has not only proved to grow successfully, but it has also proved to be resilient through a challenging time during the pandemic. Not many countries have shown a GDP growth post pandemic in 2020 but Vietnam was one of the few that did have a growing GDP. Unfortunately, the economy eventually took a turn due to the Delta version in 2021 and slowed down but in 2022 it is expected to be growing again.

Along with the economic growth, health among the population has also shown an improvement. Infant mortality has decreased, and life expectancy has increased. Access to clean water and electricity plays a key role in health improvement. In 1993 about 14% of the population had access to electricity and by 2019 it grew to 99,4%, clean water access has increased to 51% in 2019 from 17% in 1993.

By 2045 Vietnam aims to be a high-income country, to achieve this the economy must continue growing with five percent annually. With global warming being a fact Vietnam also aims to become greener, by 2050 the country aims to be carbon neutral. To be able to reach these goals improvements need to be done within the implementation of policies regarding finance, infrastructure, environment, social protection for instance (World bank, 2022).

About half of the population in Vietnam remains employed in the agriculture sector but at the same time agriculture is becoming less and less important for the country's economy. The manufacturing and service sector has since the early 1990s overtaken the agriculture sector in terms of productivity, with around only 8% of the population employed in the industry.

But the agriculture sector still makes a large contribution to the nation's export, the main agricultural areas are the Red River delta (north Vietnam) and Mekong River delta (south Vietnam) and the Southern Terrace region. The most important crop is rice and is mostly cultivated in the Red and Mekong River deltas. Sugarcane, cassava, corn, sweet potatoes, and nuts are other major crops that are grown in Vietnam. Except for the major ones, bananas, coconut, citrus fruit, coffee, and tea are other common crops. The industry is still relying on old methods that are labor intensive, which explains the large number of employees (Britannica, 2022).

2.1 Description of the study area Son La

This research focus on Son La province. Son La is in the northwest of Vietnam, a province of 14 123 square kilometer and home to 1.25 million people which also makes it the third biggest locality in the country. The province has one city and eleven districts. The most common ethnicity is Thai ethnic minority followed by Kinh along with some indigenous ethnicity groups residing in the province which are H'mong, Muong, Dao, Kho Mu, Xin Mun, Khang, La Ha, Lao, Tay and Hoa.

The province is 78 850 hectares of fruit plantations and particularly Son La plum, passion fruit, mango, banana, avocado, and red dragon fruit. Other cultivations are tea and flower farms. Son La has a potential of developing in the agricultural sector, tourism, and renewable energy - instead of the current hydropower - which in turn could potentially diversify the province's budget and socio-economic situations. To attract investors to projects in Son La, a deal of tax reduction is offered, this to better the difficult socioeconomic status the province is facing (Vietnam law magazine, 2022).

2.2 Food insecurity experience scale (FIES)

Food insecurity is defined as the lack of regular access to enough, safe, and nutritious food to be able to sustain an active and healthy life and nourish normal growth and development (FAO, 2022). The FIES was developed by Ballard, T.J.,

Kepple, A.W. and Cafiero, C. together with the FAO and the idea behind the it was to, as realistic as possible estimate food insecurity worldwide.

An experience-based metric for food insecurity is used in the scale, which is based on the individual's direct response to specific questions regarding food insecurity. The FIES measures the severity of food insecurity of an individual or household based on eight questions with Yes/No response (Ballard et al., 2013). To develop the FIES which is based on the Rasch-model, FAO together with Ballard, T.J., Kepple, A.W. and Cafiero, C. collected data from 150 countries over three years. The people interviewed were also associated with conditions that typically cause food insecurity, like lack of income or other resources. Analytical procedures based on the Rasch-model was conducted to process the data and to calibrate it to a global measurement.

Depending on how many points the individual or household scores on these eight questions it will place them on the scale of food secure, mild food insecurity, moderate food insecurity or severe food insecurity (Cafiero et al., 2017). The FIES is a food insecurity scale has an advantage due to its global application. There are multiple food security scales that have been tested and studied in the literature, however the issue appears when comparing the results of different scales and it must be done with care (Ballard et al. 2013).

3. Literature review

From an economic point of view, starvation has often been analyzed with the so-called food availability approach, which explains that extreme hunger in any geographic location is a result of a sudden reduction in food supply (Sen, 1977). But this approach fails to explain the underlying cause of starvation, particularly in the case of the Bengal famine in 1943. The explanation is that the world population growth hasn't exceeded the production rate of food production worldwide. Instead, Sen (1977) uses the entitlement approach to describe issues causing starvation. The entitlement approach is based on an exchange economy, where a family's labor and possession values will determine whether they will starve or not, depending on what they have sell to exchange for food. An unexpected change reducing the value of labor or possession may therefore develop starvation while the supply of food remains the same. In a study by Bandara and Cai (2014) South Asia is identified as one of the most vulnerable geographic locations to be affected by climate change. The study aimed to investigate the impact from climate change on food prices, food security and crop productivity, particularly rice, wheat, and cereal grains. According to the results, it's likely that all South Asian countries will be expecting negative impacts on food production as well as facing food insecurity, as South Asia is habituated by close to half of the world's poorest population and therefore climate change adaptation policies become important.

Several studies have analyzed the determinants of food security with a logistic regression measuring factors that correlate with food insecurity, the same method used in this study. There are a few significant factors that are consistent through most of the studies. All the reviewed studies have the same endogenous variable, a dichotomous variable that is either food insecure or food secure. The methods to estimate the dependent variable were different in all the reviewed studies, there were mainly two methods, the expenditure method and calorie per capita method.

Demographic and some socio-economic characteristics have been found to influence on food security. Education and age of household were significant factors that positively affect food security according to a study by Ali et al. (2016) from households in Rangpur City, Bangladesh. According to Bashir et al. (2012) education level of the household head was also significant in their study, showing the same significant variables from a perspective of landless rural households. Contrary to the study by Ali et al. (2016), Bashir et al. (2012) showed that an

increase in the age of the household head increases the chance to become food insecure. The explanation is that younger people are stronger and can endure tougher jobs and that households with older household heads are multigenerational households, which means that they have older/retired people to feed hence increasing food insecurity. Ali et al. (2016) showed an increase in food insecurity along with an increase in dependents in the household, a study by Mensah, O; James, A and Tuffour (2013) from the Sekyere-Afram Plains district of Ghana also support this by showing a negative relationship between household size and food security.

Income is another significant factor in almost all the reviewed studies. According to Mensah, O; James, A and Tuffour (2013) their significant results from the regression showed consistency with earlier studies, with the following significant variables; off-farm income, credit assets and farm size. These variables showed to have a positive impact on food security. Though the education level of the household head did not show to be statistically significant with food security as expected. Having several income sources and assets (Beyene and Muche, 2010) has a significant contribution to an increased food security. Similar results are found in the study from Rangpur City (Ali et al.,2016) where the head of the household being gainfully employed and thereby having a stable income had a positive effect. For the landless household in Punjab (Bashir et al., 2012) income was also a significant factor for food security. Bashier et al. (2012) used the dietary-intake based method in their study, which have been criticized due to its limitations. But the reasoning for the selection of the method is justified because all the household observed in the study belonged to the lowest income group.

According to Quisumbing et al. (1996) women play a significant role for keeping food security in the household in developing countries but the rules of society and culture in these countries are not in their favor which in turn prevent them from their potential of taking care of their family. To create a change incentive from the government and international organizations are needed to construct policies in favor of women, most importantly is to increase their human and physical capital through education and to protect their health and nutritional status (Quisumbing et al., 1996). Kennedy & Peters (1992) suggest in a study analyzing household food security and child nutrition in Kenya and Malawi that a household run by a woman has a significant and positive effect on the calorie intake of the household. Even though the income level of the households run by women were the lowest, the children in these households showed a much better nutritional status than the other households. Hadley et al. (2007) studied the seasonal food insecurity and perceived social support in rural Tanzania, where food insecurity is highly prevalent. The study showed that a food security is associated with a strong social support, which in this case would protect the households against seasonal food insecurity.

Lastly, a recent survey-based study from Vietnam that studied the effects of COVID-19 on small-holder farmers and vulnerable rural populations showed that the pandemic hit the hardest among the poorest household's livelihoods. To cope with the negative effects from the pandemic most households chose to spend less and use savings rather than spending money on social or agricultural insurance and were getting support from relatives or friends. A trend shown from the study is that most of the people indicated that they want to increase the scale of the production and that were positive to get more off-farm jobs post pandemic (Tran et al., 2022)

4. Methodology

4.1 Data description

The data uses survey data that were collected by Thi Thanh Mai Ha, a researcher at the Swedish University of Agriculture Science and her research collaborators in a project funded by International Foundation of Science (IFS). The survey covered 415 randomly selected household representatives in Son La, a province in northern upland Vietnam. A structured questionnaire was made for the household representatives to give answers about food security of their households. Furthermore, to avoid bias and violation of the assumptions regarding the multiple logistic regression it was essential that the survey was sent out randomly.

The questionnaire consists of 37 questions in total, not including the sub-questions and divided into three sections. Questions asked in the first section are based on demographic, socio-economic characteristics, and agricultural production, in section two regarding climate change perception and adaptation and in section three food insecurity. All data collected is quantitative.

To perform the analysis with consideration for the scope and relevance fourteen questions in total were picked out. Further, data from some of the questions needed to be re coded to be fitted for the logistic regression model. The independent variables are gender, age, high school education, household members, how many children under 15, number of crops grown, number of income activities, income level, social support, and food sharing. Which were selected based on the literature review. The dependent variable is based on the data regarding food security measured by the FIES. Originally the FIES is divided into four categories: food secure, mild food insecure, moderate food insecure and severe food insecure. But for this study the categories are re-coded into two categories. By summing up the points in the questions regarding food insecurity, the individual or household is then placed on either food secure or food insecure.

4.2 Data analysis

To analyze the research question, a multiple logistic regression is conducted with the software Stata. A multiple regression consists of one nominal variable (dependent variable) and two or more measurement variables (independent variables). The aim is to identify if there are any correlations between the dependent variable and independent variables. But with these correlations alone, it is not enough to be able to draw conclusion about any causal relationships between the variables.

A logistic regression is used to understand how the independent variables predict the probability outcome of the dependent variable, which can obtain only specific values (Biostathandbook, 2022). The probability of an event occurring or not, is commonly estimated with the logistic regression and because the outcome is a probability the dependent variable can only take the value of 0 or 1. The odds of an event occurring is calculated by dividing the probability of success by the probability of failure and in a logistic regression a logit transformation is applied to the odds.

The coefficients, also known as the beta parameters, is commonly estimated by a method called maximum likelihood estimation (MLE). The log odds are simply the beta parameters, transformed into odds ratio (OR) to make the interpretation of the results easier. If the OR is greater than 1, the odds are higher that the event will occur, contrary to when the OR is lower than 1 the odds will be lower for the event to occur. The Hosmer-Lemeshow, a commonly used method to see how well the dependent variable is predicted by the model can be conducted after performing the regression analysis (Ibm, 2022).

Following are the five assumptions of the data used in a logistic regression:

1. If it's a binary logistic regression, the dependent variable must be binary.
2. All observations are required to be independent.
3. Little or no multicollinearity between the independent variables.
4. Linearity of independent variables and log odds.
5. Large sample size.

By violating these assumptions, the validity of the results may be reduced (Statistics solution, 2022).

4.3 Econometric model

The equation which the multiple logistic regression uses to estimate the relationship between the dependent and independent variable is the following:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + + b_{12}X_{12} + + b_{13}X_{13}$$

Where Y = Status of household's food security (1-food secure, 0-food insecure)

b_0 = constant

$b_1 - b_{11}$ = Coefficients of the explanatory variables

X_1 = Age of the household (Years)

X_2 = Children under 15 (0-5)

X_3 = Education level: high school (0-No, 1-Yes)

X_4 = Education level: no school

X_5 = Gender (0-female, 1-male)

X_6 = Food sharing (0-No, 1-Yes)

X_7 = Hmong (0-No, 1-Yes)

X_8 = Household members (2-15)

X_9 = Income level (Numbers 1-5)

X_{10} = Number or crops grown (1-9)

X_{11} = Number of livelihood activities (2-7)

X_{12} = Off-farm job as main income (0-No, 1-Yes)

X_{13} = Social support from family and relatives (0-No, 1-Yes)

5. Results and discussion

5.1 Results

Following are the results from the logistic regression analysis. The significance of the variables varies between 10% (*), 5% (**) and 1% (***). A negative coefficient implies a negative effect, in this case a negative effect on food security. The odd ratio measures the relationship between the likelihood of an event to occur and a variable (Statistics by Jim, 2022).

Table 1 Logistic regression results

Variable	Coefficients	Odds ratio	z-values	p-values
Constant	-4.049*	0.075	-1.69	0.091
Age	0.040**	1.041	2.31	0.021
Children under 15	-0.167	0.845	-0.83	0.405
Education level; high school	1.090**	2.925	2.45	0.014
Education level; none	-2.978**	0.050	-2.77	0.006
Food sharing	-0.871*	0.418	-1.70	0.089
Gender	-0.603	0.547	-1.60	0.110
Hmong ethnicity	-0.563	0.568	-1.49	0.137
Household members	0.170	1.185	1.62	0.105
Income level	-0.374	0.687	-0.89	0.375
Number of crops grown	-0.475***	0.621	-3.70	0.000
Number of livelihood activities	0.480**	1.617	2.49	0.013

Off-farm job as main income	0.003	1.003	0.01	0.995
Social support from family and relatives	-0.974**	0.377	-2.31	0.021

*, *, *** *denote significance level of 90%, 95% and 99%*

Number of observations	415
Number of covariate patterns	414
Prob > chi2	0.0000
Pseudo R2	0.2147
VIF	1.08

After the regression, a Hosmer-Lemeshow test was performed to see how well the data fits the model. The results from this test will show a chi-square value and a p-value. When the p-value is small, under 5%, it is an indication that the model is a poor fit. But a large p-value doesn't necessarily always mean that the model is a good fit (Statistics how to, 2022).

In this case the p-value was under 5%, which means that the data in this study is a poor fit to the logistic regression model. The Pseudo R shows a very low value of 0.1415, concluding that the variation in food security status is explained by 14.15% by the socio-economic and demographic characteristics. A VIF-test (variance inflation factor) was performed with the aim to detect multicollinearity, a low value of 1.08 shows that multicollinearity is not present.

Table 2 Hosmer-Lemeshow test (goodness-of-fit)

Pearson chi2 (401)	666.90
Prob > chi2	0.0000

Table 3 Summary of the independent variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	415	37.763	10.45	18	76
Children under 15	415	1.465	0.986	0	5
Education (1) *	415	0.175	0.381	0	1
Education (0) *	415	0.209	0.407	0	1
Food sharing	415	0.889	0.314	0	1
Gender	415	0.518	0.500	0	1
Hmong	415	0.433	0.433	0	1
Household members	415	4.927	1.564	2	15

Income level	415	2.710	0.665	1	5
Number of crops grown	415	4.180	1.528	1	9
Number of livelihood activities	415	4.460	0.966	2	7
Off-farm as Main income	415	0.149	0.356	0	1
Social support from family and relatives	415	0.790	0.407	0	1

High school (1), no school (0)

Table 4 Food security status

	Frequency	Percent
Food insecurity	372	90%
Food security	43	10%
Total	415	100%

5.2 Discussion

The main goal of the study was to study the relationship between food security and socio-economic characteristics, with the demographics variables as control variables. As mentioned before, it is important to note that this study is only looking at correlations between the variables and even two variables are correlated it cannot be concluded that they affect each other, there could be another factor or coincidence causing that correlation (Khan Academy, 2022). The results interpretation are therefore only speculations based and not conclusions.

According to the data (table 4), almost 90% of the household representatives experienced either a mild, moderate, or severe form of food insecurity based on the FIES. The income level in the survey is scaled as the following: 1. very poor, 2. poor, 3. comfortable, 4. well-off and 5. very well-off. Looking at the mean of the income level which is 2.7 states that the average income level is between poor and

comfortable, leaning more towards comfortable. The conclusion from interpreting this data is that food insecurity is indeed an issue in the province of Son La.

From the results, the significant factors were, age, education (high school), education (none), food sharing, number of crops grown, number of livelihood and social support from family and relatives.
Even though the model shows to have a poor fit, the results still show to be coherent with previous studies and results. One of the reasons for the poor fit could be the re-coding of the FIES variable to a binary variable. The study could have been conducted with an ordered logistic model instead. In an ordered logistic regression, the dependent variable is ordered, which means a meaningful order with more than two categories (Statistics how to, 2022). Then all the original categories food insecurity of the FIES would be included.

To keep in mind that in the previous literature, the survey was answered by the household heads, in this study the survey was answered by household representative which doesn't necessarily equals household heads. Following, the results from these variables will be discussed in detail below.

5.2.1 Age

This variable shows a positive coefficient which is significant at 95%, indicating that food security will increase the older the individual is. As the age increases with one the odds ratio of being food secure increases with 1.037. The results show consistency with a previously conducted study, but the variable was regarding the age of household head in foregoing study. In this study Ali et al. (2016) the observed individuals are necessarily the household representative, but they are supposed to represent the household when answering the question in the survey.

Another of the reviewed literature for this study showed the opposite, which implies that the older the household head is, the food insecurity will increase. In this study the explanation for the result for the age variable could be supported by various factors but one could be that the older the more stable an individual becomes when it comes to feeding themselves. The age of the observed individuals ranges from 18 to 76 years with the average age being approximately 38.

5.2.2 High school education and no education

The results show a positive relationship between this variable and the dependent variable. Implying that having a high school level education will increase the odds of food security by 2.925 and that having no education would decrease odd ratio of food security with 0.050. Among the households' representatives only 17.5% had finished high school, suggesting that the education level in the province is low. The

result from this study is aligned in the study by Ali et al. (2016) as well as Bashir et al. (2012) where the education variable also showed to be significant and positively affect food security.

For households suffering from food insecurity in low-income countries, it is not always apparent to send their children to school as the value of putting dinner on the table is more important, when choosing between the two options (Rise against hunger, 2022). If the individuals in this province continue to remain food insecure, there will not be room for education. This could be one explanation to the low education rate from the observed area and how the variable is relating to food security.

In the creation of the Sustainable Development Goals (SDG) the United Nations (UN) recognized education to be the foundation on the success of the goals, especially food security. Highlighting that education is a potential instrument to help children and young adults to leave the cycle of poverty, as well as building a brighter future (Rise against hunger, 2022). As a matter of fact, education is also a human right. The declaration appeals for elementary education to be free and compulsory and aside from breaking the cycle of poverty among millions of children and young adults, education is also one of the tools to achieve gender equality. In this moment, about 258 million children and young adults worldwide don't have an education or are without an opportunity to go to school and 617 million children and young adults cannot do basic mathematics and read (UN, 2022).

5.2.3 Number of crops grown

This variable presents a 1% significance level and was also the only one to do that. The coefficient for this variable shows a negative sign, which implies that the number of crops grown reduce the food security status of the household. The number of crops grown ranges from one to nine with a mean of roughly 4 crops.

The odds ratio for food security is decreasing at a rate of 0.628 as the number of crops grown is increasing with one unit. The results might seem contradictive at first because as the number of crops grows, the logic would be that self -sufficiency increases and therefore increase food security. But in this case, consideration must be taken to the food security status of the area, which 90% was food insecure. This is called reversed causality, instead of X causing a change in Y it is the other way around. Instead of the number of crops grown affecting food security it is rather reversed, the food insecurity status of the household will determine the number of crops grown.

One explanation for this reversed causation could be that the more limited the resources are to obtain food in the current, the more crops will be grown for future

consumption instead of purchasing it. It could also be explained that the individuals chose to use their income on education for their children, to feed older/retired household members or on unexpected expenditure for instance. This variable is unique for this study and not found in any of the reviewed literatures.

5.2.4 Number of livelihood activities

This variable showed a positive coefficient and significance at 5%. This variable summarizes all the income related activities the household representative has reported in the survey. The average number of income activities seem to be around four, ranging from two to seven. The results indicate that the more income generated activities the household has the odds factor of being food secure increase with 1.607. The result is supported in almost all the reviewed literature for this study, showing that the income related variables have been consistently significant. The variable differs in how it is estimated between all the studies. Regarding this study this variable includes the following activities: crop production, livestock production, maintaining of home-garden, receiving remittance, receiving support from the government and others and off-farm jobs.

5.2.5 Social support from family and relatives and food sharing

Food sharing has a negative coefficient and a significance level at 10%. This indicates that as food sharing is increasing the food security will decrease with the odds factor of 0.405. The variable social support from family and relatives also has a negative coefficient. These two variables are both under the category of social support. What differs them from each other is that social support includes different types of support like monetary for instance whereas food sharing is very specific to only that. But they both indicate that household representatives that tend to be less food secure are also the ones getting more support from family and relatives as well as getting food shared to them.

An explanation could be that the direct community is a better support than receiving support from the government for instance. The answer of yes to food sharing is 89% and 79% to social support from family and relatives, indicating that the community support in the area is strong. This goes against the literature, which indicated that an immense social support in the community is associated with food security.

6. Conclusion

The findings from this study suggest the importance of education as well as having a stable income in improving food security, which is also proven in previous studies. Son La seem to be habituated by around 43% of the indigenous ethnicity Hmong that has a significantly lower income rate than other ethnicities, this could be the reason why the food insecurity was so high, though the Hmong variable didn't have a significant effect on food insecurity. The survey was conducted during a pandemic which could be one explanation for food insecurity to increase. But even though the results from this study are showing consistency with previous literature it is important to understand that these studies are limited to measuring correlations only and thus the conclusion about causality between food insecurity and its independent variables cannot be drawn. Moreover, climate change and COVID-19, two possible factors that might affect food insecurity was not considered in the analysis. However, further studies are suggested to address these limitations to archive a comprehensive understanding of the determinants of food security in Northwest Vietnam.

To conclude, food insecurity is a complex economic and social issue that takes root in many different factors and in simple words it could be explained as a mismanagement in food allocation. As for example, the blooming economy in Vietnam during the last two decades might have increased the availability of food per capita but that doesn't necessarily mean that food insecurity among the population have decreased, according to Sen (1977) starvation is not necessarily the cause of food shortage. Hence policy making for areas like Son La, all the above factors and more needs to be taken into consideration in the precautionary work to reduce food insecurity.

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