



NAFRI Research Report

Farmers' access to credit in the Lao PDR

Date: 18.10.19



Funding and Technical Support by:



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development
and Cooperation SDC

Embassy of Switzerland

Technical Support by:



Contents

1. Research Background and Rationale	5
1.1 Background.....	5
1.2 Rationale	6
1.3 Research Objectives and question	7
2. Methodology	8
2.1 Target population and sample.....	9
2.2 Data collection	10
2.3 Data analysis	11
3. Descriptive Statistics.....	11
3.1 Farmers and their farms	11
3.2 Access to credit.....	14
3.2.1 Descriptive statistics of farmer on access to credit.....	14
3.2.1 Sources and conditions of credit.....	15
3.2.3 Purpose of finance.....	17
3.2.4 Credit risks.....	17
3.3 Determinant of access to credit.....	23
3.3.2 Result of Logit Regression.....	26
4. Organization working to access to credit.....	30
4.1 The formal bank sector	30
4.2 Non-bank credit institutions and traders	31
4.3 Access to credit at times of disaster.....	31
4.3.1 National Disaster Management Committee.....	33
4.3.2 Labor and Social Welfare Division.....	33
4.3.3 The Bank of Lao PDR.....	33
4.3.4 Agriculture and Forestry Divisions.....	34
5. Conclusion and Policy Implication.....	35
6. References.....	37
7. Appendix.....	39
A.1 Questionnaire	39
A.2 Interview Guideline.....	40
A.3 Logit Regression	51

Executive Summary

The agricultural sector plays an important role in the development of the Lao PDR. In 2017, the growth rate of GDP was 6.9%. The growth rate of agricultural sector increased by 2.9% contributing to 17.7% of country's GDP. In addition, agriculture sector contributed to 60.8% of total employment. The financial sector largely misses the needs of poor farmers and small processing units located in rural areas, as most financial institutions are located in the cities. In rural areas, small-scale credit schemes and financial support are mainly provided to farmers through development projects, and local government agencies.

Not only are financial institutions underrepresented in rural areas, credit access procedures are too complex for the farmers and loans are ill-adapted to the farmers' needs and constraints. It needs to simplify lending procedures for farmers and to help farmers prepare the required documents. The questions are how much credit is released for commercial production, livestock and agriculture promotion, and small/medium processing industries in rural areas? What kind of financial support is available to support rural activities and to help those who have experienced natural disasters? How to improve improved the availability of and access to rural finance in rural areas through non-bank financial products?

The risk of natural disasters, including climate change seems to increase the need for investments to improve the resilience of agriculture. Financial support and access to finance could empower farmers to increase their wealth and ability to feed the population. The agriculture sector tends to receive less support from the government. Access to credit for farmers remains a huge challenge in the Lao PDR. The lack of financial management skills such as absence of trading and production records, credit history, lack of collateral, and risk from natural disasters. Smallholder farmers do not seem to have enough savings or insurance to cope with crises, and they have little or no access to insurance schemes, whether social or market-based.

The main hypotheses underlying our research are farming households have a variety of needs that they must address that cannot always be completely separated from one another, rural HHs adopt different strategies that may in turn impact their ability to generate income and meet their needs in the future and the financial needs of the farmers are highly crop dependent and need to be answered at a specific period, but formal credit institutions have no idea about the farmers constraints. The objectives of this research are to assess the main financial needs of smallholder farmers, to study the procedures of access to credit, to identify the factor determining farmers' access to credit and to analyze credit risk of farmers; and to find support mechanisms for farmers to recover from impacts of natural disasters.

Primary and secondary data include: field observations, the study of regulations and relevant development project documents. While the secondary data analysis was mainly done through desk review, the primary data were collected through an original survey

conducted in May-June 2019. This study aims to identify the determinants of farmers' access to credit are using a regression model. The assessment of rural household repayment performance was evaluated through the 5 Cs approach. A total of 368 households were included in the analysis: 303 households mainly grew rice, 33 households were engaged in maize production, and 32 household mainly raised pigs.

Most households surveyed in this study counted at least five members. Over 95% of all farm households reported that two members in their household worked in the labor market. There were more male-headed (59%) than female-headed households (41%). The average age of household heads in this survey was 49 years old. 93% of the household heads were married, while single household heads represented less than 2% of the total sample. 12% of all households had no education, while 47% had primary education and 28% had attained lower secondary school. 93% of the household heads were farmers. A small number of household heads declared doing their own business while household heads working for the government represented 3% of the sample.

Regarding the access to credit, approximately 45% of the respondents had access to credit. Main reason for not accessing credit was high interest rate. However, two-thirds of the households went to the *Village Fund* to borrow money where the monthly interest rate proposed by the village fund was about 4.75% per month or 57% per year. In comparison, the LDB had very low interest rates on average 5.06% per year. Over 90% of the households borrowed money for their agricultural activities, regardless of the financial institution through which they obtained the loan. Only the loans obtained from the village fund had more diverse uses, *e.g.*, investment, disaster relief, child education, health treatment.

Credit risks analysis suggests that most farmers have a relatively high level of risk, which is likely to limit their access to credit. Indeed, while most farmers have at least primary school attainment, they can access credit, but might not be able to manage it properly. Furthermore, farmers may have agriculture land, but cannot use this land as collateral as they have no land title. There are some several factors affecting the access to credit of famers. Lao-ethnic farmers are found to have lower access to the credit market compared to farmers from other ethnic groups. Household heads' education tends to raise the probability of households' access to credit. Agricultural land is still one of the most important collaterals in access to the credit market of Laos. The occurrence of disaster increases the demand for credit among farmers.

Main organizations deal with access to finance include bank, non-bank credit institutes and traders. Village banks and saving group play more roles than other sources of credit. Farmers tend to borrow from village banks and saving group although the interest rate is high. The main reason is that within a village they know information of each other which make faster decision of lender. Farmers are likely to receive relief from the government when they experienced severe damage from natural disasters. It seems that the engagement of the private sector, international organizations, as well as other farmers in

assisting farmers affected by natural disasters, is relatively small. However, interpreting this result is not straightforward because the donation from the private sector and other organizations was mostly made throughout government agencies. Thus, farmers might not know where the sources of the donation came from.

Research team

Date 23/12/2019

1. Research Background and Rationale

1.1 Background

The agricultural sector plays an important role in the development of the Lao PDR. This is reflected in the 8th National Socio-Economic Development Plan (NSED), which emphasizes the need to focus on poverty reduction and rural development programs. In 2017, the growth rate of GDP was 6.9%. The growth rate of agricultural sector increased by 2.9% contributing to 17.7% of country's GDP. In addition, agriculture sector contributed to 60.8% of total employment (The Asian Development Bank, 2019).

In 2018, the financial sector comprised of 43 commercial banks, 103 branches, 533 service units, and 1,193 ATMs. Unfortunately, the financial sector largely misses the needs of poor farmers and small processing units located in rural areas, as most financial institutions are located in the cities (Bank of Lao PDR, 2018). Moreover, the main policy supporting the access to credit (SMEs Development Plan 2016-2020) focuses on SMEs¹. In rural areas, small-scale credit schemes and financial support are mainly provided to farmers through development projects, and local government agencies. Rural finance institutions include *Village Savings and Credit Schemes* that mobilize village savings and provide funds for small agricultural and trade businesses and *Village Banks*.

Not only are financial institutions underrepresented in rural areas, credit access procedures are too complex for the farmers and loans are ill-adapted to the farmers' needs and constraints. A policy dialogue (NAFRI-FAO, 2018) highlighted the need to simplify lending procedures for farmers and to help farmers prepare the required documents. Moreover, farmers asked: to take into account the specificities (conditions and calendar of production) of different farming activities –e.g., by applying different interest rates for different products– and to better take into account farming risks –e.g., by introducing some flexibility in the payback period for credit/loans if disease outbreaks or extreme climatic event disrupted production. Farmers also asked whether the government could provide financial help if such incidents occurred. Farmers and small processing units located in rural areas also face very high interest rates despite existing policies –e.g., Notices No. 527/BoL; and No. 662/MPD fixing the interest-rate spread set at maximum 4%, based on weighted-average. Finally, the procedures and conditions for establishing farmer groups are not easy to follow for poor farmers.

While there is a need to support farmers/farmer organizations, rural finance and insurance mechanisms to improve productivity, several questions remain unanswered: how much credit is released for commercial production, livestock and agriculture promotion, and small/medium processing industries in rural areas? What kind of financial support is available to support rural activities and to help those who have experienced natural

¹ This policy focuses on: building the capacity of banks, financial institutions and SMEs; developing financial products and services for SMEs; creating an enabling environment for business development and; allocating financial resources to release credit/loans to SMEs.

disasters? How to improve improved the availability of and access to rural finance in rural areas through non-bank financial products? One way to meet increasing credit requirements in rural areas would be to link the lending activities of commercial banks with those of Village Banks. This approach might be further supported by on-farm technical support services² delivered through farmer organizations to help reduce risks.

1.2 Rationale

Because of the rise in the overall population of Laos, and due to changing consumer preferences in emerging markets (with a higher demand for safe food and high-value agricultural products), there is an increasing demand for investment in agriculture development. In addition, the risk of natural disasters, including climate change seems to increase the need for investments to improve the resilience of agriculture. Financial support and access to finance could empower farmers to increase their wealth and ability to feed the population.

From the perspective of trade and capital inflows, the Laotian economy is exposed to external shocks and to a decline in aid assistance. As a result, the agriculture sector tends to receive less support from the government –*e.g.*, in the area of financial risks related to disasters and outbreaks effecting agricultural production. At the same time, the government promotes commercialization and tries to attract the private sector to invest in the sector. For a successful transition from subsistence to commercial agriculture, small farm households need to be better organized in order to meet the market demand in terms of product volumes and quality. This means that efforts should be made: to help smallholder farmers access finance, to improve the legal framework and the enabling environment for businesses. A better understanding of available financial support at the local level could greatly contribute to developing and implementing agriculture finance strategies and instruments to enhance the access of smallholder farmers to suitable financial services and to risk mitigating strategies.

Agriculture is vulnerable to a variety of setbacks (excessive/insufficient rain, late/early rain, forest fires, plant pests, animal disease outbreaks, chemical spills) and disasters (floods, typhoons) that are likely to cause agricultural losses. According to MAF (Sector Working Group on Agriculture and Rural Development, 2015), the agriculture and forestry sector also faces difficulties related to the fluctuations in the prices of agricultural products and input prices. Not only do these unforeseen events impede the development of the agriculture sector, they are a big factor of risk for poor farmers. In this context, it is crucial to think about how to help small farmers and their families recover from and adjust to various types of risk. One avenue worth exploring is the elaboration of a policy framework and the design of specific credit facilities to help poor farmers affected by

² The needs in terms of capacity building identified by farmers include: business planning, financial management, group management, monitoring and reporting (Farmer Statement 2012).

unexpected events.

Increased commercialization of the agricultural sector and the production of cash crops often result in higher incomes for the farmers. On the other hand, farmer indebtedness is also increasing. While farmers need to improve their productive capacity, it is difficult for them to access credit to finance their agricultural investment. Specific areas of interest for this study include: (i) characterizing the financial needs of smallholder farmers (production, household needs, insurance); (ii) identifying and quantifying farmers' current access to credit from various sources (formal, informal) and the conditions of this credit; (iii) providing recommendations for effective mechanisms of financial support for smallholder farmers.

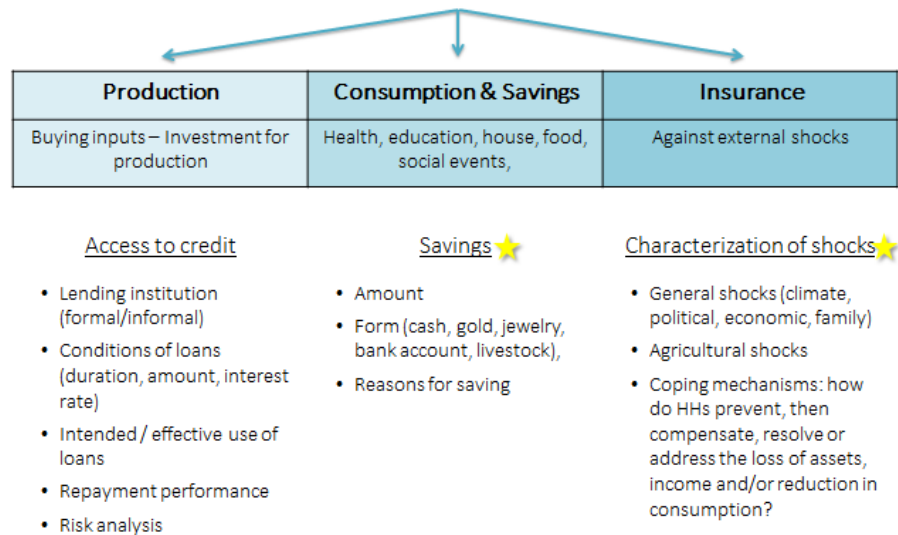
Access to credit for farmers remains a huge challenge in the Lao PDR. Despite efforts by the government and the support from development partners to finance farmers, it seems that financial institutions and banks still fail to offer reliable and affordable banking products and services to farmers. Moreover, farmers' lack of financial management skills such as absence of trading and production records, credit history, lack of collateral, small turnover means that financial institutions believe them as too risky and too costly to serve as customers. Smallholder farmers do not seem to have enough savings or insurance to cope with crises, and they have little or no access to insurance schemes, whether social or market-based.

1.3 Research Objectives and question

Base on the above mentioned the research questions raised:

- 1) What are the main financial needs of smallholder farmer households?
 - For production
 - For household expenses,
 - For insurance needs,
- 2) What do smallholder farmers do when they need money?
 - Borrow from informal and formal credit institutions
 - When do they borrow money?
 - Credit conditions (amount of credit, repayment time, interest rates)
 - Is the use of credit different by credit source?
- 3) What are the main motivations for savings?
 - What determines the access of rural HHs to different types of credit?
 - What are farmers' repayment performances?

Figure 1 Different type of financial needs at the household level



The main hypotheses underlying our research are the following:

H1) Farming households have a variety of needs that they must address that cannot always be completely separated from one another (see Figure 1 above).

H2) To address these needs, rural HHs adopt different strategies –e.g., borrow money from formal/informal credit institution, sell cattle or valuables (gold, jewelry), work on other peoples’ farms, etc.– that may in turn impact their ability to generate income and meet their needs in the future

H3) The financial needs of the farmers are highly crop dependent and need to be answered at a specific period (timing is important), but formal credit institutions have no idea about the farmers constraints

The objectives of this research are therefore:

- To assess the main financial needs of smallholder farmers;
- To study the procedures of access to credit;
- To identify the factor determining farmers’ access to credit;
- To analyze credit risk of farmers and
- To find support mechanisms for farmers to recover from impacts of natural disasters.

2. Methodology

This study aims to identify the determinants of household access to finance. To achieve this goal, we conducted in May-June 2019 a country-wide household survey.

2.1 Target population and sample

The survey took place in five target provinces –Vientiane Capital, Vientiane, Khammuan, Savannakhet, and Attapue province. The target population for our study was mainly smallholder farmers, *i.e.* farmers who work on their own land (usually less than three hectares) for which they seldom hold an officially recognized land title. Smallholders produce various types of agricultural products with different production processes, costs, market prices, and risks. They have many financial needs and are quite vulnerable to shocks. This study covers three priority agricultural products: rice, live pigs and maize.

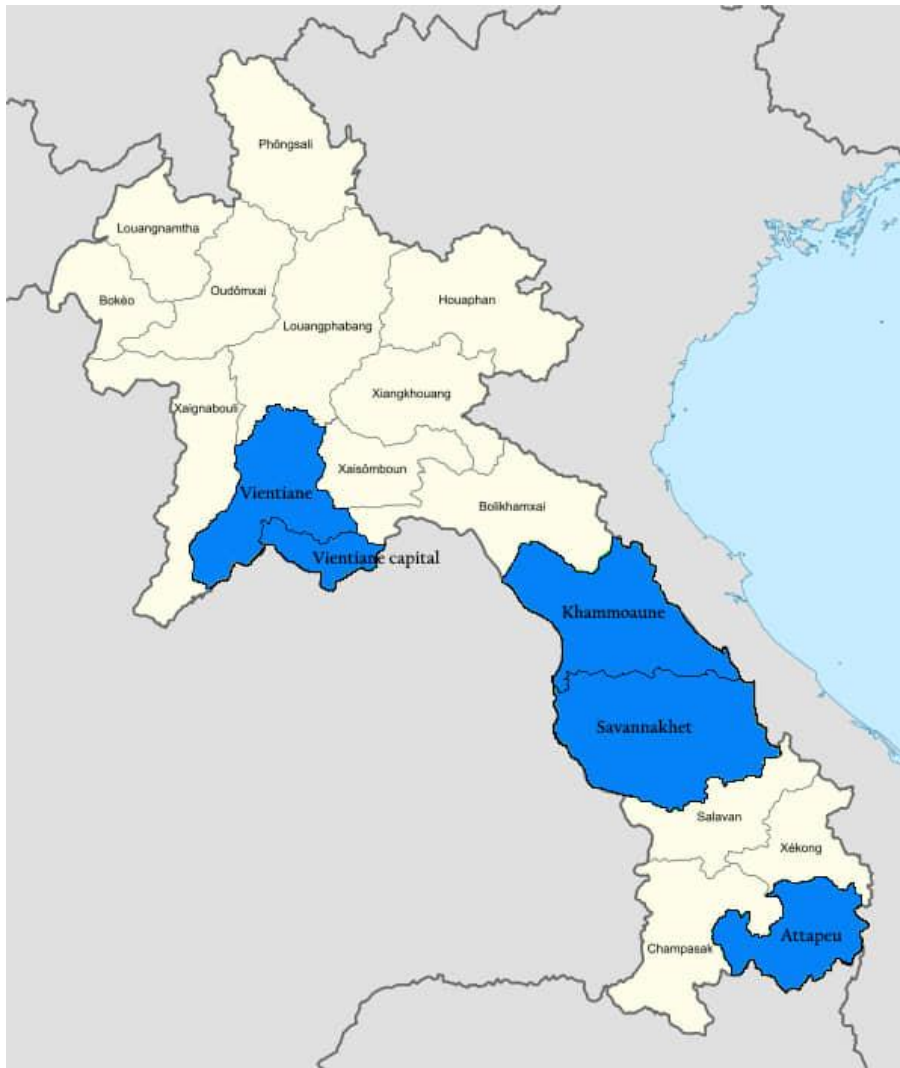
The survey also focuses on formal and informal credit institutions that are involved in lending money to these farmers –*e.g.*, commercial banks and formal financial institutions, village banks, traders, etc. Government departments and development partners involved in rural credit were also interviewed at the central, provincial and district levels as shown in Table 1 below.

Table 1 Outline of survey

	Government	Credit institutions	Development partners & projects	Farmers
	12	10	2	368
Village		Village banks, Traders		✓
District	✓	Commercial		
Province	✓	banks		
Central	✓	Bank of Lao PDR	✓	

Source: Authors' survey.

Figure 2 Survey location



2.2 Data collection

Primary and secondary data include: field observations, the study of regulations and relevant development project documents –*e.g.*, micro-credit projects. While the secondary data analysis was mainly done through desk review, the primary data were collected through an original survey conducted in May-June 2019. The distribution of the individual household surveys is presented in below.

Table 2 Distribution of farmer surveys by province

Province	Product	Number
Vientiane Capital	maize	33
Vientiane	pig	32
Khammouane	rice	135
Savannakhet	rice	132

Attapeu	rice	36
Total		368

Source: Authors' survey.

The questionnaires were developed before the survey and administered with the help of research assistants who helped the respondents whenever they needed assistance.

2.3 Data analysis

The assessment of rural household repayment performance was evaluated through general information provided by the farmers (e.g., experience, house owner size, number of workers) as well as by assessing the farmers' capacity to repay, which depends on several variables that include: their incomes and expenditure, number of buyers, production cost, other farm income and expenditure, liabilities, and the likes. This study aims to identify the determinants of farmers' access to credit are using logit regression model (See Appendix A.3 for details).

In order to investigate the repayment on debt of farmers, the 5 Cs approach is applied in this research. The five Cs of credit is a system used by lenders to gauge the creditworthiness of potential borrowers. This concept is applicable to various type borrower from small scale to large scale of loan. The 5 Cs include

- *Character* refers to a borrower's reputation or record of financial matters. It is mainly related to education, experience, household income and expenditure accounts, previous loans, remaining debt and saving.
- For *Capacity*, lenders must be sure that the borrower has the ability to repay the loan, based on the proposed amount and terms. *Capacity* is determined by income and profit from farm activities.
- *Capital* is what lenders analyze when determining borrower's creditworthiness. Capital consists of various types of assets such as residential land, agriculture land and vehicles.
- *Collateral* refers to all personal assets that are pledged by a borrower as security for a loan. Main collaterals include property, and sometimes farmer do not need a collateral if they have a guarantee from a reliable organization.
- *Conditions* refer to the terms of the loan itself, as well as to any economic conditions that might affect the borrower such as interest rate, loan amount, term of loan and the likes (Investopedia, 2019).

3. Descriptive Statistics

3.1 Farmers and their farms

This section presents the characteristics of the interviewed households (rice, maize and pig farmers). This information includes household size, the number of household members who are active in the labor market, household head's gender, age, education,

occupation, marital status. A total of 368 households were included in the analysis: 303 households mainly grew rice, 33 households were engaged in maize production, and 32 household mainly raised pigs.

Table 3 The number of household members

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	1	0.27	-	-	-	-	1	3.13
2	7	1.90	6	1.98	1	3.03	-	-
3	24	6.52	23	7.59	1	3.03	-	-
4	61	16.6	46	15.18	7	21.21	8	25.0
5	75	20.4	55	18.15	11	33.33	9	28.1
6	75	20.4	63	20.79	5	15.15	7	21.9
7	50	13.6	43	14.19	3	9.09	4	12.5
>7	75	20.4	67	22.11	5	15.15	3	9.38
Total	368	100.0	303	100.0	33	100.0	32	100.0

Table 3 shows that most households surveyed in this study counted at least five members. These results are consistent with the Population and Housing Census of 2015. They show that households in Laos were relatively large although smaller than that in the previous decade.

Over 95% of all farm households reported that two members in their household worked in the labor market. This proportion was relatively larger among rice farming households in the Central and Southern Laos.

Table 4 below shows that there were more male-headed (59%) than female-headed households (41%), yet the difference was small over the whole sample. The proportion of male-headed households was relatively higher for rice farming households (60%). These results contradict the Population and Household Census according to which male-headed households represented over 85% of all households.

Table 4 Gender of household heads

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Male	218	59.2	182	60.1	18	54.6	18	56.3
Female	150	40.8	121	39.9	15	45.5	14	43.8
Total	368	100.0	303	100.0	33	100.0	32	100.0

Source: Authors' survey.

Table 5 Age of household heads

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%

Under 25 years	25	6.8	25	-	-	-	-	-
26-35 years	3	0.8	3	-	-	-	-	-
36-45 years	34	9.2	28	9.2	5	15.1	1	3.1
46-55 years	114	31.0	85	28.1	11	33.3	18	56.3
55-65 years	109	29.6	88	29.0	12	36.4	9	28.1
66-75 years	76	20.7	67	22.1	5	15.1	4	12.5
Over 76 years	7	1.9	7	2.3	-	-	-	-
Total	368	100.0	303	100.0	33	100.0	32	100.0

Source: Authors' survey.

The average age of household heads in this survey was 49 years old (Table 5). Over the entire sample, 31% of the household heads were 46-65 years old. The distribution of household heads' age appears to be in the symmetric bell-shaped curve. It seems to be true for all subsamples.

Table 6 below shows that 93% of the household heads were married, while single household heads represented less than 2% of the total sample. The share of single household heads was larger for maize and pig farmers.

Table 6 Marital status of household heads

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Single	5	1.4	3	1.0	1	3.0	1	3.1
Married	342	93.0	280	92.4	31	93.9	31	96.9
Others	21	5.7	20	6.6	1	3.0	-	-
Total	368	100.00	303	100.00	33	100.00	32	100.00

Source: Authors' survey.

Table 7 below shows the educational attainment of the household head. 12% of all households had no education, while 47% had primary education and 28% had attained lower secondary school. Interestingly, pig farmers seemed to have an overall higher level of education –none had no education at all, while almost 69% had at least lower secondary education.

Table 7 Educational attainments of the household head

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No education	45	12.2	42	13.9	3	9.1	-	-
Primary	173	47.0	150	49.5	13	39.4	10	31.3
Lower secondary	104	28.3	77	25.4	11	33.3	16	50.0
Upper secondary	32	8.7	23	7.6	5	15.2	4	12.5
Vocational	13	3.5	10	3.3	1	3.0	2	6.3
Undergraduate	1	0.3	1	0.3	-	-	-	-

Total	368	100.0	303	100.0	33	100.0	32	100.0
-------	-----	-------	-----	-------	----	-------	----	-------

Source: Authors' survey.

The respondents were asked about the main occupation of the household head. Seven types of occupations were proposed: farmer, laborer, general worker, join businessman, business owner, government employee, and private employee. Only four types of occupations are reported in Table 8 below because few household heads involve in several types of occupations. According to Table 9, 93% of the household heads were farmers. A small number of household heads declared doing their own business while household heads working for the government represented 3% of the sample.

Table 8 Main occupation of the household head

	All		Rice		Maize		Pig	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Farmer	342	92.9	281	92.7	32	97.0	29	90.6
Business owner	3	0.8	3	1.0	-	-	-	-
Government officer	12	3.2	9	3.0	1	3.0	2	6.3
Others	11	3.0	10	3.3	-	-	1	3.1
Total	368	100.0	303	100.0	33	100.0	32	100.0

Source: Authors' survey.

3.2 Access to credit

In this section, after studying loan conditions (*e.g.*, interest rates, term, collateral and purposes of loan), we analyze credit risk of farmers.

3.2.1 Descriptive statistics of farmer on access to credit

Access to credit means that at least one member in the household is able to access credit. Table 9 below shows that approximately 45% of the respondents had access to credit.

Table 9 Access to credit

Access to credit	Freq.	%
Yes	167	45.4
No	201	54.6
Total	368	100.0

Source: Authors' survey.

Table 10 below shows that a little less than 70% of the maize farmers accessed credit, against only 41% of the pig farmers and 43% of the rice farmers.

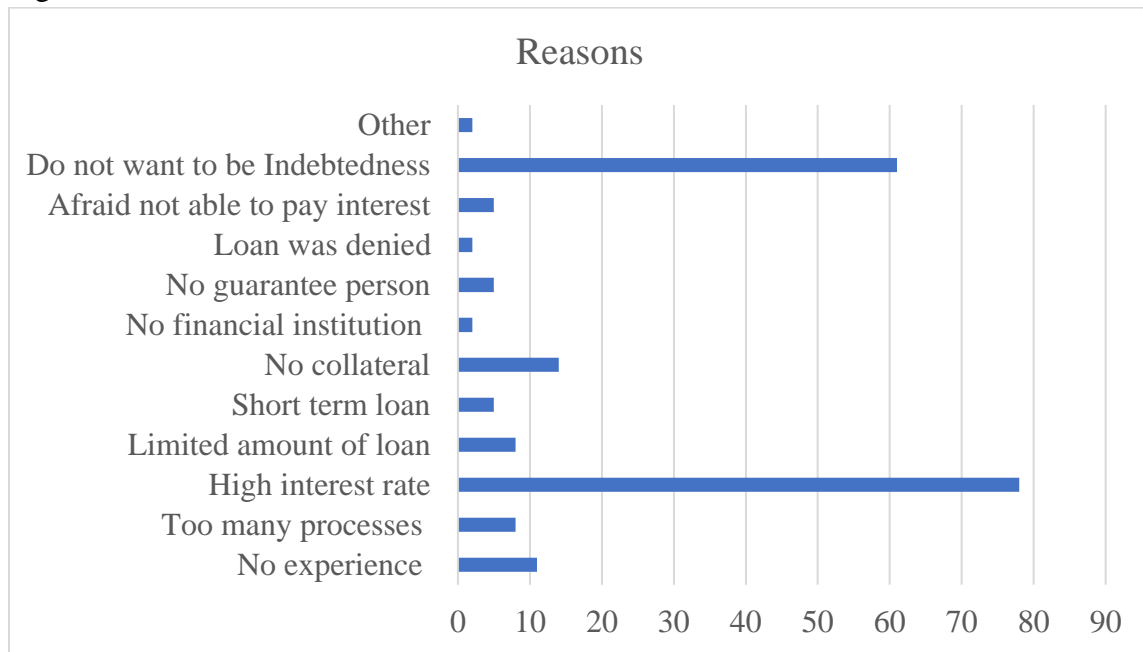
Table 10 Households' access to credit by farm activity

Access to credit	Yes	%	No	%	Total
Maize	23	69.7	10	30.3	33
Pig	13	40.6	19	59.4	32
Rice	131	43.2	172	56.8	303
Total	167	45.4	201	54.6	368

Source: Authors' survey.

Error! Reference source not found. below shows that the main reason for not accessing credit was high interest rate, which was mentioned by nearly 39% of the respondents. The second reason was that households did not want to be indebted (30%). The lack of collateral and the lack of experience in borrowing represented 7% and 6% of the respondents respectively. Supply-side reasons for not borrowing included: high interest rates, many procedures, limited amounts, need of a collateral, etc. Demand-side reasons included not willing to be indebted, having no experience of borrowing money, afraid of not being able to pay interest rates.

Figure 3 Main reason not to access to credit



Source: Authors' survey

3.2.1 Sources and conditions of credit

This section presents the main source of credit that the households were able to access. Table 11 below shows that two-thirds of the households went to the *Village Fund* to borrow money and the average amount of the loans was around 3.5 million LAK. The second provider of credit was the *Agriculture Promotion Bank (APB)*, which accounted

for nearly 21% of the respondents who borrowed money and the average amount of the loans was around 18.8 million LAK. This is a much higher amount than what is borrowed from the village fund. The *Lao Development Bank* (LDB) and traders accounted for respectively 7.2 and 4.8% of the sources of credit.

Table 11 Financial sources

Financial sources	Freq.	%	Average amount
Agriculture Promotion Bank	35	20.9	18.8
Lao Development Bank	12	7.2	14.4
Village fund	112	67.1	3.5
Trader	8	4.8	6.7
Total	167	100.0	7.6

Source: Authors' survey.

Table 12 below compares the interest rate and period of loan of the following credit providers: *Agricultural Promotion Bank* (APB), *Lao Development Bank* (LDB), village fund (VF), traders (TD). On average, the monthly interest rate proposed by the village fund was about 4.75% per month or 57% per year. In comparison, the LDB had very low interest rates on average 5.06% per year but only 7% of the households borrowed money from this bank, mainly because there were few the LDB branches in the area of the study and the main focus of the LDB was lending to traders, not farmers. Although the APB asked for much higher interest rates than the LDB, a higher percentage of farmers borrowed from there. In terms of loan period, the LDB provided longer terms than the other financial institutions. On average, a loan with the LDB lasted over 20 months, while a loan from the APB lasted 15 months, and the village fund and informal lenders provided loans over periods of around 7 months.

Table 12 Loan conditions by financial provider

Description	APB	LDB	VF	TD
Average interest rate per year	11.6%	5.06%	57.0%	39.7%
Loan period (months)	15.5	20.8	7.3	7.0
% of loans with a contract	100	100	83.3	50
Land as collateral	54%	25%	21%	0%

Source: Authors' survey.

Table 13 below shows that all of the households who borrowed money from the APB and the LDB had a contract, against only 83% of those who borrowed from the village fund and half of those who went through an informal lender. In order to apply for a loan, different types of collaterals were required, depending on the financial institution. For the APB, land was the main collateral, which was not the case of the LDB (LDB did not always ask for a collateral). Surprisingly, both the APB and the LDB provided loans without any

collateral. The village fund used different types of collateral (Land, vehicles, and animals) or no collateral at all.

Table 13 Types of collateral

Collateral type	APB	LDB	VF	TD
Land	19	3	23	-
Vehicles	-	1	24	-
Agricultural outputs	-	-	2	-
Animal	1	-	21	-
No collateral	3	7	22	1
Other	7	5	5	1
Total	35	12	112	8

Source: Authors' survey.

3.2.3 Purpose of finance

Over 90% of the households borrowed money for their agricultural activities, regardless of the financial institution through which they obtained the loan. Only the loans obtained from the village fund had more diverse uses, *e.g.*, investment, disaster relief, child education, health treatment. Money borrowed from traders also served a variety of purposes outside farming. Farmers were able to borrow money from banks to use for their agriculture's activities, and new investment, but there were no financial products for other activities. For other uses (education, health, festivals, family expenses or disaster relief), farmers had few other choices than to borrow from the village fund or the trader although the interest rate was much higher than the bank.

Table 14 Purpose of borrowing money

Reasons of borrowing	APB	LDB	VF	TD
For agricultural activities	32	12	98	1
For investment	3	-	2	-
For disaster relief	-	-	1	2
For children education	-	-	2	3
For health treatment	-	-	1	-
For traditional festival	-	-	-	-
For family expense	-	-	8	1
Others	-	-	-	1
Total	35	12	112	8

Source: Authors' survey.

3.2.4 Credit risks

This section analyses the credit risk of farmers by using 5 Cs credit analysis which includes character, capacity, capital, collateral and condition.

1) Character

Several indicators can be used to assess the level of credit risk of different individuals such as education, experiences, and indebtedness:

- *The level of education* can indicate how farmers manage their farm activities and income and expenditure. If farmers have basic education, they can understand cost and benefit from farm activities and plan for their investment. Higher farmer education can thus lower credit risk. Most respondents had primary school education and thus a basic knowledge of mathematics (see Table 18 above). However, this might not be sufficient to properly manage incomes and expenditures. Approximately 12% of all respondents did not attend school at all, especially rice farmers;
- *Household income and expenditure accounting* is another indicator to identify farmer risk. Farmers keeping household accounts tend to better understand their income and expenditure as well as cost and revenue from farm activities. In addition, household accounting also links to household savings. Farmers keeping household accounts can: compare their incomes and expenses, tell which expenses are necessary or unnecessary and how to expand their production. These questions are very important for farmers to manage their finance. On average, only 2% of farmers kept income and expenditure accounts (See Table 17)
- *Savings* are also important to assess farmer credit risk. Farmers with savings have a lower risk of loan default. On average 40% of the respondents had savings. Table 15 below shows that pig farmers had the highest percentage of saving, the highest percentage of farmers keeping accounts and the lowest percentage of farmers with no education.

Table 15 Summary of characteristics of respondents

Description	Rice farmer	Pig farmer	Maize farmer	Total
No education	13.8%	-	9.1%	12.2%
Home income & expenditure accounts	1.3%	3.13%	0	2%
Savings	31%	91%	82%	41%

Source: Authors' survey.

2) Capacity

Lenders must be sure that the borrower has the ability to repay the loan based on the proposed amount and terms. Capacity depends on the number and amount of debt obligations the borrower currently has compared to the amount of income or revenue expected each month. This section analyses revenues, costs and net profits from main agriculture activities. Some observations were dropped from the sample as there were missing data for several variables. Table 16 below shows that the average revenue of from agriculture was 24.4 million LAK. The minimum and maximum revenue were 0.9 million

LAK and 257 million LAK, respectively. Total costs were calculated as the sum of fixed costs and variable costs. Fixed costs were calculated using the buildings, equipment and machinery used for production. Variable costs included the costs of seeds, animal feed, fertilizers, petrol and the like to use for production. The average total cost was 20.2 million LAK per year. The lowest and highest total costs were 1 million LAK and 214 million LAK per year, respectively. The average net profit of the respondents was 4.7 million LAK per year.

Table 16 Income, expenditure and net income

Variable	Obs	Mean	Std. Dev.	Min	Max
Revenue	314	24.4	28.4	0.9	257.0
Fixed cost	314	3.9	6.8	0.1	66.6
Variable cost	314	16.3	22.4	0.8	211.0
Total cost	314	20.2	24.0	1.0	214.0
Net profit	314	4.7	18.3	-90.7	118.0

Source: Authors' survey.

Revenue, cost and net profit calculations by product are presented in Table 20 below. Pig farmers had the highest average income and expenditure. However, the average revenue, cost and net profit of pig farmers had high standard deviations, due to the size of the farm (especially number of pigs that reflects the variable cost). Pig farmers had the highest average net profit, while maize farmers had the lowest net profit. It is noteworthy that maize farmers had the lowest revenue, cost and net profit. The main reasons for losses in the maize sector were flooding and pest.

Table 17 Income, expenditure and net income by products

Product	Variable	Obs	Mean	Std. Dev.	Min	Max
Rice	Revenue	250	19.8	14.0	1.3	105.0
	Fixed cost	250	3.8	7.3	0.3	66.6
	Variable cost	250	11.1	7.9	1.2	75.1
	Total cost	250	14.9	11.3	3.4	86.9
	Net profit	250	5.6	15.7	-67.5	118.0
Pig	Revenue	32	78.1	55.4	6.5	257.0
	Fixed cost	32	4.3	2.3	0.8	10.2
	Variable cost	32	64.5	41.6	22.4	211.0
	Total cost	32	68.8	41.7	24.9	214.0
	Net profit	32	9.3	31.3	-52.9	82.2
Maize	Revenue	32	7.0	4.2	0.9	15.0
	Fixed cost	32	4.0	6.2	0.1	29.3
	Variable cost	32	9.2	13.2	0.8	76.4
	Total cost	32	13.2	17.9	1.0	106.0
	Net profit	32	-6.2	16.1	-90.7	7.2

Source: Authors' survey.

3) Capital

Lenders also analyze a borrowers' capital to determine their creditworthiness. This section focuses on the assets that farmers can use as collateral.

Residential land

Table 20 below shows the surface and type of title for residential land. Most rice farmers had only a land use certificate that could not be used as collateral and 97 farmers had a land title. Most rice farmers had a land area under 0.05 hectare, which limited their access to credit. Most pig farmers had land titles, while approximately 13 pig farmers had a land certificate. Most pig farmers had 0.06-0.11 hectare of land. Pig farmers usually build the pig house close to their home to make it easier for them to feed pig and for security purposes. Almost all maize farmers had a land title, only 2 of them had a land use certificate and 1 had no certificate which means they have collateral to borrow money. There are 14 maize farmers have land between 0.06-0.11 hectare and 2 of them has no land certificate.

Table 18 Residual Land ownership

Area (ha)	Pig		Maize		None	Rice		
	Title	Certificate	Title	Certificate		Title	Certificate	None
lower 0.05	5	3	6	2		70	97	1
0.06-0.11	5	5	12		1	16	49	
0.12-0.17	2	3	7			5	27	

0.18-0.23			1			4	9	
larger 0.23	7	2	4			3	21	1
Total	19	13	30	2	1	98	203	2

Source: Authors' survey.

Farmland

Agriculture land is another type of collateral for borrowing money from the financial institutes. Majority of rice farmer do not have land title for rice filed and that limit use of land as collateral to borrow money. Only 5.7 % of rice farmer had a land title. Most pig farmers have land title for rice filed. Only 1 of 20 pig farmers had a land use certificate. Approximately 13 pig farmers had no rice field.

Table 19 Farmland ownership

Area (ha)	Pig		Maize		Rice		
	Title	Certificate	Title	Certificate	Title	Certificate	None
<0.5	2	3	6		5	37	
0.6-0.11		11	9	1	5	90	
1.2-1.7	1	3			2	43	2
1.8-2.3	2	3			1	37	
>2.3		7	4		4	73	
Total	5	27	19	1	17	280	2

Source: Authors' survey.

Vehicles

Vehicles (*e.g.*, motorbikes, cars, trucks) can be used as collateral for borrowing money. Table 20 below shows the number of vehicles owned by the different types of farmers. Most rice farmers had a motorbike while they did not have a truck for transporting rice. 19 farmers had a car and only one farmer has two cars. Maize farmers did not own any truck and 4 maize farmers had one car. All pig farmers had at least one motorbike. 20 out of 32 pig farmers had a car and 3 pig farmers had one truck.

Table 21 Vehicles of famers

No.	Rice farmer			Maize farmer			Pig farmer		
	Motorbike	Car	Truck	Motorbike	Car	Truck	Motorbike	Car	Truck
0	53	283	302	0	29	33	0	10	28
1	146	19	1	11	4	0	8	20	3
2	82	1	0	14	0	0	20	2	0

3	22	0	0	8	0	0	4	0	1
Total	303	303	303	33	33	33	32	32	32

Source: Authors' survey.

4) Collaterals

Personal assets pledged by a borrower as a security for a loan are known as collateral. Business borrowers may use equipment or accounts receivable to secure a loan, while individual debtors often pledge savings, a vehicle, or a home as collateral. Collateral is link to capital that farmers own. However, not all capital can be used as a collateral. The previous section shows that most farmers did not have a land title required by credit institutes to reduce the risk. Although almost all farmers could use their motorbike as collateral, this limited the amount of loan they were able to access. Recently, financial institutes provided a group loan without collateral. A member of the group guaranteed others member in the group. As a high percentage of pig farmers are members of a production group, they have more chances to borrow money in a group. In addition, some production groups arrange finance among their members.

Table 22 Farmers who are members of a production group

Production group	Rice		Pig		Maize	
	Freq.	%	Freq.	%	Freq.	%
Yes	62	20.5	30	93.7	0	100
No	241	79.5	2	6.3	33	100
Total	303	100	32	100	33	100

Source: Authors' survey.

5) Condition

This section details the conditions of loans for those farmers currently borrowed money from financial institutes. Conditions refer to the terms of the loan itself, as well as any economic conditions that might affect the borrower. This includes: the purpose, the source, the amount, the interest rate.

37 farmers were able to borrow money from financial institutes last year. This means that most farmers had to borrow from other sources such as relatives, friends and informal credit institutions. Approximately 20 rice farmers borrow money from financial institutes last year, of which 18 borrowed from Agriculture Promotion Bank (APB) and two from the Lao Development Bank (LDB). Pig farmers were able to borrow from APB. Many of the farmers paid back all of their debt while some of remained indebted.

Table 23 Source of loan

	Rice farmers	Maize farmers	Pig farmers	Total
Agriculture Promotion Bank	18	9	7	34
Lao Development Bank	2	0	0	2
Village Fund	0	1	0	1
Total	20	10	7	37

Source: Authors' survey.

Table 24 below shows the loan conditions of the *Agriculture Promotion Bank*. Maize farmers had the highest average debt, but the average remaining debt was 9 million LAK. In addition, they paid the highest interest rate (15% per year). The remaining debt of pig farmers was approximately 50 million LAK.

Table 25 Loan conditions of the Agriculture Promotion Bank

Agriculture Promotion Bank	Rice farmer			Maize farmer			Pig farmer		
	Max	Min	Ave.	Max	Min	Ave.	Max	Min	Ave.
Amount of Loan (Mn LAK)	20	1	8	150	3	28	60	10	39
Remaining debt (Mn LAK)	5	2	4	12	5	9	60	30	50
Interest rate (%)	12.0	10.0	11.0	15.0	10.0	13.0	12.0	11.0	11.0

Source: Authors' survey.

Table 26 below shows the loan conditions of the *Lao Development Bank*. Only rice farmers were able to obtain a loan from LDB. The average amount of the loans was 14.4 million LAK, and the average interest rate was 5% per year. It is worth noting that there was no remaining debt in case of LDB.

Table 26 Loan conditions of the Lao Development Bank

Lao Development Bank	Rice farmer		
	Max	Min	Ave.
Amount of Loan (Million LAK)	15	5	14.4
Remaining (Million LAK)	-	-	-
Interest rate (%)	11.00	6.00	5.00

Source: Authors' survey.

3.3 Determinant of access to credit

3.3.1 Definition of variables and farmer individual characteristics

The access of small farmers to credit depends on a wide range of factors, including the characteristics of household heads and households. The detail descriptions of dependent and independent variables included in the current study are shown in the following table.

Table 27 The definition of variables

Variable name	Description
Access to credit	1 if a household gets access to credit and zero otherwise
Gender	1 if a household head is male and zero otherwise
Age	Household head's age in years
Married status	1 if a household head is married and zero otherwise
Lao ethnic	1 if a household head's ethnic is Lao and zero otherwise
Primary school	1 if a household head finished primary school and zero otherwise
Lower secondary school	1 if a household head finished lower secondary school and zero otherwise
Upper secondary school	1 if a household head finished upper secondary school and zero otherwise
Higher education	1 if a household head finished a higher education and zero otherwise
Occupation	1 if a household head is farmer and zero otherwise
Household size	The number of members in a household
Dependency rate	The portion of members whose ages are in non-working age in a household
Total expenditure	Total monthly expenditure per capita
Household saving	The amount of household saving per capita
Residential land	The total area of residential land
Agricultural land	The total area of agricultural land
Production member	1 if a household is a member of production group and zero otherwise
Disaster	1 if a natural disaster took place in the community in the last 12 months
Pig	1 if pig farm and zero otherwise
Maize	1 if maize farm and zero otherwise
Rice	1 if rice farm and zero otherwise

Error! Reference source not found.8 below summarizes the information we have about individual farmers. We distinguish in the table the farmers with access to credit from those without access. It seems that there is no statistical difference between many characteristics of household heads with and without access to financial credit, except age and the share of household heads completing primary school. The results of the T-test indicate that household heads from households with access to the credit market are on average 48 years old while household heads from those without access to credit are slightly older. The age difference is statistically significant at the 1 % level. The proportion of

household heads completing only primary school degree in households with access to credit is larger relative to heads of households without access to credit.

Unlike household heads' characteristics, there is a significant difference between households with and without access to credit. Household size and dependency rate of households borrowing money from the credit market are relatively smaller than that of households not borrowing money. The difference in means of these factors is statistically significant at least at the 5 % level. Wealthier households, observed from the size of residential and agricultural land per capita, have better access to the credit market. This result is consistent with the fact that households holding larger land can easily borrow money because the land is important collateral. Households with better access to the credit markets have a larger expenditure per capita and a smaller amount of saving than those without access to credit. This result is somewhat compatible with conventional wisdom.

The production group seems to play a crucial role in access to credit. The larger the proportion of production members, the greater the number of households getting access to the credit market. The T-test indicates that it is significant at the 10 % level. This implies that credit providers are more likely to reduce their risk by lending money through the production group. The share of maize farm households with access to credit is significantly larger than those without access to credit. The opposite results are found among rice farm households.

Table 28 Summary of farmer individual characteristics

	All samples	Farmers with access to credit	Farmers without access to credit	T-test of equality means
Male	0.406	0.377	0.430	-0.053
Age	49.37	47.671	50.785	-3.114***
Married status	0.929	0.934	0.925	0.009
Lao ethnic	0.787	0.760	0.810	-0.050
Primary school	0.469	0.533	0.415	0.118**
Lower secondary school	0.283	0.269	0.295	-0.026
Upper secondary school	0.087	0.102	0.075	0.027
Higher education	0.038	0.036	0.040	-0.004
Farmer	0.929	0.946	0.915	0.031
Household size	5.954	5.617	6.235	-0.618***
Dependency rate	0.334	0.308	0.357	-0.049**
Total expenditure	3.264	3.633	2.957	0.677**
Household saving	0.784	0.562	0.968	-0.406**
Residential land	218.8	259.3	185.1	74.25*
Agricultural land	4272.9	4805.5	3828.2	977.3**
Production member	0.251	0.287	0.220	0.067*

Pig	0.087	0.078	0.095	-0.017
Maize	0.090	0.138	0.050	0.088***
Rice	0.823	0.784	0.855	-0.071**
Observations	367	167	200	

Note: *** denotes significant at the 1 % level, ** significant at the 5 % level, and * significant at the 10 % level.

3.3.2 Result of Logit Regression

This study applies maximum likelihood method to estimate the logistic equation. The results are shown in Table x below. The first two columns are the results of the Logistic equation whose dependent variable is whether a household has access to credit regardless of the source of the credit. To simplify the interpretation of empirical results, this study computes the marginal effects of the Logit Model which are presented in the last two columns in Table 30. This research estimates the heteroskedasticity-consistent standard error to deal with the inconstant distribution of disturbances.

Table 29 The summary statistics of variables

	Obs	Mean	S.D.	Min	Max
Access to credit	367	0.455	0.499	0	1
Male	367	0.406	0.492	0	1
Age	367	49.37	11.55	6	87
Married status	367	0.929	0.257	0	1
Lao ethnic	367	0.787	0.410	0	1
Primary school	367	0.469	0.500	0	1
Lower secondary school	367	0.283	0.451	0	1
Upper secondary school	367	0.087	0.283	0	1
Higher education	367	0.038	0.192	0	1
Farmer	367	0.929	0.257	0	1
Household size	367	5.954	2.087	1	14
Dependency rate	367	0.334	0.238	0	0.9
Log of total expenditure	367	14.65	0.860	11.5	17.2
Log of household saving	367	6.231	7.514	0	19.3
Log of residential land	367	6.326	1.096	4.5	9.9
Log of agricultural land	367	9.483	1.400	0	12.7
Production member	367	0.251	0.434	0	1
Pig	367	0.087	0.283	0	1
Maize	367	0.090	0.286	0	1
Rice	367	0.823	0.382	0	1

Table 30 The marginal effects of covariates affecting small farmers' access to credit

	Logit		Marginal Effects	
	Coefficient	Robust S.E.	Coefficient	Robust S.E.
Constant	-9.316***	3.189	-	-
Male	-0.179	0.243	-0.044	0.059
Age	0.190**	0.085	0.047**	0.021
Age square	-0.002**	0.001	-0.001**	0.000
Married status	-0.474	0.597	-0.118	0.148
Lao ethnic	-0.493	0.325	-0.122	0.080
Primary school	1.197***	0.459	0.287***	0.104
Lower secondary school	0.571	0.504	0.141	0.124
Upper secondary school	1.081*	0.581	0.262**	0.129
Higher education	0.322	0.910	0.080	0.227
Farmer	-0.061	0.626	-0.015	0.155
Household size	-0.114*	0.063	-0.028*	0.015
Dependency rate	-0.379	0.538	-0.093	0.132
Log of total expenditure	0.112	0.151	0.028	0.037
Log of total saving	-0.002	0.021	0.000	0.005
Log of residential land	-0.048	0.119	-0.012	0.029
Log of agricultural land	0.336***	0.097	0.083***	0.024
Production member	0.915***	0.334	0.225***	0.080
Maize	2.322***	0.663	0.480***	0.087
Rice	0.750	0.543	0.174	0.116
Disaster	0.579	0.387	0.136	0.086
Pseudo R-square				0.133
Chi-square				51.52***
Observations				367

Note: *** denotes significant at the 1 % level, ** significant at the 5 % level, and * significant at the 10 % level.

Gender. In this analysis, a dummy variable is created to control if a household is headed by a male. While Muhongayire et al. (2013) and Sebatta et al. (2014) show no bias against the access to credit female-headed households in the context of rural Rwanda and Zambia, respectively. Conversely, Baiyegunhi and Fraser (2014) show a positive correlation between male-headed households and access to credit in South Africa. Similarly, Zeller et al. (1994) show that males are more likely than females to obtain informal credit.

Head of household age. This variable is commonly included as a predictor of access to credit. Several studies in the literature (Baiyegunhi & Fraser, 2014; Lemessa &

Gemechu, 2016) find that there is no linear correlation between head of household age and access to credit. It is possible that the age of the household head is non-linearly related to credit access. This concern is taken into consideration by including the squared age of household heads in the equation, in addition to their age. The idea is that the likelihood of access to credit firstly increases with the age of the household head, but after a certain age (approximately 45 years old), a further increase in age reduces the likelihood of the household head to access to credit. The concave shape of the correlation to some extent supports the view that younger farmers with insufficient wealth are likely to rely more on credit markets to adopt modern technologies (Nguyen, 2003). Because of risk aversion and a higher probability of default, the demand for credit of older household heads could be lower.

Marital status, ethnicity and occupation. In line with other studies, this study shows that ethnicity of household head is found to significantly determine households' access to credit. Due to living in the area with the better economic condition and improved credit market, this may benefit Lao-ethnic farmers. Surprisingly, the result does not appear as expected, as household heads from Lao ethnic group are less likely than those from other ethnic groups to rely on the credit market. This study includes a dummy to test whether farmers have a better access to credit or not. The result of this study does not find the statistical effect of the household head farmer on credit access.

Education. Education plays a crucial role in the access to credit throughout on-farm efficiency. Musebe et al. (1993) assert that higher educational attainment enables a household head to have better money management skills, which may secure access to finance. Additionally, Ibrahim and Bauer (2013) point to the possibility that education enables households to improve agricultural production throughout the application of new agricultural methods and risk management. To capture this, this study generates four dummies for educational attainments, primary school, lower secondary school, upper secondary school, and higher education. No formal education is used as a reference. The estimate shows that while lower secondary school and higher education are not significant at the conventional levels, primary and upper secondary schools appear to be statistically significant at the 1% and 10% levels, respectively. Holding other factors constant, household heads with primary and upper secondary school degrees are more likely to participate in the credit market than those with no formal education by approximately 29% and 26%, respectively. This result is in line with other studies in the case of Pakistan (Shah et al., 2008), Uganda (Kiiza & Pederson, 2001), and Nigeria (Nwaru et al., 2008) although these studies use the number of years in school as a proxy of educational attainments.

Size and composition of the household. According to the literature, labor endowment may affect the participation of the household in the credit market. More labor allows a household to have a better ability to manage credit risk (Schereiner & Nagarajan, 1997). In addition, Lemmesa and Gemmechu (2016) emphasize that smaller households are likely to employ more capital, this raising the demand for credit. As expected, the result

shows that household size is significantly and negatively correlated with access to credit. This result is compatible with the finding of Lemmesa and Gemmechu (2016) in the context of Ethiopia whereas it is contrary to the study of Muhongayire et al. (2013). Corresponding to Baiyegunhi and Fraser (2014), this study finds that the dependency rate plays no statistically significant role on access to credit.

Collateral. According to the literature, credit provision is highly dependent on household wealth and collateral. Credit demand equation in this analysis contains both residential and agricultural land as a proxy of household richness. These covariates are in the logarithmic form. The estimate indicates that residential land does not appear as a significant predictor of credit access. In line with other studies in the literature, agricultural land in logarithmic form is statistically significant at 1%. *Ceteris paribus*, a 1% increase in agricultural land is positively associated with around 8.3% increase in the probability of credit access. As agricultural land is the most important collateral for access to credit. Farmers with larger farm size tend to exploit more capital in their production and seek more credit (Binswanger & Rosenzweig, 1986).

Farmer group. The current study attempts to capture if being a member of agricultural production group increases the household's likelihood to access credit. If credit providers lower their risk by lending their money through a production group, then joining a production group may allow a farm household to have easier access to credit. Also, the production group may have more power than a single household in bargaining with credit providers, thereby enabling farmers to get a larger amount of credit as well as a lower interest rate. The estimate demonstrates that farm households are likely to gain a substantial benefit from being members of the production group. Holding other factors unchanged, the probability that households' access to credit is raised by on average 22.5% if they are members of the production group.

Crop. In addition to the characteristics of households and household heads, access to credit is highly dependent on the types of production. Lenders are likely to provide credit to farmers engaging in production with lower risk. In this analysis, rice and maize farmers are found to have better access to credit market relative to the reference group. By assuming other factors constant, farmers who mainly raise pigs are likely to have a lower probability than rice and maize farmers by 17.4% and 48% respectively to access the credit market.

Natural disaster. The occurrence of natural disaster is anticipated to be related to smallholder farmers' decision in access to credit. When a natural disaster takes place, it may potentially damage agricultural production and property. The negative effects of disaster may push farm households' demand for credit to recover their production property. Based on the estimated result, the likelihood that households have access to the credit market tends to increase by 13.6% when a natural disaster occurred in the community in the last 12 months prior to the survey. Nevertheless, the association between the likelihood of credit access and natural disaster is not statistically significant.

In sum, the impacts of household heads' characteristics on the likelihood of access to credit are mixed. There is no difference in access to credit market between male-headed and female-headed households. Thus, gender discrimination in the credit market is not the case in Laos. Household heads' marital status does not matter for households' access to credit. Lao-ethnic farmers are found to have lower access to the credit market compared to farmers from other ethnic groups. However, the lower probability that Lao-ethnic farmers get access to the credit market compared to farmers from other ethnic groups is still ambiguous. Household heads' education tends to raise the probability of households' access to credit whereas their occupation cannot explain the variation in access to credit. Access to credit market appears to decline in the size of household and dependency rate. Per capita household expenditure, saving and the area of residential land do not significantly determine credit access. This result confirms that agricultural land is still one of the most important collaterals in access to the credit market of Laos. The occurrence of disaster increases the demand for credit among farmers.

4. Organization working to access to credit

4.1 The formal bank sector

The stated-owned banks work with smallholder farmers, but they concentrate on difference aspects.

The *Agricultural Promotion Bank (APB)* mainly provides credit to farmers. There are three credit products: group loan, small loan and personal loan. Loan for group is mean a group of farmers who set up a group to produce agricultural product with equally responsibility over the loan on voluntary basis to borrow from APB. Small loan is for general people and civil servant who have payroll account with APB to use as working capital for his/her business (not allow for Bank employee). Personal loan means individual or entity doing business under the enterprise law, the individual or entity who wish to take this loan must have asset as collateral inform of land certificate under the name of borrower or other person, relative, parents with proper A Power of Attorney Letter (original land certificate) with loan value of more than 50 Million LAK. The collateral must have value higher than the loan amount in accordance with regulation from APB (*Agriculture Promotion Bank, 2019*). These products support farmer activities. The interest rate is based on the credit risk of the farmers and duration of the loan. The interest rate ranges from 9-11% per year for short term loans (less than 1 year), 9.5-11.5% per year for medium term loans (1-5 years), and 10.5-12.5% per year for long term loans (more than 5 years). APB has no specific policy to support farmers who are victims of natural disasters or disease outbreaks. BOL requests cooperation from APB when it is necessary.

NAYOBY Bank mainly provides credit to poor people and small projects in rural areas. The small projects must be in the plantation, livestock, handicraft, agro-processing

or service sectors. There are personal loans and group loans. The interest rate ranges between 5-7% per year depending on term of the loan. However, none of the respondents from our survey borrowed money from NAYOBY Bank.

The *Lao Development Bank* concentrates on SMEs. However, some farmers borrow money from the LDB when there is no other bank located in the area. The interest rate ranges from 9-11% per year for short term loans (less than 1 year), 10-12% per year for medium term loans (1-5 year) and 11-13% per year for long term loans (more than 5 years).

4.2 Non-bank credit institutions and traders

Microfinance institutes are another source of finance for farmers in the rural areas. However, they concentrate more on the trade sector. Few farmers are able to borrow from microfinance institutions because of high interest rates. The maximum amount of loan for microfinance is 50 million LAK and the maximum interest rate is 5% per month. In practice, the interest rate is approximately 3-4% per month due to the competition in this sector. The average amount borrowed by the farmers is 5 million LAK. For loans under 5 million LAK, farmers are not required to have a collateral. The procedure to borrow from microfinance institutions is relatively fast –it takes only half an hour if they meet all requirements (land title, guarantor, and application form). Microfinance institutions have a policy to support the farmers in the case of disasters –*e.g.* by extending term of payment and reducing the interest rate.

Village banks or saving groups are other sources of finance for farmers. There are many village banks around the country. Most of the village banks are supported by the government of Laos and some village banks are coordinated by both the government and international agencies such as GIZ, ILO and the likes. According to Table 14 above shows that farmers borrow money from village fund for many different purposes, but the main purpose is for farming activities. Although the interest rate is relatively high, there is no requirement for collateral and the process to get the loan is easier than with the formal banking sector. Finally, traders who buy agricultural products from farmers and sell them processing factories or other traders lend money to farmers only when they trust them. Most of the loans are emergency and short-term loans. The interest rate is approximately 3-5% per month which is not much different from what is proposed by the village bank.

4.3 Access to credit at times of disaster

This section aims to explain the role played by different government agencies and what policies are effective to help farmers when there is an outbreak of natural disaster. It is better to observe the situation natural disaster from farmers. The frequency of natural disasters occurring in the last decade is displayed in Table 31. Farmers in the rural areas of Laos face several types of natural disasters, flood, drought, insect pests in agricultural production, and the spread of disease in livestock. Over the last ten years, household samples included in this study reported that natural disasters took place on average three times in their communities. Most of the household samples, more than 50 % of the total

household samples, revealed that they experienced two times in the last decade. There are 48 households or about 15% of samples reporting that natural disasters occurred in their cultivation area every year. Since the primary focus of this study is farm households suffering from some kinds of natural disasters, these households share around 85 % of total samples (Table 32).

Table 32 The frequency of natural disaster over the last decade

Number of natural disasters	Freq.	%
1	56	18.0
2	161	51.8
3	34	10.9
5	8	2.57
6	4	1.29
10	48	15.4

Source: Authors' survey.

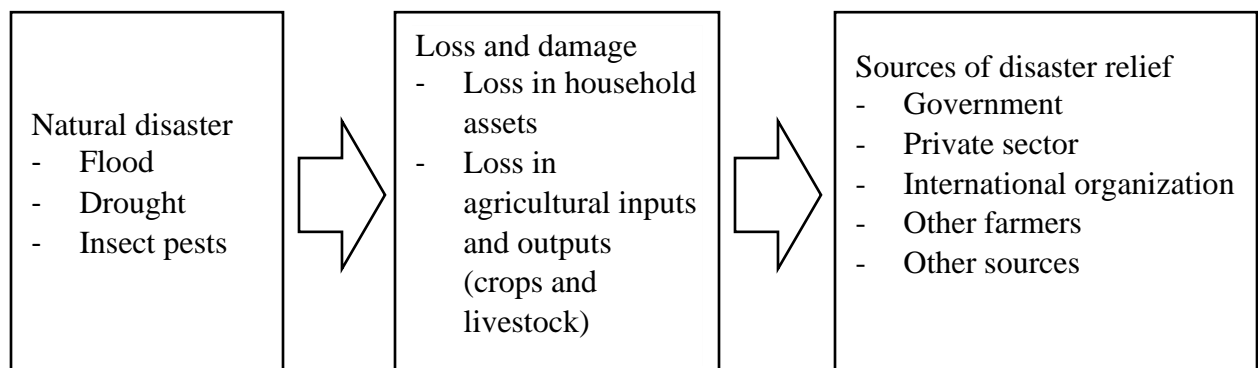
Table 33 The occurrence of natural disaster in the last 12 months

	Freq.	%
Yes	312	84.78
No	56	15.22
Total	368	100

Source: Authors' survey.

Figure 4 presents the consequence of natural disaster impacts and from which sources farmers could seek help for recovery. In most cases, farmers are likely to receive relief from the government when they experienced severe damage from natural disasters. Based on the survey, it seems that the engagement of the private sector, international organizations, as well as other farmers in assisting farmers affected by natural disasters, is relatively small. However, interpreting this result is not straightforward because the donation from the private sector and other organizations was mostly made throughout government agencies. Thus, farmers might not know where the sources of the donation came from.

Figure 5 Natural disaster impacts and sources of disaster relief



4.3.1 National Disaster Management Committee

At the national level, the *National Disaster Management Committee* (NDMC) is responsible for the prevention and control of disasters for the whole country, based on systematic communication and coordination with all stakeholders.

The Minister of Labor and Social Welfare (MLSW) is the director of the NDMC, the vice-director of the Prime Minister's Office and the Vice-Minister of Agriculture and Forestry are the vice-directors of the NDMC. Other government offices are members of the NDMC. At the provincial level, the Committee is structured the same way as the national level, but the Provincial Government is the director of the Committee. The Labor and Social Welfare Division acts as the Secretariat for National Disaster Prevention and Control when a natural disaster takes place. The role of the Labor and Social Welfare Division in the NDMC is detailed in Decree number 75/PO about the establishment and function of the NDMC Committee.

4.3.2 Labor and Social Welfare Division

Based on interviews with the heads of the Labor and Social Welfare Division, the victims from disasters faced severe situation. Several reasons explain the late and inadequate response to disasters, which include: the lack of trained staff who can tackle emergencies properly and the low budget allocated by the government to this matter –too low to make it possible to deal with several natural disasters that may happen simultaneously across the country. The involvement of the Labor and Social Welfare Division in the credit market remains limited. Facilitating farmers' access to credit is beyond the responsibility of this division (Interview of head of the LSW Division). As detailed individual information is important for financial institutions, gathering information about the amount of agricultural output loss verified by the divisions of Agriculture and Forestry and Labor and Social Welfare will enable farmers to access credit when natural disasters happen. The sharing of information among government agencies and offices could help improve the recovery from disaster.

4.3.3 The Bank of Lao PDR

Bank of Lao PDR implements credit policies for the victims of natural disasters and disease outbreaks. The policy includes: 1) deferring the payment of both principal and interest; 2) providing new loans to persons affected by natural disasters and disease outbreaks certified by relevant sectors and local authorities; 3) Any banks that postpone the payment to debtors who affected by natural disasters and spread out of disease will receive incentive policy from BOL. The victims of natural disasters and disease outbreaks should be checked by government agencies to determine whether they are entitled to receive support from this policy. Remedial measures are implemented as the follows: 1) revise the loan agreement to the affected debtors, set new calendar of repayment according to the situation of the debtor; 2) provide grace period of debt, principal and interest for one year or according to the debtor's actual ability to pay; and 3) provide new loans to debtors and provide loans to the affected people.

4.3.4 Agriculture and Forestry Divisions

According to face-to-face interviews, the heads of Agriculture and Forestry Divisions revealed that agricultural sector in provinces surveyed in this study continuously grew although the expansion of this sector is relatively low. The production outputs of rice, maize, and pig produced in the surveyed provinces are mostly reliant on the domestic market. As a result, there is no critical constraint in access to market among households producing rice, maize, and raising pigs. It is widely known that most Lao farmers in rural areas are still reliant on the application of the inefficient technique in their production, this results in low productivity. This concern is confirmed by the heads of Agriculture and Forestry Divisions and Offices.

Agricultural production in rural areas is quite sensitive to natural disasters and to disease outbreaks. In 2018, farmers in Vientiane Capital, Khammouan, Savannakhet, and Attapue suffered from massive floods that damaged their agricultural production. According to the head of the Agriculture and Forestry Division, the collapse of Xe Pien-Xe Nam Noi dam caused a loss of lives and assets. Moreover, this disaster raised the price of rice on the domestic market and increased the cost of living in Attapue. When a natural or human-made disaster happens, the head of the Agriculture and Forestry Division or Office becomes a member of the Committee for Natural Disaster Management and Control. The Agriculture and Forestry Division is supposed to report the loss of agricultural production to the Labor and Social Welfare Division. This division uses this to submit a proposal for financial assistance to the central government. The Agriculture and Forestry Division is responsible for distributing seeds to farm households to restore their production after a natural disaster. Usually, mostly rice seeds are distributed to families affected by disasters because there is a shortage of other crop seeds.

The role of Agriculture and Forestry Division regarding the access of farming households to finance is still limited. However, the heads of the Agriculture and Forestry Division recognized the importance of access to credit. All interviewees agreed that being a member of a production group enables farmers in rural areas to get access to credit more easily. Farmers benefit from being members of production groups by learning and sharing their experience and practical knowledge, but also from improved bargaining power on various markets, including credit. For example, members of production groups can often access credit market without collateral. This is a big advantage, for poor households who usually lack guarantees. When a natural disaster happens, some farmers ask the head of Agriculture and Forestry Division to assess the loss of their products so that they can use this letter to ask for an extension of payback period from their lenders. However, whether this letter alters the decision of credit providers is still ambiguous.

5. Conclusion and Policy Implication

This study evaluates the access to finance of three main agriculture activities including rice, pig and maize. The main determinants of the access to finance are: experience in farming, education, land size and number of workers. Farmers with at least primary school education have a higher probability of obtaining credit than those who have no school attainment.

The analysis of farmer credit risk, based base on the 5 Cs principle, suggests that most farmers have a relatively high level of risk, which is likely to limit their access to credit. Indeed, while most farmers have at least primary school attainment, they can access credit, but might not be able to manage it properly. Furthermore, farmers may have agriculture land, but cannot use this land as collateral as they have no land title. However, they may access credit if they organize a lending group which mean they guarantee each other in a lending group. Farmers have little savings which means they requires more money when emergencies situation. Although can use their motorbike as collateral, they can get little credit. Finally, the condition of the loans (high interest rates) are not sustainable for farmers.

There are no concrete policies to support famers after disaster from bank and non-bank institutes. Bank of Lao PDR proposes the incentive policies for bank and non-bank institutes who provide assistance for victims from disaster. National Disaster Management Committee is the main responsible for prevention and control disaster.

The assistance to the victim is implemented though the Labor and Social Welfare Division where they face many challenge such as lack of trained staff who can tackle emergencies properly and the low budget allocated by the government to this matter –too low to make it possible to deal with several natural disasters that may happen simultaneously across the country.

Policy implications derive from the results of study as following:

No.	Recommendations	How to	Who	Timeframe
1	Promote financial literacy	Extend financial literacy projects to other provinces. Apply teaching materials of GIZ on financial literacy to school, colleges and universities.	GIZ and BOL are the leader and educational institutes should involve to promote to students	1-5 year
2	Encourage production groups	Encourage farmers to establish production groups by drafting a promotion policy for production group.	MAF	1-2 year
3	Initiate crop insurance	Feasibility study on crop insurance should be developed with the details of organization structure, stakeholders, insurance premium, payment system and the likes.	NAFRI and NUOL should work on feasibility study. MAF, Bank of Lao PDR, Ministry of Labor and Social Welfare and private companies should integrate and initiate the crop insurance on priority agriculture products.	1-5 year
4	Establish disaster protection funds	Establish disaster protection funds related to projects that may have a negative impact on farmers (e.g., hydropower, mining, wood processing)	MOF and MLSW	Immediate
5	Information distribution	Basic procedures to ask for assistance and basic rules for disaster prevention should be distributed through posters, leaflets or electronic files.	MLSW	Immediate

6. References

- Agriculture Promotion Bank. (2019). APB Credit products. Retrieved from https://www.apb.com.la/loans_en.php
- Asian Development Bank. (2019). Key Development Database. Retrieved from <https://kidb.adb.org/kidb/sdbsCountryView>
- Baiyegunhi, L. J. S., & Fraser, G. C. (2014). Smallholder farmers' access to credit in the amathole district municipality, eastern Cape province, South Africa. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, 115(2), 79-89.
- Binswanger, H. P., & Rosenzweig, M. R. (1986). *Credit markets, wealth and endowments in rural south India*. Research Unit, Agriculture and Rural Development, Operational Policy Staff, World Bank.
- Fletschner, D. (2008). Women's access to credit: Does it matter for household efficiency? *American journal of agricultural economics*, 90(3), 669-683.
- Ibrahim, A. H., & Bauer, S. (2013). Access to micro credit and its impact on farm profit among rural farmers in dryland of Sudan. *Global Advanced Research Journal of Agricultural Science*, 2(3), 88-102.
- International Monetary Fund. (2016). 2016 Article IV Consultation – Press Release; Staff Report; and Statement by the Executive Director for Lao People's Democratic Republic. IMF Country Report No. 17/53.
- Investopedia. (2019). Understanding the Five Cs Credit. Retrieved from <https://www.investopedia.com/ask/answers/040115/what-most-important-c-five-cs-credit.asp>
- Lemessa, A., & Gemechu, A. (2016). Analysis of factors affecting smallholder farmers' access to formal credit in Jibat District, West Shoa Zone, Ethiopia. *International Journal of African And Asian Studies*, 25.
- Ministry of Planning and Investment (2015). Background document for the 12th High Level Round Table Meeting Vientiane, Lao PDR. Retrieved from <https://rtm.org.la/high-level-round-table-meeting-2015/>
- _____. (2016). Background document for the Round Table Meeting Vientiane, Lao PDR. Retrieved from <https://rtm.org.la/resources/2018-round-table-implementation-meeting/>
- _____. (2018). Mid-term review of the Eighth National Socio-Economic Development Plan, 2016-2020. Retrieved from https://rtm.org.la/wp-content/uploads/2018/11/Lao-PDR_MTR_8th-NSEDP_19-Oct_Third-Draft.pdf

- Ministry of Agriculture and Forestry. (2015). Sector Working Group on Agriculture and Rural Development Progress Report. Retrieved from <https://rtm.org.la/wp-content/uploads/formidable/SWG-ARD-2015-ANNUAL-REPORT1.pdf>
- Mohamed, K. S., & Temu, A. E. (2009). Gender characteristics of the determinants of access to formal credit in rural Zanzibar.
- Muhongayire, W., Hitayezu, P., Mbatia, O. L., & Mukoya-Wangia, S. M. (2013). Determinants of farmers' participation in formal credit markets in rural Rwanda. *Journal of Agricultural Sciences*, 4(2), 87-94.
- Musebe, R., Oluoch-Kosura, W., & Wangia, C. (1993). An Analysis of Agricultural Credit Markets in Vihiga Division of Kakamega District, Kenya. *East African Agricultural and Forestry Journal*, 58(3-4), 117-126.
- Nguyen, V. (2003). *Effects of the Value of Assets on Farming Households' Access to Credit in Rural Vietnam: The Case of Chau Thanh A District, Can Tho Province* (Doctoral dissertation, MA thesis, Master thesis, The Vietnam-Netherlands Project, Ho Chi Minh City).
- Sebatta, C., Wamulume, M., & Mwansakilwa, C. (2014). Determinants of smallholder farmers' access to agricultural finance in Zambia. *Journal of Agricultural Science*, 6(11), 63.
- Zeller, M. (1994). Determinants of credit rationing: A study of informal lenders and formal credit groups in Madagascar. *World development*, 22(12), 1895-1907.
- Zola, M. A. (2011). *Trade Development Facility Scoping Study on Trade, Food Production, and Service Sector Linkages in Luangprabang*. The National Agriculture and Forestry Research Institute (NAFRI), and FAO, supported by the EU-funded project on Capacity Development for Agricultural Innovation Systems (CDAIS), organized a dialogue in Thalath, Vientiane Province on 29 June 2018.

7. Appendix

A.1 Questionnaire

HOUSEHOLD QUESTIONNAIRE (Rice)

Village: Name of household: Date of interview:
 District: Name of enumerator: Name of data entry person:
 Province: Phone number: Name of reviewer :

The nature of the Household and the Head of the family (Identify only members living in family and live with their families)

Number of household:person, female:.....person,

Number of Main Labor (who can work):.....person, female:.....person,

Information of household

NO	Questionnaire	Code and Units
1	Gender	1) Male 2) Female
2	Age	Year
3	Status	1) Single 2) Married 3) Other
4	Ethnic groups	1) Lao, 2) Khamou, 3) Mong, 4) Other (Specify).....
5	Highest education level	1) No school; 2) Primary school; 3) Lower secondary education; 4) Higher secondary education; 5) Vocational school education 6) Bachelor degree; 7) Higher than bachelor degree
6	Main career	1) Agriculture; 2) Worker; 3) General staff; 4) Personal business; 5) Personal Business (Trading); 6) Government officer; 7) private sector; 8) Other (Specify).....

Use of land and produce area

No	Type of land	Area	Measuring units	Kind of Rice	Access to land	Land type document	If this plot sells
	1) Resident Rice 2) Paddy Rice 3) up land Rice 4) cultivated crops	5) Fish pond 6) pastures 7) Plantation 8) other soils (specified)	1 = charge, 2 = ha 3 = square meters	1 = Nanon 2 = Natham 3 = Nakok 4 = other Specify).....	the road of car into land the road of motorcycle in to land the way peoples Difficult into land	1 permanent land title 2) There are books used 3) No	You think you can sell it How much does it cost? (LAK million)

1							
2							
3							
4							
5							
6							
7							

A.2 Interview Guideline

Bank

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when
- Number of employees

3. Credit situation

- Overview of credit in the past five years
- Deposit to credit ratio
- Sector share (agriculture, trade, and construction) of loan
- How many of farmers customers (rice, pig and maize)

4. Procedure of credit analysis

- How do farmers apply for the loan?
- What are the requirements to get the loan?
- What are the conditions of loan such as interest rate, term of loan, amount of loan, fee and collaterals?
- How do you estimate the value of collateral such as land, house of vehicle?
- How do you analyze the risk of farmers?
- Are there any farmers (rice, pig and maize) able to borrow money?

5. Non-Performing Loans

- Overall NPL rate and NPL rate of famers?
- How do you manage NPL?

6. Support smallholder farmers

- Is there any special support to smallholder farmers? What kind of support?
- Do you have any support if farmer suffer from disasters?

7. Challenges

- What are the key challenges of your department? challenges to deal with smallholders' farmers

8. Recommendations

- Please provide recommendation to smallholders if they want to borrow money? What should they do?

Microfinance

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Overview of financial institution

- Type of microfinance (NDTMFI, DTMFI, SCU)
- Ownership, year of established, size, register capital, number of employee and etc)
- How do you raise fund? What is the interest rate?
- Deposit to loan ratio
- Approximately of number of farmers customers (rice, pig and maize) and percentage of farmers loan to total.

4. Procedure of credit analysis

- How farmers apply for the loan?
- What are the requirement documents to get the loan?
- What are the conditions of loan such as interest rate, term of loan, amount of loan, fee and collaterals?
- How do you estimate the value of collateral such as land, house of vehicle?
- What are the main purposes of farmer credit?
- How do you analyze the risk of farmers?
- Are there any farmers (rice, pig and maize) able to borrow money?

5. Non-Performing Loans

- Overall NPL rate and NPL rate of famers?
- How do you manage NPL?

6. Support smallholder farmers

- Is there any support to smallholder farmers? What kind of support?

7. Challenges

- What are the key challenges of your business? And to deal with smallholders' farmers

8. Recommendations

- Please provide recommendation to smallholders if they want to borrow money? What should they do?

Saving group and village fund

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Overview of saving group

- Briefly explain about the group: When and why the group was established?
- Organization structure
- Management cost and revenue
- No members in the group/ male and female
- How do you raise fund? deposit? what is the interest rate?
- Number and percentage of farmers who borrow money

4. Procedure of credit analysis

- How farmers get the loan?
- What are the requirement documents to get the loan?
- Are there any farmers (rice, pig and maize) able to borrow money?
- What are the conditions of loan such as interest rate, term of loan, amount of loan, fee and collaterals?
- How do you analyze the risk of farmers?

5. Non-Performing Loans

- Number and amount of people do not return borrowing?

- How do you solve the problem?

6. Support smallholder farmers

- Is there any support to smallholder farmers? What kind of support?

7. Challenges

- What are the key challenges of saving group/village fund?

POIC (Rice)

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Background information on the rice sector

- The current situation of trade and investment in province.
- The export and import of agricultural products to other provinces and neighboring countries.
- The current trade of rice in the local market.
- Main markets (local, domestic, export, processing) for rice.
- How many rice mills and barns in the province? How big are they?
- Are there any groups or associations organized by rice farmers in the province? How many?
- Access to market of farmers producing rice in the province.
- What are the main challenges encountered by rice farmers in selling their products (local and foreign market)?
- What are the main risks encountered by rice farmers and farmers in general?

4. POIC and rice farmers

- What is the role of POIC regarding investment in producing rice, and other agricultural products?
- Past and current promotion policies to support the production of rice farmers and other farmers (subsidies, tax exemption, training, marketing, credit schemes, certification, etc.)
- Do POIC regularly collect and monitor rice prices (whole and retail sales)?
- Specific support for rice farmers?

- Plans and priorities for producing rice in the future.

5. Rules & Regulations

- Main provincial regulations in investing and trading agricultural products in general.
- Main provincial regulations in investing and trading rice in the province.
- Main provincial regulations to improve the rice market.
- Main provincial regulations to promote exporting rice products.

6. Contract farming

- The general situation of agricultural production related to contract farming in the province.
- Official procedures for CF with smallholder farmers.
- The role of POIC related to contract farming production (encourage/discourage)?
- Do you have guidelines/models for CF agreements?

7. Smallholder vegetable farmers

- Is there any support to smallholder farmers?
- What kind of support (extension, access to credit, subsidization of inputs)?
- How many rice farmer groups are there?
- Is the creation of farmer groups encouraged? How? If no, why?

8. Access to credit

- Comparing to the last five years, do rice farmers have a better access to credit?
- Does POIC help in any way?

POIC (Pig)

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Background information on the pig farming sector

- The current situation of trade and investment in province.
- The export and import of agricultural products to other provinces and neighboring countries.

- The current trade of pig in the local market.
- Main markets (local, domestic, export, processing) for pig.
- How many abattoirs in the province? How big?
- Are there any groups or associations organized by pig farmers in the province? How many?
- Access to market of farmers raising pig in the province.
- What are the main challenges encountered by pig ranchers in selling their products (local and foreign market)?
- What are the main risks encountered by pig ranchers and farmers in general?

4. POIC and pig farmers

- What is the role of POIC in regarding investment in raising pig and other cattle?
- Past and current promotion policies to support the production of pig ranchers, and other products (subsidies, tax exemption, training, marketing, credit schemes, certification, etc.)
- Do POIC regularly collect and monitor pig or pork prices (whole and retail sales)?
- Specific support for pig farming?
- Plans and priorities for pig farming in the future.

5. Rules & Regulations

- Main provincial regulations in investing and trading agricultural products in general.
- Main provincial regulations in investing and trading pig in the province.

6. Contract farming

- The general situation of agricultural production under contract farming agreement in the province.
- Official procedures for CF with smallholder farmers.
- The role of POIC regarding contract farming production (encourage/discourage)?
- Do you have guidelines/models for CF agreements?

7. Smallholder pig farmers

- Is there any support to smallholder farmers?
- What kind of support (extension, access to credit, subsidization of inputs)?
- How many pig farmers groups or associations are there?
- Is the creation of farmer groups encouraged? How? If no, why?

8. Access to credit

- Comparing to the last five years, do pig ranchers have a better access to credit?
- Does POIC help in any way?

PAFO (Rice)

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Background information on the rice farming

- The share of rice cultivation area, total number of rice farmers
- Main markets (local, domestic, export, processing) for rice
- How has the rice farming sector changed over the past 10 years?
- Are there any groups or associations organized by rice farmers in the province? How many?
- Access to market of rice farmers in the province.
- What are the main challenges encountered by rice farmers in selling their products (local and foreign market)?
- What are the main risks encountered by rice farmers and farmers in general?

4. PAFO and rice farming

- What is the role of PAFO regarding rice production?
- Past and current support to the rice farming sector (subsidies, tax exemptions, training, credit schemes, certification, etc.)
- Specific support for rice farmers (seeds, technical support, etc.)?
- Plans and priorities for rice farming in the future

5. Rice trade

- How is rice trade organized in VC?
- Total rice sales (2015-2018) in LAK and in tons
- Are rice prices regularly monitored? Since when? Frequency?

6. Rules & Regulations

- Main provincial regulations concerning rice production
- Main provincial regulations concerning rice trade

7. Contract farming

- Official procedures for CF with smallholder rice farmers

- Role of PAFO cf. contract farming (encourage/discourage)?
- Do you have guidelines/models for CF agreements?

8. Smallholder rice farmers

- Is there any support to smallholder rice farmers?
- What kind of support (extension, access to credit, subsidization of inputs)?
- How many rice farmers groups or associations are there?
- Is the creation of farmer groups or associations encouraged? How? If no, why?

9. Access to credit

- Comparing to the last five years, do rice farmers have a better access to credit?
- Does PAFO help in any way?

PAFO (Pig)

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Background information on the pig farming sector

- Total number of pig ranchers.
- Main markets (local, domestic, export, processing) for pig farming
- How has the pig farming sector changed over the past 10 years?
- Are there any groups or associations organized by pig ranchers in the province? How many?
- Access to market of pig ranchers in the province.
- What are the main challenges encountered by pig ranchers in selling (local and foreign market)?
- What are the main risks encountered by pig ranchers and other cattle farmers in general?

4. PAFO and pig farming

- What is the role of PAFO regarding pig farming?
- Past and current support to the pig farming sector (subsidies, tax exemptions, training, credit schemes, certification, etc.)

- Specific support for pig ranchers (vaccine, disease control, etc.)?
- Plans and priorities for pig farming in the future

5. Pig trade

- How is pig trade organized in VC?
- Total pig sales (2015-2018) in monetary unit and number of pigs
- Are pig and pork prices regularly monitored? Frequency?

6. Rules & Regulations

- Main provincial regulations concerning pig farming
- Main provincial regulations concerning pig trade

7. Contract farming

- Official procedures for CF with smallholder pig ranchers
- Role of PAFO cf. contract farming (encourage/discourage)?
- Do you have guidelines/models for CF agreements?
- Is the presence of CP in the local market good for local pig ranchers? How?

8. Smallholder pig farmers

- Is there any support to smallholder pig ranchers?
- What kind of support (extension, access to credit, subsidization of inputs)?
- How many pig farmers groups or associations are there?
- Is the creation of farmer groups or associations encouraged? How? If no, why?

9. Access to credit

- Do pig ranchers have access to credit?
- If yes, what kind?
- Does PAFO help in any way?

PAFO Vientiane Capital (Maize)

1. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

2. About the respondent

- Name, position held & since when

3. Background information on the maize sector

- Total maize surface, total number of maize farmers
- Main markets (local, domestic, export, processing) for maize
- How has the maize sector changed over the past 10 yrs?
- How is maize production considered (good image)?
- What are the main challenges encountered by maize farmers?
- What are the main risks encountered by maize farmers and farmers in general?

4. PAFO & Maize

- What is the role of PAFO regarding maize production?
- Past and current support to the maize sector (subsidies, tax exemptions, training, credit schemes, certification, etc.)
- Specific support for maize farmers?
- Plans and priorities for maize in the future

5. Maize trade

- How is maize trade organized in VC?
- Number of organic markets
- Total maize sales (2015-2018) in LAK and in tons
- Are maize prices regularly monitored? Since when? Frequency?

6. Rules & Regulations

- Main provincial regulations concerning maize production
- Main provincial regulations concerning maize trade

7. Contract farming

- Official procedures for CF with smallholder maize farmers
- Role of PAFO cf. contract farming (encourage/discourage)?
- Do you have guidelines/models for CF agreements?

8. Smallholder maize farmers

- Is there any support to smallholders?

POIC (Maize)

10. Introducing the interview

- Introduction of the survey team & survey
- Objectives of the interview and approximate duration

11. About the respondent

- Name, position held & since when

12. Background information on the maize sector

- The current trade of maize
- The share of maize in the market
- Main markets (local, domestic, export, processing) for maize.
- How has the maize sector changed over the past 10 years?
- Are there any groups or associations organized by maize producers in the province?
How many?
- Access to market of maize farmers in the province.
- What are the main challenges encountered by maize farmers in selling their products (local and foreign market)?
- What are the main risks encountered by maize farmers and maize in general?

13. POIC and maize farming

- What is the role of **POIC** regarding maize trade?
- Past and current support to maize sector (subsidies, tax exemptions, training, credit schemes, certification, etc.)
- Plans and priorities for maize sector in the future

14. Maize trade

- How is maize trade organized in VC?
- Total maize sales (2015-2018) in LAK and in tons
- Are maize prices regularly monitored? Since when? Frequency?

15. Rules & Regulations

- Main provincial regulations concerning maize production
- Main provincial regulations concerning maize trade

16. Contract farming

- Official procedures for CF with smallholder maize farmers
- Role of PAFO cf. contract farming (encourage/discourage)?
- Do you have guidelines/models for CF agreements?

17. Smallholder maize farmers

- Is there any support to smallholder maize farmers?
- What kind of support (extension, access to credit, subsidization of inputs)?
- How many maize farmer groups or associations are there in this province?
- Is the creation of farmer groups or associations encouraged? How? If no, why?

18. Access to credit

- Comparing to the last five years, do maize farmers have a better access to credit?
- Does PAFO help in any way?

A.3 Logit Regression

There are several methods that can be applied to estimate the equation with a binary dependent variable. The Linear Probability Model (LPM), estimated by the Ordinary Least Square (OLS), is a technique easily implemented to deal with the binary dependent variable. However, the linear estimation does not satisfy a critical assumption that the estimated outcomes strictly lie in the boundary of zero and one (Wooldridge, 2015). To overcome the shortcoming of the linear estimation, Logit and Probit Models are widely applied in the literature. These models are non-linear techniques which are estimated by applying the Maximum Likelihood. Due to its computational simplicity, this study is solely reliant on the Logit Model. The structure of this model is specified as follows:

$$P_i = F(Z) = F(\alpha + \sum \beta_i X_i) = \frac{1}{1+e^{-z}} \quad (1)$$

where P_i is the probability that a farmer gets access to credit. X_i denotes the vector of independent variables which are described in the Table A1. α is the constant term. β_i is the vector parameters of independent variables to be estimated in this study.

Since the probability that a farmer can get access to credit is P_i , the probability that a farmer cannot get access to credit can be expressed as below:

$$1 - P_i = 1 - F(Z) = 1 - F(\alpha + \sum \beta_i X_i) = \frac{1}{1+e^z} \quad (2)$$

Dividing (1) by (2) gives the odd ratio which is the proportion of the probability that a farmer gets access to credit to the probability that a farmer does not get access to credit.

$$\frac{P_i}{1-P_i} = \frac{1+e^z}{1+e^{-z}} = e^z \quad (3)$$

Taking the natural logarithm into the both sides of equation (3) and adding the disturbance, u_i , into the equation, we can have a Logit Model as follows:

$$L_i = \ln \left[\frac{P_i}{1-P_i} \right] = \alpha + \sum \beta_i X_i + u_i \quad (4)$$

where L_i is the logarithm of odd ratio which is potentially determined by independent variables X_i . These include household heads' characteristics (gender, age, marital status, ethnicity, occupation, and education background), and household characteristics (household size, dependency rate, household expenditure, saving, residential land, agricultural land, the membership of production group, the types of production).