รายงานวิจัยฉบับสมบูรณ์

โครงการความเปราะบางของครัวเรือนเกษตรกรในภาคตะวันออกเฉียงเหนือและภาคเหนือของไทย

The Vulnerability Assessment of Rural Farm Household in Thailand : the Comparison Case Study of the Northeastern and Northern of Thailand

ฐิติวรรณ ศรีเจริญ

สิงหาคม 2560

สัญญาเลขที่ RSA5680050

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ไม่จำเป็นต้องเห็นด้วยเสมอไป)

Abstract

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This research has the purpose to estimate vulnerability to poverty, specify vulnerable group and identify the strategies that households use to address the exposure of risks of rural farm household in Northeastern and Northern of Thailand. This study is conducted in four provinces of Thailand: Northeastern region (Kalasin and Buri Ram province); Northern region (Chiangmai, Nan province). Data of total 1,400 households was collected in the year of 2014. The qualitative analysis applies both descriptive and inferential statistics. The quantitative method applies the econometrics model.

Research results indicate that household size is between 4-6 persons. Each household have at least 1-2 students. Most of household occupations are farm related. Most of the household head's genders are male, age between 41 and 60 years. Main occupation of household head is agricultural work. There are more than one risk hit households in each period. It was about 80% of total household encounter with risks in last year. The adaptive strategy in last year was diversification of income source, hygiene and disease prevention, less risky production system, saving in cash and diversification of crops. The coping strategies that household mostly select to handle risks are reduce food consumption, dis-saving, credit from bank and credit from family and relatives. Household has high demand level on all policy that are: 1) price guarantee on agricultural product; 2) guarantee on fertilizer and factor price; 3) drug and gambler reduction and control policy; 4) funding circulates in village; 5) land allocation; 6) solving agriculture work problem; 7) solving unemployment problem; 8) water supply arrangement; 9) funding for farm work; and 10) road construction.

The result on vulnerability to poverty analysis is done by feasible generalized least squares (FGLS) method. Upon subjecting the data to analysis, the first stage of the OLS

reveals that 48% of the variation in log consumption (a measure of well-being) can be explained by the following factor: household size square, education of family member, education of household head, non-farm occupation of household head, disable person, number of unemployed family member, non-farm full-time employees (adult), own livestock, monetary asset, tangible asset value, total borrowing in last 12 months, expenditure on last five year risks, severity of risk, unemployment, theft of producer goods, crop loss by insect and plant disease, working disability by accident of household head, and theft of crops.

The relationship between predicted vulnerability and logarithm of consumption is analyzed in four cases, which are extreme poor, very poor, poor and non poor. Thailand poverty line in the year of 2014 was at 2,647 Baht per capita per month. The rural headcount ratio in terms of household expected consumption less than poverty line is at 28.79%. The result shows two groups of vulnerable households, which are, high and low vulnerable households. The estimates show that about 53.57% of households were vulnerable to poverty. The comparison of observed poverty status based on vulnerability index present that 75% of farm households are poor, whereas another 25% are non-poor. The classification of poverty status based on observed poverty status and vulnerability index can be classified into four groups. The first group is the poor household with high vulnerability to poverty, which can be counted for 9.64%. The second group is the household that is currently not poor but has high vulnerability to be poor in the future, amount for 43.93%. The third group is the poor household but has low vulnerability to poverty, account for 19.14%. The last group is not poor and low vulnerability to poverty, about 27.29%. A vulnerability profile by selected household characteristics is displayed. When concentrating to the non vulnerable group, northeastern region contain the higher percentage (59.69%) than the northern region. When comparing between non vulnerable and vulnerable group, it indicates that northern households are vulnerable with 62.57%. The analysis of the province, it depicts that Chiangmai, Nan, and Kalasin province have high percentage of vulnerable households. In overall number of households, non vulnerable households account for 46.43%, the rest are vulnerable household account for 53.57%.

Key word: Vulnerability to Poverty, Poverty, Risk Management, Feasible Generalized Least Square, Farm Household

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อประเมินความเปราะบางต่อความยากจน แบ่งกลุ่มครัวเรือนยากจนและบ่งชี้กลยุทธ์ที่ครัวเรือนในภาคตะวันออกเฉียงเหนือและภาคเหนือใช้เมื่อเผชิญกับความเสี่ยง การศึกษานี้ ดำเนินการในสี่จังหวัดของไทยคือ ภาคตะวันออกเฉียงเหนือ (จังหวัดกาฬสินธุ์ บุรีรัมย์) ภาคเหนือ (จังหวัดเชียงใหม่ น่าน) ข้อมูลที่ใช้ในการวิจัยเป็นข้อมูลที่ได้จากการสัมภาษณ์ครัวเรือน 1,400 ครัวเรือน การวิเคราะห์เชิงพรรณนาใช้การบรรยายและสถิติ การวิเคราะห์เชิงปริมาณใช้แบบจำลองเศรษฐมิติ

ผลการวิจัยพบว่า ขนาดครัวเรือนอยู่ระหว่าง 4-6 คน แต่ละครัวเรือนมีนักเรียน 1-2 คน อาชีพส่วนใหญ่เกี่ยวข้องกับการเกษตรกรรม หัวหน้าครัวเรือนส่วนใหญ่เป็นชาย อายุ 41-60 ปี อาชีพหลักของหัวหน้าครัวเรือนคือ การเกษตร ในแต่ละช่วงเวลา ครัวเรือนได้รับความเสี่ยงมากกว่า 1 ชนิด ร้อยละ 80 ของครัวเรือนเผชิญกับความเสี่ยงปีที่ผ่านมา กลยุทธ์การปรับตัวในปีที่ผ่านมาคือ การสร้างความหลากหลายของแหล่งที่มาของรายได้ การป้องกันโรคและสุขอนามัย ระบบการผลิตที่ลดความเสี่ยง การออมในรูปตัวเงินและการสร้างความหลากหลายของพืชที่เพาะปลูก กลยุทธ์การรับมือที่ครัวเรือนเลือกมากที่สุดในการจัดการความเสี่ยงคือ การลดการบริโภคอาหาร การลดการออกม การขอสินเชื่อจากธนาคาร และการขอสินเชื่อจากครอบครัวและญาติพี่น้อง ครัวเรือนมีระดับความต้องการให้รัฐบาลช่วยเหลือในนโยบาย: 1) การประกันราคาผลผลิตทางการเกษตร; 2) การประกันราคาปัจจัยการผลิตและราคาปุ๋ย; 3) นโยบายการควบคุมและการลดการพนันและยาเสพติด; 4) เงินทุนหมุนเวียนในหมู่บ้านและเงินทุนเพื่อการเกษตร; 5) การจัดสรรที่ดิน; 6) การแก้ปัญหาการเกษตร; 7) การแก้ไขปัญหาการว่างงาน; 8) การบริหารจัดการน้ำ; 9) การให้เงินทุนเพื่อการทำเกษตรกรรม และ 10) การก่อสร้างถนน

ผลการวิเคราะห์ความเปราะบางต่อความยากจนวิเคราะห์โดยการใช้ feasible generalized least squares (FGLS) ผลการวิเคราะห์ถดถอยที่ใช้กำลังสองน้อยที่สุด (Ordinary Least Square: OLS) แสดงให้เห็นว่า ร้อยละ 48 ของความเบี่ยงเบนในค่าล็อกกาลิทึ่มของการบริโภค (การวัดความเป็นอยู่) สามารถอธิบายด้วยตัวแปรต่อไปนี้: ขนาดครัวเรือนกำลังสอง การศึกษาของสมาชิกในครัวเรือน การศึกษาของหัวหน้าครัวเรือน อาชีพที่ไม่ใช่การเกษตรของหัวหน้าครัวเรือน คนพิการ คนว่างงาน แรงงานผู้ใหญ่ที่ทำงานนอกภาคเกษตรเต็มเวลา การเป็นเจ้าของปศุสัตว์ สินทรัพย์ทางการเงิน มูลค่าสินทรัพย์ที่จับต้องได้ การกู้ยืมเงินใน 12 เดือนที่ผ่านมา รายจ่ายเพื่อจัดการความเสี่ยงใน 5 ปีที่ผ่านมา ความรุนแรงต่อความเสี่ยง การว่างงาน ขโมยสินค้าผู้ผลิต ความสูญเสียพืชผลจากแมลงและโรคพืช การไม่สามารถทำงานได้ของหัวหน้าครัวเรือนจากอุบัติเหตุ และขโมยพืชผลทางการเกษตร

ความสัมพันธ์ระหว่างค่าความเปราะบางและค่าล็อกการิทึมของการบริโภคถูกวิเคราะห์ใน 4 กรณีคือ ยากจนดักดาน ยากจนมาก ยากจน และไม่ยากจน เส้นความยากจนของไทยในปี 2557 อยู่ที่ 2,647บาทต่อหัวต่อเดือน สัดส่วนของความยากจนต่อหัวในชนบทในรูปของการบริโภคครัวเรือนที่คาดการณ์ต่ำกว่าเส้นความยากจนร้อยละ 28.79 ผลการวิจัยยังพบว่า กลุ่มครัวเรือนเปราะบางแบ่งเป็น 2 กลุ่มคือ ครัวเรือนที่มีความเปราะบางต่อความยากจนมากและครัวเรือนที่เปราะบางต่อความยากจน

น้อย การประมาณค่าพบว่า ร้อยละ 53.57 ของครัวเรือนมีความเปราะบางต่อความยากจน การเปรียบเทียบสถานะความยากจนที่สังเกตบนพื้นฐานของค่าดัชนีความเปราะบางต่อความยากจนพบว่า ร้อยละ 75 ของครัวเรือนเกษตรกรรมยากจน ขณะที่ร้อยละ 25 ของครัวเรือนเป็นครัวเรือนที่ไม่ยากจน การแบ่งสถานะความยากจนบนพื้นฐานของสถานะความยากจนและดัชนีความเปราะบางสามารถแบ่งเป็น 4 กลุ่มได้แก่ กลุ่มแรกเป็นครัวเรือนยากจนที่มีความเปราะบางที่จะยากจนสูง คิดเป็นร้อยละ 9.64 กลุ่มที่สองเป็นครัวเรือนที่ปัจจุบันไม่จนแต่จะมีความเสี่ยงที่จะจนในอนาคตสูง คิดเป็นร้อยละ 43.93 กลุ่มที่สามเป็นครัวเรือนยากจน มีความเปราะบางที่จะยากจน ร้อยละ 19.14 กลุ่มสุดท้ายเป็นกลุ่มที่ไม่จนและมีความเปราะบางต่อคามยากจนต่ำ คิดเป็นร้อยละ 27.29 ความเปราะบางต่อความยากจนแบ่งตามลักษณะครัวเรือน เมื่อพิจารณากลุ่มไม่มีความเปราะบางต่อความยากจนพบว่า ภาคตะวันออกเฉียงเหนือมีครัวเรือนที่เปราะบางอยู่ร้อยละ 59.69 มากกว่าภาคเหนือ เมื่อเปรียบเทียบระหว่างกลุ่มเปราะบางต่อความยากจนกับกลุ่มที่ไม่เปราะบางต่อความยากจน บ่งชี้ว่า ครัวเรือนาคเหนือมีความเปราะบางที่ร้อยละ 62.57 การวิเคราะห์รายจังหวัด พบว่า จังหวัดเชียงใหม่ น่าน กาฬสินธุ์มีร้อยละของครัวเรือนเปราะบางสูง ในจำนวนครัวเรือนทั้งหมด ครัวเรือนไม่เปราะบางต่อความยากจนคิดเป็นร้อยละ 46.43 ที่เหลือเป็นครัวเรือนที่เปราะบางต่อความยากจนร้อยละ 53.57

Key word: ความเปราะบางต่อความยากจน ความยากจน การจัดการความเสี่ยง Feasible Generalized Least Square ครัวเรือนเกษตรกร

<u>เอกสารแนบหมายเลข 3</u>

Output จากโครงการวิจัยที่ได้รับทุนจาก สกว.

1. ผลงานตีพิมพ์ในวารสารวิชาการนานาชาติ
   อยู่ในระหว่างการดำเนินการ

2. การนำผลงานวิจัยไปใช้ประโยชน์
   - เชิงนโยบาย
     งานวิจัยนี้มีประโยชน์ต่อการกำหนดนโยบายในเรื่องของการจัดสวัสดิการสังคมเพื่อคนจนและคนด้อยโอกาสในสังคมไทย โดยงานวิจัยนี้ แสดงให้เห็นว่า ความยากจนไม่ได้ขึ้นอยู่กับรายได้และรายจ่ายเพียงอย่างเดียว ปัจจัยโครงสร้างพื้นฐานเพื่อการดำเนินชีวิตและความเสี่ยง มีผลทำให้ครัวเรือนเกิดความเปราะบางที่จะยากจนในอนาคตด้วย

   - เชิงวิชาการ
     งานวิจัยนี้ สามารถนำไปเป็นกรณีศึกษาและใช้ในการพัฒนาการเรียนการสอนในรายวิชาการวิจัยในหัวข้อเฉพาะ หมวดวิชาเศรษฐศาสตร์การวางแผนและพัฒนา และในการจัดทำวิทยานิพนธ์ สำหรับนิสิตในระดับบัณฑิตศึกษา ซึ่งส่งผลต่อการสร้างนักวิจัยใหม่ในสาขาดังกล่าวได้

3. การเสนอผลงานในที่ประชุมวิชาการ
   อยู่ในระหว่างดำเนินการ

PREFACE

The World Bank reports that poverty in Thailand has declined substantially over the last 30 years from 67% in 1986 to 7.2% in 2015 during periods of high growth and rising agricultural prices. However, poverty and inequality continue to pose significant challenges, with vulnerabilities as a result of faltering economic growth, falling agricultural prices, and ongoing droughts. Poverty in Thailand is primarily a rural phenomenon.

As of 2014, over 80 percent of the country's 7.1 million poor live in rural areas. Moreover, an additional 6.7 million were living within 20 percent above the national poverty line and remained vulnerable to falling back into poverty. Although inequality has declined over the past 30 years, the distribution in Thailand remains unequal compared with many countries in East Asia. Significant and growing disparities in household income and consumption can be seen across and within regions of Thailand, with pockets of poverty remaining in the Northeast, North, and Deep South. Historically, economic growth has been the key driver of poverty reduction in Thailand (World Bank, 2017).

However, GDP growth rate has been declined during 2014 and 2016, with less than 2.5 percent a year. Looking ahead, the unstable economic growth may drive down the economic recovery and poverty situation of Thailand. The vulnerability to poverty may increase in the risk group especially the unemployed person, disable person, illiterate person, the elder, and rural person.

Rural households are vulnerable and fragile. They take high risk, which cause them to be under the unsustainable livelihood to be falling into the poverty in the future. It would be better if the government can give the aid direct to the target poor group. Therefore, the method to identify the vulnerable households is important to identify which group of households should be under supervising in orderly. Therefore, the vulnerability measurements are so important.

ACKNOWLEDGEMENT

The author continues to review on the vulnerability literature and find out there are many different methods to calculate vulnerability. Each method is complicated. It must spend a lot of time on concentrating and enduring on it. After the review literature and questionnaire are done, the field research is included in the action plan. The author attempts to complete the research on vulnerability to poverty by extending the scope of study area covering the northeastern and northern region of Thailand. The enormous of household data collection can not be completed without the helping of team work of students of Khon Kaen University. The challenging of the research field is the long distance travelling. The difficulty is the finding out households, which are located far from each other. The first touch is the poverty-stricken households in the northeast and northern regions are poor more than the expected. The author thought immediately that time that it would be good to help people if there are a good policy implement or projects in the rural area. However, this research can't success without the supporting.

First of all, the author is indebted to Thailand Research Fund, Faculty of Management Science, Khon Kaen University and Kasetsart University at Sriracha campus for funding the underlying research.

Next, I also wish to thank for all research field teams for organizing the household survey. Thank for a good time to join together. I thank for the previous authors, who are written on the vulnerability, i.e. Stefan Dercon, Chaudhuri, Hoddinott, and so on, whose work incentive me to continue and apply the research in Thailand.

Lastly, I have a special thank for lovely Mac, Simon, family, relatives, and friends for metal support. This work is valuable for me because it's hard; challenge; pressure, and need the endurance. I take a lot of effort to push it finish. All long days and nights are in memories. Thank God to support my spirit.

Thitiwan Sricharoen

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ABSTACT

This research has the purpose to estimate vulnerability to poverty, specify vulnerable group and identify the strategies that households use to address the exposure of risks of rural farm household in Northeastern and Northern of Thailand. This study is conducted in four provinces of Thailand: Northeastern region (Kalasin and Buri Ram province); Northern region (Chiangmai, Nan province). Data of total 1,400 households was collected in the year of 2014. The qualitative analysis applies both descriptive and inferential statistics. The quantitative method applies the econometrics model.

Research results indicate that household size is between 4-6 persons. Each household have at least 1-2 students. Most of household occupations are farm related. Most of the household head's genders are male, age between 41 and 60 years. Main occupation of household head is agricultural work. There are more than one risk hit households in each period. It was about 80% of total household encounter with risks in last year. The adaptive strategy in last year was diversification of income source, hygiene and disease prevention, less risky production system, saving in cash and diversification of crops. The coping strategies that household mostly select to handle risks are reduce food consumption, dis-saving, credit from bank and credit from family and relatives. Household has high demand level on all policy that are: 1) price guarantee on agricultural product; 2) guarantee on fertilizer and factor price; 3) drug and gambler reduction and control policy; 4) funding circulates in village; 5) land allocation; 6) solving agriculture work problem; 7) solving unemployment problem; 8) water supply arrangement; 9) funding for farm work; and 10) road construction.

The result on vulnerability to poverty analysis is done by feasible generalized least squares (FGLS) method. Upon subjecting the data to analysis, the first stage of the OLS reveals that 48% of the variation in log consumption (a measure of well-being) can be explained by the following factor: household size square**,** education

of family member, education of household head, non-farm occupation of household head, disable person, number of unemployed family member, non-farm full-time employees (adult), own livestock, monetary asset, tangible asset value, total borrowing in last 12 months, expenditure on last five year risks, severity of risk, unemployment, theft of producer goods, crop loss by insect and plant disease, working disability by accident of household head, and theft of crops.

The relationship between predicted vulnerability and logarithm of consumption is analyzed in four cases, which are extreme poor, very poor, poor and non poor. Thailand poverty line in the year of 2014 was at 2,647 Baht per capita per month. The rural headcount ratio in terms of household expected consumption less than poverty line is at 28.79%. The result shows two groups of vulnerable households, which are, high and low vulnerable households. The estimates show that about 53.57% of households were vulnerable to poverty. The comparison of observed poverty status based on vulnerability index present that 75% of farm households are poor, whereas another 25% are non-poor. The classification of poverty status based on observed poverty status and vulnerability index can be classified into four groups. The first group is the poor household with high vulnerability to poverty, which can be counted for 9.64%. The second group is the household that is currently not poor but has high vulnerability to be poor in the future, amount for 43.93%. The third group is the poor household but has low vulnerability to poverty, account for 19.14%. The last group is not poor and low vulnerability to poverty, about 27.29%. A vulnerability profile by selected household characteristics is displayed. When concentrating to the non vulnerable group, northeastern region contain the higher percentage (59.69%) than the northern region. When comparing between non vulnerable and vulnerable group, it indicates that northern households are vulnerable with 62.57%. The analysis of the province, it depicts that Chiangmai, Nan, and Kalasin province have high percentage of vulnerable households. In overall number of households, non vulnerable households account for 46.43%, the rest are vulnerable household account for 53.57%.

JEL Classification: I3, C31, D3

Key word: Vulnerability to Poverty, Poverty, Risk Management, Feasible Generalized Least Square, Farm Household

EXECUTIVE SUMMARY

This research has the purpose to estimate vulnerability to poverty, specify vulnerable group and identify the strategies that households use to address the exposure of risks of rural farm household in Northeastern and Northern of Thailand. This study is conducted in four provinces of Thailand: Northeastern region (Kalasin and Buri Ram province); Northern region (Chiangmai, Nan province). Data of total 1,400 households was collected in the year of 2014. The research methodologies are qualitative and quantitative method. The qualitative analysis applies both descriptive and inferential statistics, such as the frequency, percentage, mean and standard deviation. The quantitative method applies the econometrics model.

Research results indicate that household size is between 4-6 persons. Each household have at least 1-2 students, which family must support school cost. Most of household occupations are farm related. Most of the household head's genders are male, age between 41 and 60 years. Main occupation of household head is agricultural work. Livelihood assets compose of natural assets, physical assets, and financial assets. The most popular social group is agricultural group (55%). There were more than one risk hit households in each period. Main risks hit household in last year were sudden moving away of working family member and breaking ties, crop loss from insect and plant diseases, theft of crops, land slide, loss of house from flood, fire, crop loss from weather, damage of house from weather, flood, and low crop production. It was about 80% of total household encounter with risks in last year. The highest adaptive strategy in last year was diversification of income source. The other strategies were hygiene and disease prevention, less risky production system, saving in cash and diversification of crops. The coping strategies that household mostly select to handle risks, which are reduce food consumption, dis-saving, credit from bank and credit from family and relatives. Household has high demand level on all policy that are: 1) price guarantee on agricultural product; 2) guarantee on fertilizer and factor price; 3) drug and gambler reduction and control policy; 4) demand on funding circulates in village; 5) demand on land allocation; 6) solving agriculture work problem; 7) solve unemployment problem; 8) demand for water supply arrangement; 9) demand on funding for their farm work; and 10) road construction.

Result of estimating vulnerability to poverty with OLS and FGLS, the results of the model for the log consumption equation and variance of the log consumption (OLS) reveals that 48% of the variation in log consumption (a measure of well-being) can be explained by the following factor: household size square**,** aged dependency ratio**,** family member: household size square, family members: below primary education, family members: primary education, family members: secondary education, family members: vocational education, family members: bachelor education, education of household head: below primary education, education of household head (level), literacy of household head: can not reads or write, non-farm occupation of household head, disable person, number of unemployed family member, non-farm full-time employees (adult), own livestock, monetary asset, tangible asset value, total borrowing in last 12 months, expenditure on last five year risks, severity of risk, unemployment, 2014, theft of producer goods, 2014, theft of producer goods, 2010-2013, crop loss (insect, plant disease), 2014, working disability (accident) of household head, 2010-2013, theft of crops, 2010-2013.

The relationship between predicted vulnerability and logarithm of consumption is analyzed in four cases, which are extreme poor, very poor, poor and non poor. Thailand poverty line in the year of 2014 was at 2,647 Baht per capita per month. The rural headcount ratio in terms of household expected consumption less than poverty line is at 28.79%. The result shows two groups of vulnerable households, which are, high and low vulnerable households. The estimates show that about 53.57% of households were vulnerable to poverty. The comparison of observed poverty status based on vulnerability index present that 75% of farm households are poor, whereas another 25% are non-poor.

The classification of poverty status based on observed poverty status and vulnerability index. Poverty status can be classified into four groups. The first severe group is the poor household with high vulnerability to poverty. This group can be counted only 9.64%. The second group is the household that is currently not poor but has high vulnerability to be poor in the future, amount for 43.93%. The third group is the poor household but has low vulnerability to poverty, account for 19.14%. The last group is safe group that is not poor and low vulnerability to poverty. This group has 27.29%.

A vulnerability profile by selected household characteristics is displayed. When concentrating to the non vulnerable group, northeastern region contain the

higher percentage (59.69%) than the northern region. When comparing between non vulnerable and vulnerable group, it indicates that northern households are vulnerable with 62.57%. The analysis of the province, it depicts that Chiangmai, Nan, and Kalasin province have high percentage of vulnerable households. In overall number of households, non vulnerable households account for 46.43%, the rest are vulnerable household account for 53.57%.

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LIST OF ABBREVIATIONS

%	Percent
Avg.	Average
BAAC	Bank of Agriculture and Cooperatives
BHT	Thai Baht (Thai Currency)
FGLS	Feasible Generalized Least Square
GLS	Generalized Least Square
HH	Household
i.e.	That is
NESDB	The National Economic and Social Development Board
NSO	The National Statistical Office
OLS	Ordinary Least Square
OTOP Group	One Tambon One Product Group
Rai	Land Measurement of Thailand (1 Rai = 1,600 Square Meters)
Sig	Significant
SPSS	Statistical Package for the Social Sciences
THB	Thai Baht

Chapter 1

Introduction to the Research Problem and Its Significance

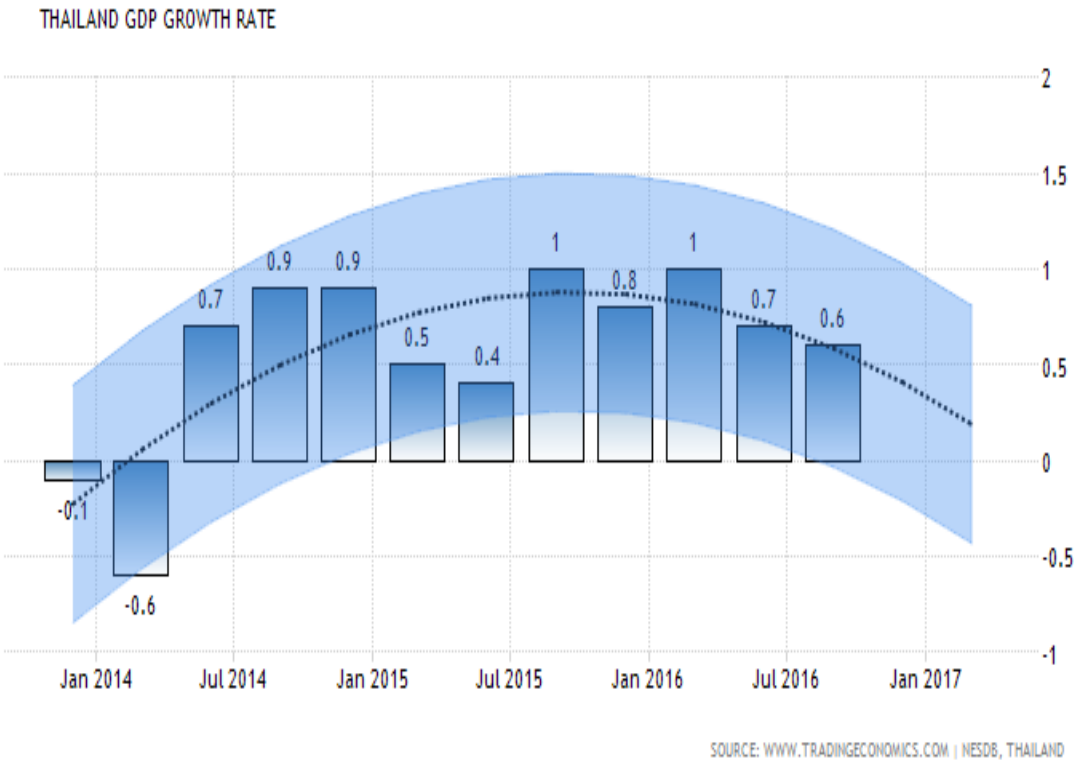
The purposes of this research are to describe household's characteristics; to provide an overview of risks; to points out the difference strategies on risk management; and to analyze vulnerability household. This is achieved by reviewing a range of literature reviews that are considered as representing the various social protection, risk and vulnerability.

1.1 Statement of the Problem

Over the last four decades, Thailand has made remarkable progress in social and economic development, moving from a low-income country to an upper-income country in less than a generation. Thailand's economy grew at an average annual rate of 7.5 percent in the boom years of 1986 to 1996 and 5 percent following the Asian crisis during 1999 to 2005. **Historically, economic growth has been the key driver of poverty reduction in Thailand.** However, GDP grew by less than 2 percent a year in 2014 and 2015. Looking ahead, the World Bank forecasts growth rate of Thailand is 2.9 to 3.3 percent for 2016-2018 (World Bank, 2016).

Figure 1.1 indicates that GDP Growth Rate in Thailand is expected to be 0.80 percent by the end of 2016, according to Trading Economics global macro models and analysts expectations. Looking forward, GDP Growth Rate in Thailand is estimated to stand at 0.90 in 12 months time. In the long-term, the Thailand GDP Growth Rate is projected to trend around 0.80 percent in 2020, according to our econometric models (Trading Economics, 2016).

Figure 1.1 Thailand GDP Growth Rate Forecast 2016-2020



Source: Trading Economics, 2016.

Poverty has declined substantially over the last 30 years from 67% in 1986 to 11% in 2014 during periods of high growth and rising agricultural prices. However, poverty and inequality continue to pose significant challenges, with vulnerabilities as a result of faltering economic growth, falling agricultural prices, and ongoing droughts. Poverty in Thailand is primarily a rural phenomenon. As of 2013, over 80 percent of the country's 7.3 million poor live in rural areas. Moreover, an additional 6.7 million were living within 20 percent above the national poverty line and remained vulnerable to falling back into poverty. Although inequality has declined over the past 30 years, the distribution in Thailand remains unequal compared with many countries in East Asia. Significant and growing disparities in household income and consumption can be seen across and within regions of Thailand, with pockets of poverty remaining in the Northeast, North, and Deep South (World Bank, 2016).

In Thailand, the poverty line has been utilized for assessing and monitoring the poverty situation. Thailand's poverty line was 2,575 baht per person per month in 2013, 2,647 baht in 2014 and 2,644 baht in 2015 (Bangkok Post,2016). The average poverty line from 2006 to 2015 indicated that northern and northeastern region had the lowest poverty line (Table 1.1).

Table 1.1 Poverty Line (Expenditure) by Region and Province: 2006 – 2015

Baht/Person/Month

Region and Province	2015	Average 2006-2015 (10 years)
Whole Kingdom	2,644	2,334
Bangkok	3,132	2,841
Central Region	2,827	2,539
Northern Region	2,377	**2,087**
Northeastern Region	2,355	**2,042**
Southern Region	2,724	2,400

Note: Poverty line as a tool for measuring poverty. The calculation of the cost or expense of the individual in the acquisition of food and basic services essential to life, Bueng Kan province starting with data year 2012.

Source: Data of The Household Socio-Economic Survey, National Statistical Office. Processing by the Development Indicators database and social NESDB, Office of The National Economic and Social Development Board.

One striking feature of poverty in Thailand is the large disparity between regions. Poverty is concentrated in the northeast where nearly a half of the country’s poor reside, and the north, with more than 20% of the poor. On the other hand, only 2% of the country’s poor live in Bangkok (Table 1.2).

Table 1.2 Number of Poor (Expenditure) by Region and Province: 2006 - 2015

Region and Province	Whole Kingdom	Bangkok	Central Region	Northern Region	Northeastern Region	Southern Region
2006	13,779.7	214.7	2,081.7	2,962.4	6,853.0	1,667.8
2007	12,718.3	269.4	2,022.1	2,961.0	5,823.0	1,642.8
2008	13,116.3	183.5	2,195.5	3,328.6	5,965.6	1,443.1
2009	11,623.9	190.5	1,971.8	2,699.7	5,275.0	1,487.0
2010	10,800.7	186.7	1,957.9	2,602.5	4,790.4	1,263.3
2011	8,751.9	647.9	1,905.1	1,869.5	3,425.9	903.4
2012	8,402.1	161.5	1,291.5	2,017.0	3,735.2	1,196.9
2013	7,305.1	90.4	1,014.9	1,937.1	3,271.2	991.5
2014	7,057.4	140.6	941.5	1,519.9	3,200.6	1,254.8
2015	4,847.2	173.7	827.3	1,007.8	1,929.8	908.6
Average 2006-2015 (10 years)	9,840.3	225.9	1,620.9	**2,290.5**	**4,427.0**	1,275.9
Percent of the Poor of Whole Kingdom		2.3	16.5	**23.3**	**45.0**	13.0

Note: Number of poor means the population has consumption expenditure per person per month less than the poverty line.

Source: Data of the Household Socio-Economic Survey, National Statistical Office. Data was processing by the Development Indicators database and social, Office of The National Economic and Social Development Board (NESDB).

Table 1.3 presents the average number of poor population in Northern and Northeastern region of Thailand between 2006 and 2015.The poverty is evident in the north, notably Chiang Rai, Chiang Mai and Nakhon Sawan. The number of poor has intensified in the Northeast, notably Nakhon Ratchasima, Buri Ram and Si Sa Ket province.

Table 1.3 Number of Poor (Expenditure) by Northern and Northeastern Region and Province: 2006 – 2015

Unit: Thousand Persons

Region and Province	Average 2006-2015 (10 years)
Whole Kingdom	9,840.26
Northern Region	2,290.55
Chiang Rai	296.20
Chiang Mai	216.33
Nakhon Sawan	205.22
Phetchabun	197.67
Tak	191.79
Lampang	157.09
Sukhothai	138.53
Phitsanulok	135.15
Mae Hong Son	129.45
Nan	118.93
Uttaradit	97.95
Kamphaeng Phet	90.11
Phayao	86.40
Phrae	83.85
Uthai Thani	60.72
Phichit	45.68
Lamphun	39.47
Northeastern Region	4,426.97
Nakhon Ratchasima	492.56
Buri Ram	486.50
Si Sa Ket	404.22
Ubon Ratchathani	382.13
Kalasin	358.47
Surin	257.97
Chaiyaphum	250.94
Khon Kaen	247.89

Table 1.3 Number of Poor (Expenditure) by Northern and Northeastern Region and Province: 2006 – 2015 (Continue)

Unit: Thousand Persons

Region and Province	Average 2006-2015 (10 years)
Sakon Nakhon	223.26
Nakhon Phanom	197.85
Roi Et	194.74
Maha Sarakham	179.14
Udon Thani	175.66
Yasothon	128.85
Nong Bua Lam Phu	106.73
Loei	103.02
Nong Khai	94.73
Mukdahan	74.86
Amnat Charoen	62.71
Bueng Kan	11.87

Source: Data of The Household Socio-Economic Survey, National Statistical Office.

According to the research of Somchai Jitsuchon and Kaspar Richter (2007 : pp. 243-244), Thailand's poverty maps are modified to compare the poverty among different regions of Thailand. Household survey data are combined with census data to derive poverty estimates at the district, sub district, and village levels across the whole of Thailand. Provinces with high poverty headcounts also tend to have large populations and, hence, a large number of poor people. The Northeast includes provinces with low poverty, such as Nong Khai, and Udon Thani, it also has the poorest provinces with the largest number of poor people, such as **Kalasin, Buriram, and Si Sa Ket**. This is an important difference with the North, the second poorest region in Thailand. In the North, the provinces with the highest poverty incidence, such as **Mae Hong Son and Tak** , tend to be remote and sparsely populated. Hence, they contribute only moderately to the national poverty rate because of low population density (Table 1.4).

Table 1.4 Head Count Index (Expenditure) by Region and Province: 2006 – 2015

Unit: Percent

Region and Province	Average 2006-2015	Level
Whole Kingdom	15.12	
Bangkok	2.77	Lowest
Northern Region	19.91	
Mae Hong Son	**62.46**	Highest
Tak	**37.07**	Highest
Nan	**26.42**	High
Chiang Rai	**25.72**	High
Uttaradit	22.30	Medium
Sukhothai	22.29	Medium
Lampang	21.21	Medium
Phetchabun	20.99	Medium
Phayao	20.66	Medium
Uthai Thani	20.40	Medium
Nakhon Sawan	20.40	Medium
Phrae	19.37	Medium
Phitsanulok	15.14	Medium
Chiang Mai	12.92	Low
Kamphaeng Phet	11.62	Low
Lamphun	9.90	Low
Phichit	8.27	Low
Northeastern Region	23.23	
Kalasin	**40.07**	Highest
Buri Ram	**37.77**	Highest
Si Sa Ket	**36.93**	Highest
Nakhon Phanom	33.52	High
Yasothon	26.18	High
Sakon Nakhon	25.65	High
Chaiyaphum	25.55	High

Table 1.4 Head Count Index (Expenditure) by Region and Province: 2006 – 2015 (Continue)

Unit: Percent

Region and Province	Average 2006-2015	Level
Surin	22.47	Medium
Nong Bua Lam Phu	22.25	Medium
Ubon Ratchathani	22.11	Medium
Mukdahan	21.94	Medium
Amnat Charoen	21.64	Medium
Maha Sarakham	21.28	Medium
Nakhon Ratchasima	19.53	Medium
Loei	18.71	Medium
Roi Et	17.84	Medium
Khon Kaen	14.37	Medium
Udon Thani	13.43	Low
Nong Khai	12.72	Low
Bueng Kan	3.34	New province

Note: Head Count Index calculated from the population with consumption expenditure below the poverty line divided by the total population multiplied by 100. Rank of the level of severity of poverty by headcount ratio refer to the research of Somchai Jitsuchton and Kaspar Richter (2007). Head Count Index equal to 0-7.4% means lowest poverty. 7.4-14.2% Low, 14.2-24.9% Medium, 24.9-35.2% High, >35.2% Highest.

Source: Data of The Household Socio-Economic Survey, National Statistical Office. Processing by the Development Indicators database and social, Office of The National Economic and Social Development Board (NESDB).

By all estimates and available definitions, the poverty of household in Northern and Northeastern region of Thailand is strikingly widespread and pervasive. It is more a rural phenomenon in Thailand with almost 90% of poor people is in rural area. Furthermore, this extreme poverty is aggravated by the high level of vulnerability and the large variance in levels of essential food consumption. Households experience poverty differently, and different aspects of poverty like deprivation, powerlessness, vulnerability, seasonally etc.

Vulnerability defines as the probability that a household will experience a future period of poverty. This sort of dynamic concern has behavioral implications separate from those of poverty. As a consequence, a measure that identifies vulnerable households is potentially quite valuable (Ghazala Mansuri and Andrew Healy, 2000).

Economists have long used measures of poverty to summarize the well-being of less fortunate households in a population. Typically either income or consumption expenditures are measured over some relatively short period of time (e.g., a year), and these are regarded as some kind of proxy for the material well-being of the household. Policies often explicitly crafted to reduce these poverty measures.

At the same time, economists have long recognized that a households sense of well-being depends not just on its average income or expenditures, but that risk plays an important role in determining welfare, particularly in households with fewer resources. To consider an extreme case, a household with very low expected consumption expenditures but with no chance of starving may will be poor, but they still might not wish to trade places with a household having a higher expected consumption but greater consumption risk. It seems desirable to have a measure of household welfare which takes into account both average expenditures as well as the risk households bear (Ethan Ligon and Laura Schechter, 2002).

Poverty is one of the chronic social problems of Thailand, and both the former and current government has set different strategies to eradicate it. Various interventions have been undertaken to strengthen the grassroots economy, as well as reduce the incidence of poverty. However, it is difficult to solve these problems due to

the complexity of the economy and society, and especially the vulnerability of the household itself. There is widespread poverty in Thailand, and many households suffer spells of chronic and transient poverty. Also, the ability of households to cross a given income threshold or poverty line is very small.

Poverty is dynamic. In solving poverty of Thailand, the policy makers need to understand the poverty in multidimensional views and solve the poverty problem direct to the target group. It is not only to help only people who are in the poverty group but it covers the people who are expecting to fall in poverty in the near future or in the vulnerability group. Therefore, this research focus on identify the vulnerability to poverty group in the northern and northeastern of Thailand (Thitiwan Sricharoen, 2006).

1.2 Objectives

1.To estimate vulnerability to poverty of rural farm household in Northeastern and Northern of Thailand.

2.To specify vulnerable group in these rural region of Thailand.

3.To identify the strategies that households use to address the exposure to various sources of risks.

1.3 Expected Benefits

1. To understand the information about the risks, that occurs to households.

2. To perceive which households are falling into the vulnerable group in Northern, and Northeastern region of Thailand.

3. To recognize the policy implementation that households desire for government assistance.

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Chapter 2

Literature Review

The theoretical reviews in this part of the study consist of the concepts and definitions of vulnerability to poverty. In connection with this definition such as vulnerability in relation with the concept of the future poverty will be briefly discussed. In addition, the related literatures will be conceptualized about measuring vulnerability. Thereafter, the results from empirical researches will be summarized. The next part present risks and risk management. Finally, conceptual framework of the research will be described under this section of the study.

2.1 Vulnerability to Poverty

Vulnerability to poverty can be defined in different ways. According to a recent review conducted by Guimaraes (2007, 236-239), most definitions of vulnerability include the following notions: (i) uncertain events (shocks) may affect individuals and households differently, and (ii) the probability that individuals and households will fall into poverty after a shock has occurred depends on the varying degrees to which they are exposed to risk and their preparedness to react of risk. For example, Heitzmann et al. (2002, 6) define vulnerability to poverty as “the forward-looking state of expected outcomes, which are in themselves determined by the correlation, frequency and timing of realized risks and the risk responses. Households are vulnerable if a shock is likely to push them below (or deeper below) a predefined welfare threshold (e.g., poverty)”. While including both of the above notions, definitions of vulnerability to poverty fall into two types: the first relates to a potential loss of welfare in the future, i.e., vulnerability as uncertain welfare, while the second views vulnerability as the inability to respond to shocks due a lack of individual, social, institutional, or location assets, i.e., vulnerability as a lack of entitlements (Guimaraes 2007, 240-247). Both types of definition stress different aspects of vulnerability to

poverty that are nevertheless strongly related to each other. The first focused on the effects of a shock on the future level of income. More precisely, it looks at the probability that income and consumption will fall below a certain threshold. With its emphasis on income and consumption, it stresses the monetary outcome of shocks. The second focuses on individual characteristics and household assets (e.g., education, health, land ownership, social status) that enable individuals or households to prepare for a shock or to respond effectively to shocks. Thus, it looks at factors that determine the capability to deal with shocks. Important terms in the context of vulnerability are risk, shock, and strategy for risk management. Risk is to be understood as a probability distribution of uncertain and potentially harmful events. If such an event occurs and pushes a household below the poverty line it is called a shock. It is useful to distinguish between idiosyncratic risks/shocks (e.g., illness, death, divorce), which only concern single individuals and households, and covariate risks/ shocks (e.g., floods, droughts, earthquakes, economic crises), which affect a large number of people in villages, regions, nations, or even larger units (Lohmann, C., and I. Liefner 2009, 142).

Vulnerability in economic literature is defined as an outcome of a process of household responses to risks. The risk response outcome framework may be examined in terms of poverty dynamics (poverty status: transition in and out of poverty), food security (probability of not meeting food needs), environment (survival loss), health (malnourishment), disaster management (welfare loss) etc. Thus, vulnerable households are those that are in, or are very close to, a state of destitution as a result of the cumulative process of a particular risk and household response.

The notion of vulnerability in the context of poverty is not as developed as the meaning and measurement of poverty. For the purpose of empirical assessments and quantifications, the working concept of vulnerability, as described in Alwang et al. (2001), is “a household is said to be vulnerable to future loss of welfare below socially accepted norms caused by risky events. The degree of vulnerability depends on the characteristics of the risk and the household’s ability to respond to risk. Ability to respond to risk depends on household characteristics- notably their asset base. The outcome is defined with respect to some bench mark- a socially accepted minimum reference level of welfare (e.g., a poverty line). Measurement of vulnerability will also

depend on the time horizon: a household may be vulnerable to risks over the next month, year, etc.

2.2 Measuring Vulnerability

Vulnerability is difficult to measure: anticipated income or consumption changes are important to individuals and households before they occur and even regardless of whether they occur at all as well as after they have occurred. The probability of falling into poverty tomorrow is impossible to measure, but one can analyze income and consumption dynamics and variability as proxies for vulnerability (World Bank, 2000). However, constructing such a measure of vulnerability implies a number of steps. First, the time horizon over which one will assess the potential of future shortfalls must be defined. The probability that a person will become poor one period ahead will be focused on. Second, in assessing vulnerability, an indicator of well-being must be chosen. Consumption is taken as indicator of well-being. Other indicators of well being include educational achievements, health outcomes, malnutrition. Third, an ex-ante probability distribution of ex-post outcomes regarding well being indicators must be estimated. Fourth, a threshold for well-being must be defined, i.e. a consumption poverty line. Fifth, to classify households in vulnerable and non vulnerable groups, a probability threshold such that a household will be considered vulnerable if its probability of shortfall exceeds must be determined (Christiaensen and Subbarao, 2004).

In the area of vulnerability there is an emerging body of literature that intends to present a summary measure of vulnerability (Table 2). Various measures have been proposed, including: vulnerability as expected poverty (VEP) (Chaudhuri et al., 2002; Christiaensen and Subbarao, 2004; Pritchett et al., 2000), vulnerability as low expected utility (VEU) (Ligon and Schechter 2002, 2003) and vulnerability as uninsured exposure to risk (VER) (Tesliuc and Lindert, 2002).[1]

[1] See Hoddinott and Quisumbing (2003) for a detailed discussion of these measures.

In the vulnerability as expected poverty (VEP) approach, vulnerability is defined as the probability that a household will fall into poverty in the future. Specifically, welfare is defined in terms of consumption so that vulnerability of household *h* at time *t* (V_{ht}) is the *probability* that the household's level of consumption at time *t* + 1 (c_{ht}+1) will be below the consumption poverty line (Chaudhuri, Jalan, and Suryahadi, 2002; and Christiaensen and Subbarao, 2004).

Vulnerability as low expected utility (VEU) measures the welfare consequences of risk. Vulnerability is defined with reference to the difference between the utility derived from some level of certainty-equivalent consumption at and above which the household would not be considered or vulnerability of the household equal utility of some certainty-equivalent consumption minus expected per capita consumption expenditures. Vulnerability is analogous to a poverty line and the expected utility of consumption. Vulnerability depends not only on the *mean* of a household's *consumption*, but also on *variation in consumption*. The balance between poverty and risk in a measure of vulnerability can decompose the measure into distinct components reflecting poverty and risk. This risk measure can decomposed into two distinct measures of risk, one aggregate, and the other idiosyncratic (Ligon and Schechter, 2002).

Vulnerability as Uninsured Exposure to Risk (VER) indicated that shocks could be either covariant (as a rainfall shock) or idiosyncratic, such as illness. In the absence of effective risk management tools, such shocks impose a welfare loss to the extent that they lead to a reduction in consumption. VER is similar to the VEP and VEU approaches in that it is concerned with assessing welfare and welfare losses in a world where some risks are at best partially insured. It differs from VEP measures in that it is backward looking; it is an *ex-post* assessment of the extent to which a negative shock caused a welfare loss rather than an *ex-ante* assessment of future poverty. Moreover, it differs from VEP and VEU measures in that there is no attempt to construct an aggregate measure of vulnerability. VEP and VEU measures make reference to a benchmark for a welfare indicator and enumerate a probability of falling below this benchmark (Tesliuc and Lindert, 2002) (table 2.1).

Table 2.1 Approach to Measure Vulnerability

	Vulnerability as expected poverty	**Vulnerability as expected low utility**	**Vulnerability as uninsured exposure to risk**
Definition	Vulnerability of household h at time t, Vht is the *probability* that the household's welfare (consumption) at time t + 1 (c_{ht+1}) will be below the benchmark (consumption poverty line, z): $V_{ht} = Pr(c_{ht+1} = z)$	Vulnerability is the difference between the utility derived from some level of certainty-equivalent consumption, zCE at and above which the household the household would not be considered vulnerable and the expected utility of consumption. $V_h = U_i(zCE) - EU_h(c_h)$ or $V_h = [U_h(zCE) - U_h(Ec_h)] + [U_h(Ec_h) - EU_h(c_h)]$	An *ex-post* assessment of the extent to which a negative shock caused a welfare loss
How calculated	1. Predict consumption for each household. 2. Derive the variance of consumption for each household. 3. Make assumptions regarding the distribution of consumption, the poverty threshold and the threshold probability value above which a household is considered vulnerable.	1. Make an assumption regarding the functional form regarding U. 2. Specify a conditional expectation of consumption Ec_h as a function of covariate and idiosyncratic/household characteristics 3. Calculate the two parts of the vulnerability measure (the risk component can be further broken down into covariate, idiosyncratic and unexplained/measurement error components).	1. Define $\Delta \ln c_{htv}$ as the change in log consumption between t and = t-1, $S(i)_{tv}$ denote covariate shocks, $S(i)_{htv}$ idiosyncratic shocks, D_v be community dummy variables, X household characteristics, *d*, *b*, g, d, and l are parameters to be estimated and $\Delta\varepsilon_{htv}$ is the error term 2. Estimate: $\Delta \ln c_{htv} = \lambda\, S(i)_{tv} + b\, S(i)_{htv} + d\, D_v + dX + \Delta\varepsilon_{htv}$

Source: Hoddinott and Quisumbing (2003).

2.3 Empirical Studies on Vulnerability to Poverty

There are many other approaches to estimate vulnerability. **Dercon and Krishnan (2000, pp.44–5)** measure 'vulnerability' in rural Ethiopia by *estimating determinants of consumption levels* and then predicting the degree of households suffering severe consumption shortfalls given particularly poor rainfall (less than half the long-term mean). Vulnerable populations are those that have a risk of falling below the poverty line. Their estimates suggest that the 'vulnerable' population (those that have a risk of falling below the poverty line) is 40 to 70 per cent higher than the observed poverty rate. Another work of **Dercon (2001)** researched on the assessing vulnerability to poverty. The paper presents a framework to describe and anlyse poverty, risk and vulnerability. It discusses the possibilities to measure vulnerablity to poverty, with an emphasis on quantitative techniques, and discusses some of the recent challenges and issues related to a policy to reduce vulnerability.

While, **Pritchett et al. (2000)** estimate the *standard deviation of consumption changes in the cross-section* and then, given that variations, predicting households which have the income level below 50% are likely to be poor next period. The idea is clear and not particularly demanding of data (a two-year panel is sufficient). A limitation is that the problems with the standard deviation are unavoidable in this framework as well. In using the bootstrap Monte Carlo method, it is possible to avoid relying on the standard deviation in this way.

Kamanou and Morduch (2002) measure vulnerability to poverty by using the 1985-88 rounds of the Cote d'Ivoire Living Standards Survey to draw on related studies of consumption patterns, poverty, and household behaviour. Poverty line had been used. Vulnerability is measured by comparing *standard deviations of consumption and income changes*. Households are more vulnerable if standard deviations of past consumption changes are higher.

Another approach was presented in the **World Development Report (2000/2001)**, vulnerability is measured by *estimating assets* rather than consumption patterns. The idea flow from what we know about coping mechanisms: having more

assets generally makes coping easier. Vulnerability is associated with the ability to smooth idiosyncratic shocks, more assets generally makes coping mechanisms easier. An asset-based measure yields useful information about coping mechanisms conditional on shocks, but extra information is required to inform about the distribution of expected shocks.

Hence, measures of vulnerability are being *developed.* Work on *poverty dynamics*, including on transient poverty has highlighted the limitations of current static poverty measures. However, these alternative approaches remain *backward-looking*. They describe the past consequences of shocks and fluctuations. While information on the characteristics of those experiencing poverty transitions may assist in identifying those most at risk for consumption shortfalls, this is not quite the same as measuring vulnerability to poverty. Such a measure should be *ex-ante*, i.e. forward-looking. One could define 'vulnerable households' as those liable to fall under an agreed poverty line over time with a particular high probability. Measures are proposed in **Christiaensen and Boisvert (2000), Chaudhuri et al. (2001), Pritchett et al. (2000), and Alwang, et al. (2001)**. More in general, beyond a headcount of vulnerability, one could construct *measures of vulnerability for different dimensions of poverty* (such as health or nutrition); or measures taking into account the extent to which households are likely to fall below the poverty line **(Kamanou and Morduch (2001)**. Some have proposed measures purely based on cross-section household data **(Chaudhuri and Datt., 2001)**, but the assumptions needed to identify common and idiosyncratic risk are very strong **(Dercon, 2002)**.

Amin et al. (1999) use econometric methods for measuring the efficiency of informal insurance to form a measure of vulnerability. In their work, 'vulnerability' is associated with consumption fluctuations associated with imperfect risk sharing. There is the study of two villages in rural Bangladesh, a household is considered vulnerable in proportion to the extent to which income shocks translate into consumption shocks.

Skoufias, E. and A. R. Quisumbing (2002) investigate linkages among the degree of consumption insurance, households' vulnerability to poverty, and household use of formal and informal coping mechanisms in five different countries-Bangladesh, Ethiopia, Mali, Mexico and Russia. Building on the recent literature of consumption

smoothing and risk sharing, the degree of consumption insurance is defined by the degree to which the growth rate of household consumption co varies with the growth rate of household income.

A.S. Oyekale (2004) study rural households' vulnerability to HIV/AIDS and economic efficiency of food production in the rainforest belt of Nigeria. The ordinary least square method was used to analyze the socio-economic factors influencing vulnerability. The determinant on vulnerability are age of house head, primary occupation, marital status, household size, years of schooling, distance of public health center and farm income.

Martha Oumer (2004) study on vulnerability of female headed households to livelihood insecurity in rural Ethiopia: a case study of Adda district. This study investigates the relationship between vulnerability to livelihood insecurity and gender in Ethiopia and identifies the major determinants of household's vulnerability and their coping strategies. Both qualitative and quantitative methods are applied and a variety of research techniques, ranging from participant observations and key informant interviews to semi-structured and structured interviews are combined to better understand the concept of vulnerability and its covariates factors. Seventy households, half of them female-headed, have been selected from Adda district which is in Oromiya regional state of Ethiopia. Descriptive analysis, statistical tests, as well as logistic regression have been used to analyze the data.

Results indicate that though there are no significant differences between female headed households and male headed households in terms of access to resources (notably: land, labor and livestock), the majority of the female headed households were food insecure. It is therefore concluded that female and male-headed households have equal access to productive resources in Adda district. Findings from the logistic regression show that the gender of the household's head and the household size are two major determinants of household's vulnerability. A household headed by a woman has a higher chance of being vulnerable. Likewise, the larger the household size, the higher the probability that this household is vulnerable. The fact that vulnerability encompasses many factors explains why female headed households are more vulnerable even if they have equal access to resource. Additionally management of the resource is also a determining factor. Further results suggest the

surveyed households make use of diverse strategies to cope with different risks and reduce the effects on hardship. The most important coping strategies are found to be ‘Reduction of food consumption’, ‘Consumption of savings’, ‘Borrowing from relatives or friends, ‘Withdrawal of children from school’, and ‘Migration in quest of employment’. The effectiveness of these strategies is however, questionable, as they threaten the long-term stability of the households. To reduce the vulnerability of female headed households, it is recommended that interventions should aim at improving or initiating alternative income-generating activities or strengthening coping strategies that are economically and environmentally sustainable. Potential areas are small scale enterprises. Furthermore, an extensive extension program is necessary to strengthen the impact of these interventions and provide female headed households with necessary managerial and technical skills.

The study by **Ninno et all (2006)** use data from the “Household Income and Expenditure Survey” (HIES), which is nationally representative and traditionally used to determine poverty indices or aggregates in Pakistan. They chose procedure developed by Chaudhauri et al (2002) to assess the vulnerability to poverty from cross sectional data, mainly due to the absence of panel data representative of the whole of Pakistan. The authors found that “the estimates of vulnerability (in 2001), instead, range between 47 to 67 percent, depending on the choice of the time horizon of the analysis and the threshold of vulnerability”. About one third of the population is vulnerable due to a low level of resources, regardless of the time horizon, while for 24-34 percent of the population, vulnerability to poverty stems from a high volatility of consumption.

Satu Kumpulainen (2006) studied on vulnerability concepts in hazard and risk assessment under The ESPON Hazards project. Vulnerability is an essential part of hazards and risk research and refers to the susceptibility of people, communities or regions to natural or technological hazards. The ESPON Hazards project defines vulnerability as combination of damage potential and coping capacity, but it also appreciates the versatile nature of vulnerability by acknowledging three vulnerability dimensions (economic, social and ecological). To measure vulnerability, indicators that cover both damage potential and coping capacity, as well as the range of all three vulnerability dimensions were used. Weighting and combining the feasible indicators

created an integrated vulnerability index and an integrated vulnerability map to depict the vulnerability of all regions of the EU 27+2. The map was further combined with an aggregated hazards map to create the aggregated risk map of Europe.

Sushil Pandey, and et.al. (2006) research on Coping with Drought in Rice Farming in Asia: Insights from a Cross-Country Comparative Study. Drought is a major constraint affecting rice production especially in rainfed areas of Asia. Despite its importance in rice growing areas, the magnitude of economic losses arising from drought, its impact on farm households and farmers' drought coping mechanisms are poorly understood. This paper provides insights into these aspects of drought based on a cross-country comparative analysis of rainfed rice growing areas in China, India and Thailand. In this study, both indicators (rainfall-based and government-declared) of drought were used for estimating the probability of drought. The analysis of the household-level impact of drought and farmers' coping mechanisms was conducted using cross-sectional data from a survey of farm households. For this, households were selected from study areas using a stratified random sampling approach. The research found that the economic cost of drought is found to be substantially higher in eastern India than in the other two countries. Higher probability and greater spatial covariance of drought and less diversified farming systems with rice accounting for a larger share of household income are likely to be the main reasons for this higher cost of drought in eastern India. Farmers deploy various coping mechanisms but such mechanisms are largely unable to prevent a reduction in income and consumption, especially in eastern India. As a result, welfare consequences on poor farmers are substantial with a large number of people falling back into poverty during drought years. The overall implications for technology design and for policy improvements for drought mitigation and drought relief are discussed in the light of the empirical findings of the study.

Thitiwan Sricharoen (2006) research on vulnerability and risk management in norteastern of Thailand. The survey underlying this study was conducted in Tambol Pong Yang, Mae Rim, which is a mountainous district of Chiangmai province. Nine villages were interviewed. Four of the villages where populated by Hmong hill tribes. The random sample consists of 200 households: 142 local northern and 58 Hmong households. The result demonstrated that 42% of the

populations in the study area were poor in 2003 and the majority of therse wre chronically poor (11% of the population). Almost one-third of the population is transitorily poor i.e., 30.5% of the total population. It is 43.5% of households are in the vulnerable group, while the rest of households (56.5%) are in the non-vulnerable group.

Fiona Miller (2008) reviews on the literature related to vulnerability and poverty reduction. It notices that in most poverty reduction strategy papers (PRSPs) there is no separate analysis of vulnerability. It is considered as a dimension of poverty or included in the definition of poverty. Exposure to natural hazards is generally mentioned but rarely is there detailed discussion of disasters, their causes, impacts, mitigation efforts or wider connection to development. While vulnerable groups are almost always identified, they are often presented as static categories and not linked to a discussion of particular processes or circumstances that lead to labeling them as 'vulnerable'. There may be some detailed discussion of environmental issues, but often the link between vulnerability and environmental issues is not elaborated in depth.

Due to the macro and aggregated analysis often contained in many PRSPs there is little reference to livelihood groups and livelihood strategies. There is very limited reference given to the role of institutions and other resource actors in influencing the context for vulnerability. Limited attention is given to the underlying causes of vulnerability, and most PRSPs only refer generally to reducing vulnerability in their proposed strategies, with few providing a detailed discussion. On the one hand, policy and actions, such as diversification, are widely recognized as contributing to poverty and vulnerability reduction, while on the other hand less than half of the reviewed PRSPs consider issues of socio-economic equity as being important to building resilience.

Isabel Günther and Kenneth Harttgen (2009) study on "Estimating Households Vulnerability to Idiosyncratic and Covariate Shocks: A Novel Method Applied in Madagascar". Households in developing countries are frequently hit by severe idiosyncratic and covariate shocks leading to high consumption volatility. A household's currently observed poverty status might therefore not be a good indicator of the household's general vulnerability to poverty. In the recent years, there has been

an emerging literature on the concept and empirical analysis of vulnerability. But because of strong data requirements for vulnerability analysis and limited availability of panel and shock data for developing countries, static poverty analysis still dominates empirical vulnerability studies. In this paper propose a simple method to empirically assess the impact of idiosyncratic and covariate shocks on households' vulnerability, which can be applied in a wide context as it relies on more commonly available cross-sectional or short panel data. The research methodology applied mean and variance of consumption, multilevel analysis, idiosyncratic and covariate variance to outline the vulnerability analysis in Madagascar. Result show that covariate shocks have a relatively higher impact on rural households, whereas idiosyncratic shocks have a relatively higher impact on urban households' vulnerability.

Carsten Lohmann, and Ingo Liefner (2009) research on Location, Non-agricultural Employment, and Vulnerability to Poverty in Rural Thailand. This research has the purpose to identify the opportunity to secure regional non-agricultural wage-employment (RNAwE) as a means of reducing vulnerability. This data set was acquired from a multidisciplinary research project on vulnerability to povety in rural areas in Thailand and Vietnam. This study uses only that part of the survey that was conducted in 222 villages in these provinces of northeast Thailand, covering a representative dataset of 2,186 households that were selected through a multi-stage process of cluster random sampling. Data were selected in three provinces (Burriram, Ubon Ratchathani, and Nakhon Phanom), within the northeast of Thailand because this region's incidence of poverty (headcount) of 16.8% is the highest in Thailand against a country average of 9.6% in 2006 (NESDB 2007). Results found that there are significant differences between peri-urban and rural-remote households regarding transport costs, travel times, participation in RNAWE, and total household income.

Yet, to this date, satisfactory vulnerability indicators have not been developed. First, there are conceptual problems, using a measure based on the variability of consumption (or another outcome indicator), rather than an ex-ante measure that takes into account the cost of taking risk reducing measures. **Gunning and Elbers (2003)** deal with this aspect by constructing a stochastic, structural dynamic model of a household's inter-temporal consumption and savings decisions. The measure of vulnerability is theoretically well defined, but practically hard to

implement. Second, there are large numbers of methodological and econometric issues (a discussed in Hoddinott and Quisumbing, 2003). **Ligon and Schechter (2004)** conduct Monte Carlo experiments designed to explore the performance of different vulnerability indicators proposed in the economic literature, under different assumptions about the underlying economic environment. They find that when the environment is stationary and consumption is measured without error, the best estimates are the ones proposed by Chaudhuri (2002). If the vulnerability measure is risk-sensitive, but consumption is measured with error, the estimate proposed by Ligon and Schechter (2003) generally performs best. However, when the distribution of consumption is non-stationary and there is measurement error, all estimators perform poorly. But since measurement error is a reality and to assess whether the distribution is non-stationary, relatively long time series are needed, this implies that methodologically sound *practical* applications may still be some time away, even though work in this field is rapidly expanding **(Hoogeveen, Tesliuc, Vakis and Dercon, 2004)**.

2.4 Risk and Risk Management

Poor rural households are vulnerable.[2] Their livelihood systems are often so fragile and finely balanced that a small misfortune can destabilize the households for many years. Crises and shocks which either requires immediate outlays of cash or which diminish already low and irregular income, or both, have long-term effects on livelihood strategies and welfare (World Bank and DFID, 1999).[3] Chambers and Conway (1992) were among the first to give a scholarly definition of livelihood. In this research context, livelihood is therefore defined as:

"The capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Chambers and Conway, 1992: 7-8).

The sustainable livelihood framework can be used as an analytical tool to identify and assess internal and external factors to the household that affect its socio-economic survival.

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[2] The concept of vulnerability has been mainly used to describe the risks to the livelihood in situations of covariate risks, such as natural disasters (Bohle, 1993; Chambers, 1989). Nevertheless, it can be equally applied to idiosyncratic risks, such as ill health (Harma *et al.,* 2000). Vulnerability refers to "the relationship between poverty, risk and efforts to manage risk" (Alwang, Siegel and Jorgenson, 2001: 1).

[3] Already seventy years ago, Tawney (1932: 77) indicated that "... the position of the rural population is that of a man standing permanently up to the neck in water, so that even a ripple is sufficient to drown him".

Livelihood strategies will differ with regard to whether people have to deal with gradual changes or sudden shocks and crises. Adaptive livelihood strategies seek to mitigate risks through livelihood adjustment (e.g. family planning or accessing insurance) or change and diversification of income creating activities.[4] This type of strategy is rather deliberate and adjusts the livelihood to long-term changes and challenges (i.e. socio-economic trends). Coping strategies (e.g. migration, sale of livestock or reduction of consumption expenditures) seek to minimize the impact of livelihood shocks and are a short-term response to sudden or periodic shocks (Carney et al. 1999, Korf, 2002).[5] Coping strategies, although providing some protection in the short run, limit the poor's long-term prospects of escaping poverty (Kanbur and Squire, 2001). Holzmann and Jorgenson (2000) differentiate adaptive livelihood strategies further into risk reducing and risk mitigating strategies. While the so called risk reducing strategies aim at reducing the probability of a shock occurring, the risk mitigating strategies look at reducing the impact of a shock on the livelihood.

Not all types of risks can be insured against, i.e. only risks with a known probability of occurrence and a high degree of specificity are suitable for insurance (Litzka, 2002). In agriculture, particularly incidents which occur more frequently (quasi-secure incidents) and which have a covariate risk character (e.g., droughts, floods, animal epidemics etc.) are therefore normally insured against, albeit at relatively high pre-shock costs for the farmers. Of the idiosyncratic risks, health risks are sought to be insured against most frequently (Jutting, 1999). Farmers thus face the decision problem whether or not to invest in insurance, which is a function of risk.

[4] Insurance reduces the uncertainty for the insured, i.e. insurance covers future financial disadvantages that are the result from clearly defined damages or losses against a priori fixed premium (Schulte-Noelle, 1995).

[5] The other two livelihood strategies not mentioned in the main body of the text are the accumulation strategy and the survival strategy. The first refers to strategies that seek to increase income flows and stocks of assets and the latter strategies that aim at preventing destitution and death.

Table 2.2 depicts frequently quoted risks in northern rural Thailand. Obviously, these risks apply also to other rural livelihoods in developing countries. The risks are divided in human, economic and asset risks; some of them are associated to the idiosyncratic (individual) and some to the covariate risk category. If a risk becomes effective and creates a shock or crisis that affects just one person (one family/household), it is classified as an individual risk. Correspondingly, risks changing the livelihood of a group of people bound together, e.g. by the same profession (e.g. farming) or the same region of residence, are called covariate risks.[6]

[6] Covariance is the tendency for either i) many households to be affected by a risk at the same time or ii) several risks to consistently occur together. Covariant or mass risks differentiate crucially from individual risks: (1) they tend to be difficult or impossible to predict; (2) they affect many people at the same time, thus hampering the ability of risk-pooling mechanisms to protect against these risks; and (3) the cost associated with mass, covariant risks tends to be significantly greater than that resulting from other risks (Brown and Churchill, 1999; Dercon, 2002).

Table 2.2 Covariate and Idiosyncratic Risks of Vulnerable Rural Livelihoods

		Type of risks	Effects
Individual Risks	Human risks	Illness	Costs of treatment and reduced income through reduced labor
		Death of working family member	Funeral expenses and loss of income from labor
		Alcoholism, drug addiction, gambling	Expenditures of addiction and reduced income through reduces labor
Covariate Risks	Economic (harvest) risks	Storage loss: varmints and other pests	Reduced income
		Crop loss: landslide	Reduced income
		Crop loss: weather (floods, droughts, typhoons, storms and high winds)	Reduced income
Individual Risks	Economic (non-harvest) risks	Domestic economic crisis	Reduced income through lack of trade and loss of employment etc.
		Animal epidemic	Reduced income, assets and security.
		Death of animals	Reduced income, assets and security.
		Failure of investment	Reduced income, failure to repay debts.
		Unemployment	Reduced income
	Asset risks	Damage of housing	High expenditure
		Theft	Loss of assets and costs of replacement

Source: Extended from WORLD BANK and DFID (1999).

Of all of the risks listed in Table 2.2, the human risks such as illness, death of a main laborer, or the economic risks such as livestock loss and failure of an investment or, even worse, a debt-financed investment appear to be particularly prevalent and destabilizing (World Bank and DFID 1999). Because farmers are aware of these risks, they would like to reduce the uncertainty. Cohen and Sebstad (2003) stated that there exists a particularly pronounced desire to ensure debt-financed investments. Among the human risks, illness, particularly of the main worker is a risk that is attractive for farm households to be insured (Gumber and Kulkarni, 2000). Providing direct or indirect insurance services (indirect in the sense that they are linked to loans) that protect clients of the formal financial sector against losses associated with idiosyncratic risks is a win-win situation and in the best interest of both sides (Barbin, Lomboy and Soriano, 2001; Cohen and Sebstad, 1999). Nevertheless, a formal agricultural or, more general, rural insurance market hardly exists in Southeast Asia (Vandeveer, 2000). Yet, the Bank for Agriculture and Agricultural Co-operative (BAAC) in Thailand is in the process of expanding its supply-driven micro-credit approach to include not only micro-savings services but also micro-insurance. So far, however, rural farm households in Thailand have to rely mainly on informal mutual aid schemes of social networks to reduce their risks.

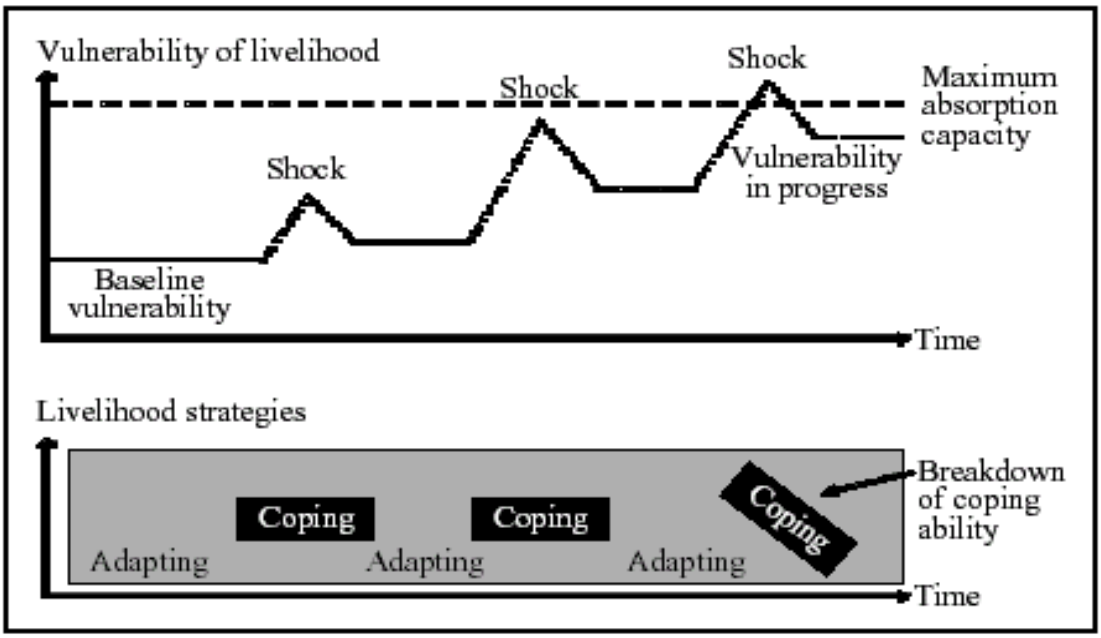
Figure 2.1 illustrates how the exposure to shocks and crises affects the vulnerability of livelihoods and how households adapt to and cope with these externally imposed conditions. The concept of vulnerability and the related adaptive and coping strategies can be used to assess which shocks, crises and which institutional changes in the socio-economic framework influence the livelihood of the exposed population in which way. Starting from baseline vulnerability, short-term shocks (e.g. natural disasters, death of animal) suddenly upset the precarious equilibrium and increase the current vulnerability level. People adopt strategies in response to the livelihood crisis. The immediate response relates to coping strategies.[7]

[7] The World Bank and DFID (1999) mention formal and informal borrowing, selling assets, liquidating savings, withdrawing children from school, selling women and girls for marriage and babies for adoption, reducing consumption, and collecting food or firewood from the forest as typical coping strategies. However, access to formal or informal lending facilities depend on social and financial capital, both of which has to be developed over a longer timeframe and could thus equally counted to the adapting strategies.

The system recovers and eventually, households employ new adapting strategies to develop a new portfolio of livelihood activities. The revision and expansion of adapting strategies can include the adaptation of existing informal local mutual-aid agreements and/or the development and adoption of formal or semi-formal micro insurance schemes for certain risks. Figure 2.1 shows that the livelihood concept is dynamic in that it attempts to understand change and complex cause-and-effect relationships (Murray, 2001).

Without formal insurance and with little income from only a few sources, households that experience shocks and crises end up either taking loans, restricting expenditures (including food or education), or selling assets to cover subsistence in the short term, that is they cope with risk. Taking loans usually raises future expenditures. Even where loans are taken from friends and relatives, there may be the requirement for some kind of reciprocation in the future. Selling assets, e.g. livestock, constrains future income generation and limits the household's capacity to withstand future shocks, thus their vulnerability increases.

Figure 2.1 Effects of Shocks on the Vulnerability of Livelihoods



Source: Adapted from Korf (2002: 3)

Note: During a period of shock, the household applies coping strategies as an immediate reaction. Empirical evidence suggests that coping strategies leave the household with a higher level of livelihood vulnerability as compared to the time before the shock. If the household reaches its maximum absorption capacity of vulnerability, coping strategies may not suffice anymore to carry it over the difficult times. Adapting strategies have the potential to adjust the household's livelihood to a changed vulnerability environment and even decrease its level of vulnerability. They are normally applied in between shocks.

Serageldin and Grootaert (1999) state that the gradual replacement of informal associations and networks with semi-formal and formal impersonal market mechanisms are a good example for development. If the development path is supported by strong structures and institutions, anonymous markets will over time replace the 'named' transactions within networks such as informal insurance networks

(that is, whereby the number of members in each network is small and they know each other by name). In this situation, all participating individuals gain (Stiglitz, 1999).[8] No matter how good the social capital or, in other words, the informal insurance mechanisms, members of those networks are unable to protect themselves from covariate risks (Kanbur and Squire, 2001). Especially the poor have less access to social capital for post-risk management if it requires time and in-kind investments (Putman, 1993). Table 2.3 gives an overview of formal and informal mechanisms for risk management.

Failure of an investment, especially when credit-financed, can leave a household in and extremely vulnerable position. If the investment was financed by a loan and directed towards livestock that represents one of the few high-value productive assets found in the region, the shock to the household is even more severe. The loss of livestock can have serious consequences on a rural household's livelihood. Livestock death and disease is considered to be one of the main factors contributing to poverty. In the absence of cash savings, small livestock are commonly used as a form of in-kind savings to be divested when cash is needed. Death of chickens and pigs therefore make it more difficult to level the unstable income flux and expenditure over the course of the year (World Bank and DFID, 1999).

[8] Under a narrow definition of social capital, this process registers as a decline in social capital. Based on a broader approach, the same process emerges as the substitution of one form of social capital (the rule of law and regulations) for another (the rule of horizontal power relations).

Table 2.3 Formal and Informal Risks Management Mechanisms

	Informal mechanisms		**Formal mechanisms**	
	Individuals and households	**Group based**	**Market based**	**Public services**
Reduce risks	Health care Migration Secure income sources	Joint infrastructure measures Management of common natural resources		Robust macro-economic policy Environmental policy Educational policy Health policy Infrastructure Labour market policy
Mitigate risks **Diversification**	Diversification of crops and plots Diversification of income sources Investment in physical & human capital	Professional associations Savings & credit associations	Savings accounts with formal financial institutes Micro-finance	
Insurance	Marriage & extended family Share cropping Buffer stocks	Investment in social capital	Old age pensions Insurance (accidents, health, etc)	Pension systems Mandatory insurance (unemployment, ill health, etc.)
Coping with risks	Sale of assets Money lender loans Child labour Reduce food consumption Seasonal or temporary migration	Transfers from mutual aid networks	Sale of financial assets Loans from formal financial institutes	Social assistance Work programs Subsidies Social aid funds Direct transfers

Source: Holzmann and Jorgenson (2000), World Bank (2000).

Note: The area with the light gray background shows how households and groups react with informal mechanisms to risks. The area with the dark gray background illustrates the publicly provided instruments for managing and coping with risks, i.e. the social security net.

In rural livelihood systems, the household is inseparable from the agricultural activities. Normally, loss of labor due to death, disability and chronic illness are also mentioned as one of the major reasons to slip into poverty. Income shocks caused by the loss of assets are affecting women more dramatically then men in a household because they act as gatekeepers and shock absorbers of income shocks (Sen, 1983).[9] Therefore, guarding against increased vulnerability due to effective risks through the development of appropriate insurance schemes, particularly micro-insurance schemes, will improve the livelihood of the household in general and of the women in particular. In this context, the livelihood concept is used as an analytical tool to observe analyses and better understand social, economic and institutional frame conditions (Korf, 2002).

Poverty analysis typically focuses on the levels and distribution of welfare in a specific context and provides a profile of the characteristics of the poor. It is less disposed toward informing about the underlying processes that contributed to the observed levels of poverty or to clarify the reasons for poverty persistence. Many factors combine to explain the dynamics of wealth and poverty. Risk is one of these factors, and in high risk environments, characteristic of developing countries, introducing it in the analytical mix is necessary if the objective is to fully understand the dynamics by which households move in and out of poverty or remain chronically poor. In this context, risk and vulnerability work is a natural complement to traditional poverty analysis that can add value to the policy dialogue (Johannes Hoogeveen, 2004).

[9] As gate keepers they decide, which family members receive scarce food or other resources, as shock absorbers they may decide to reduce own consumption more than the consumption of other household members, i.e. men, which they evaluate as crucial to regain a stable livelihood.

2.5 Conceptual Framework of Research

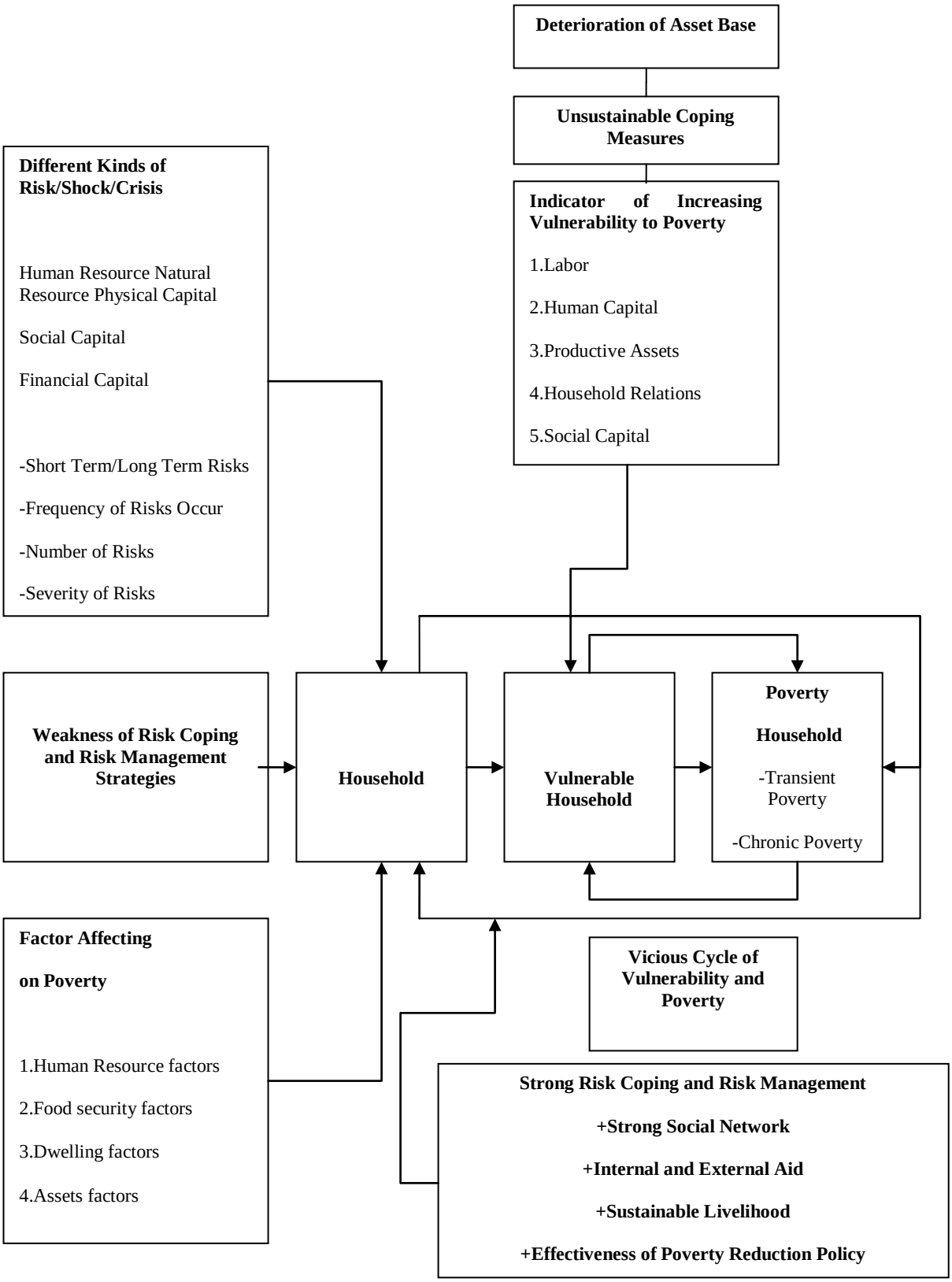
Conceptual framework in this research is to outline a preferred approach to an idea or thought of possible causes of vulnerability to poverty. The research framework attempts to connect to all aspects of inquiry (e.g., problem definition, purpose, literature review, methodology, data collection and analysis). It is upon the research question or problem that how households manage risks under the condition of their capacities, budget and time constraint.

Research under the vulnerability and risk management aims to develop a conceptual framework for examining the links between risk, insecurity, vulnerability and poverty on the one hand, and risk management strategies on the other. It will also focus on developing a strong and comparative body of evidence on these links, and to assess the effectiveness of policy options.

Figure 2.2 draw a research framework. It states with general household has been affected by different kinds of risk, which are human resource risk, natural resource risk, physical capital risk, social capital risk and financial capital risk. Risks occurring to household can be divided into short term and long term risks. Moreover, the effect of risk hit on household can be more or less also depend on the frequency of risks occur, number of risks and severity of risks.

If household has weakness of risk coping and risk management, household will become vulnerable household. If there are the factors affect on poverty of household like lack of human resource factor (i.e. high number of dependency family member, illiterate household head, high unemployment rate of family working member, etc), food insecurity factor, poor dwelling factor and shortage assets factors, that household will also be vulnerable household.

Figure 2.2 Conceptual Framework of Research



Source: Own modification (2009).

In the case of vulnerable household lack of sustainable coping measure, asset base and have the indicators of increasing vulnerability to poverty, these households are going to fall into poverty at the end. Households stay in poverty stage for long or short upon their risk coping and risk management strategies, their social network, internal and external aid, their livelihood and the effectiveness of poverty reduction policy.

In conclusion, the special attention of this research framework will develop research in two key areas: household dynamics and informality. Household dynamics, for example as a result of births or deaths, can be an important source of vulnerability, leading to persistent poverty. But they can also represent a response to vulnerability, and provide a means of escaping chronic poverty. Next, it applies to informality. Examining the link between vulnerability and chronic poverty in the context of household dynamics and informality will generate important insights into the nature of this link, and into appropriate conceptual frameworks to analyze it.

Chapter 3

Methodology

This research is a quantitative research. The purpose is to identify vulnerability, risks and risks management strategies of household in Northern and Northeastern region of Thailand. Vulnerability is an important aspect of households' experience of poverty. The fieldwork for the research was conducted between April and December 2014. This chapter describes first the research area, discussion of research area selection and then the population and data sampling are presented. Next, the handling of data used for investigating the vulnerability is discussed. Finally, the methodology, which is applied for the analysis of vulnerability, is portrayed.

3.1 Research Area

Many households, while not currently in poverty, recognize that they are vulnerable to events-a bad harvest, a lost job, an illness, an unexpected expense, an economic downturn-that could easily push them into poverty (Suryahadi, A., Sumarto, S., and L. Pritchett, 2000). Hence, this research relates to the study of poverty of household. Within Thailand, the north and northeast region are chosen to study vulnerability to poverty because they are lagging behind the rest of the country economically. From the past, these regions had the highest proportion of the poor household in Thailand (Table 3.1).

Table 3.1 Share of Poor Household in Thailand Classified by Region between 1994 and 2009

Region	1994	1996	1998	2000	2002	2004	2006	2007	2008	2009
Bangkok	5.5	1.6	1.6	1.9	2.5	1.0	0.7	1.2	0.8	0.8
Central	10.8	6.0	7.5	8.4	6.9	4.4	3.3	3.2	3.1	2.5
North	**19.3**	**16.1**	**15.0**	**21.2**	**18.2**	**14.4**	**11.3**	**12.3**	**12.4**	**10.4**
Northeast	**25.7**	**22.7**	**28.3**	**32.3**	**20.5**	**17.4**	**15.6**	**12.0**	**14.2**	**12.0**
South	15.6	9.2	10.9	13.6	8.0	4.8	4.6	5.2	3.9	3.7
Overall Kingdom	17.2	13.2	15.3	18.5	13.2	10.2	8.7	7.8	8.5	7.2

Source: NSO, 2009.

Referring to table 3.2, northern region recorded the lowest percentage of Gross Provincial Product during the last decade with an average GPP share of 8% of whole kingdom from 2005 to 2014.

Table 3.2 Gross Provincial Product at Current Market Prices by Industrial Origin: 2005 – 2014

	Gross Provincial Product (GPP) Percentage of Whole Kingdom		
	2005-2009	2010-2014	2005-2014
Whole Kingdom			
Bangkok and Vicinities	46.1	44.0	45.1
Eastern Region	17.9	18.0	18.0
Central and Western Region	10.0	9.7	9.9
Northeastern Region	8.9	10.3	9.6
Southern Region	9.4	9.5	9.5
Northern Region	7.7	8.5	**8.1**

Source: NSO, 2016.

Table 3.3: Number of Poor (Expenditure) and Head Count Index (Expenditure) by Northern and Northeastern Region and Province: 2006 - 2015

Unit: Thousand Persons

Region and Province	2014	2015	Average 2006-2015 (10 years)	Percent of Whole
Number of Poor				
Whole Kingdom	7,057.4	4,847.2	9,840.3	
Bangkok	140.6	173.7	225.9	2.3
Central Region	941.5	827.3	1,620.9	16.5
Northern Region	1,519.9	1,007.8	2,290.5	23.3
Northeastern Region	3,200.6	1,929.8	4,427.0	**45.0**
Southern Region	1,254.8	908.6	1,275.9	13.0
Head Count Index				
Whole Kingdom	10.53	7.21	**15.12**	
Bangkok	1.64	2.01	2.77	
Central Region	4.95	4.30	9.17	
Northern Region	13.19	8.78	19.91	
Northeastern Region	17.04	10.30	**23.23**	
Southern Region	13.79	9.92	14.53	

Source: Data of the Household Socio-Economic Survey, National Statistical Office, 2006-2015.

Moreover, northeast region's number of poor of 45% is the greatest share of whole kingdom. This region's incidence of poverty (headcount) of 23.2% is the highest in Thailand against a country average of 15.12% during 2006 to 2015 (Table 3.3).

The headcount index measures the proportion of the population that is poor. According to the top five range of head count index between 2006 and 2015, Mae Hong Son had the maximum share of the poor in Thailand with 62.5 percent of total population in that province, following by Kalasin province (40.07%), Buri Ram province (37.77%), Tak (37.07%), and Si Sa Ket province (36.93%) respectively. In

this study, Nan and Chiangmai province are chosen as the sample of the northern region. Kalasin and Buri Ram are selected as the sample of the northeastern region (Table 3.4).

Table 3.4 Top Five Head Count Index (Expenditure) by Region and Province: 2006 – 2015

Unit: Percent

	2011	2012	2013	2014	2015	Average 2006-2015
Rank	**Northern Region**					
1	Mae Hong Son 58.9	Kamphaeng Phet 14.3	Mae Hong Son 65.2	Mae Hong Son 46.1	Mae Hong Son 32.2	Mae Hong Son 62.46
2	Tak 43.5	Mae Hong Son 63.2	Tak 34.0	Tak 36.5	Tak 24.5	Tak 37.07
3	Uthai Thani 24.1	Tak 35.9	**Nan 23.8**	**Nan 28.8**	**Nan 21.0**	**Nan 26.42**
4	Phetchabun 23.2	Chiang Rai 24.6	Chiang Rai 22.2	Chiang Rai 26.8	Chiang Rai 17.2	Chiang Rai **25.72**
5	**Nan 18.9**	Uttaradit 24.1	Phayao 22.0	Phayao 16.5	Phayao 10.7	Uttaradit 22.30

Table 3.4 Top Five Head Count Index (Expenditure) by Region and Province: 2006 – 2015 (Continue)

Unit: Percent

Rank	Northeastern Region					
1	**Kalasin**	**Kalasin**	**Kalasin**	**Kalasin**	**Kalasin**	**Kalasin**
	28.6	**39.8**	**31.0**	**42.7**	**17.8**	**40.07**
2	Si Sa Ket	Si Sa Ket	Nakhon Phanom	**Buri Ram**	**Buri Ram**	**Buri Ram**
	35.9	36.1	31.1	**39.1**	**23.3**	**37.77**
3	**Buri Ram**	Nakhon Phanom	Mukdahan	Nakhon Phanom	Yasothon	Si Sa Ket
	33.7	35.3	29.3	24.9	17.3	36.93
4	Yasothon	Sakon Nakhon	Nong Bua Lam Phu	Mukdahan	Sakon Nakhon	Nakhon Phanom
	32.5	34.3	27.4	23.8	17.2	33.52
5	Nakhon Phanom	**Buri Ram**	**Buri Ram**	Sakon Nakhon	Nakhon Phanom	Yasothon
	32.1	**31.6**	**25.4**	23.6	16.6	26.18

Note: Head Count Index calculated from the population with consumption expenditure below the poverty line divided by the total population multiplied by 100

Source: Data of The Household Socio-Economic Survey, National Statistical Office. Processing by the Development Indicators database and social NESDB, Office of The National Economic and Social Development Board

In demographics, northern and northeastern region populations are equivalent to 51.73% of the total Thai population. In 2015, nearly half of the household population lives in the northern and northeastern region (Table 3.5).

Table 3.5 Population from Registration Record and Number of Household by Region in Thailand in 2014-2015

	Population from	Number of Household	
Region and province	**2014**	**2014**	**2015**
	(Persons)	**(Thousand)**	**(Thousand)**
Whole Kingdom	65,124,716	20,601.0	21,326.0
Bangkok	5,692,284	4,183.3	4,661.4
Central Region	16,532,023	4,504.5	4,602.2
Northern Region	11,846,651	3,770.3	3,808.6
Chiang Mai	1,678,284	597.3	626.5
Nan	478,264	139.0	146.0
Northeastern Region	21,845,254	5,458.2	5,528.4
Buri Ram	1,579,248	348.5	352.9
Karasin	984,907	227.3	231.3
Southern Region	9,208,504	2,684.7	2,725.4

Source: Population from National Statistic Office, 2015.
Number of Household from The Household Socio - Economic Survey, National Statistical Office, Ministry of Information and Communication Technology.

Data was collected in 2014. The sample size for households was calculated based on Yamane's formula (Yamane, 1967).

$$n = \frac{N}{1+Ne^2}$$

where, n = the sample size
N = the size of population
E = the error of 5 percentage points.

By using Yamane's formula of sample size with an error of 5% and with a confidence coefficient of 95% (Yamane, 1967), the calculation from a northern household population of 3,770,338 households come up with 400 households. To account for the northeastern household population of 5,458,246 households come up with 400 households. Therefore, it was planned to collect data from 4 provinces in 2 regions, approximately 1,400 households. This research applies stratified sampling, which is a method of sampling from a population (Table 3.6).

Table 3.6 Population and Sample Size

Region and	**2014**	**Sample**	**Data**
Whole Kingdom	20,601,044		
Bangkok	4,183,301		
Central Region	4,504,479		
Northern Region	3,770,338	399.96	
Chiang Mai	597,275		350
Nan	138,960		350
Northeastern Region	5,458,246	399.97	
Buri Ram	348,477		350
Karasin	227,333		350
Southern Region	2,684,680	800	1,400

Source: NSO, 2014.

This study was conducted in four different provinces of Thailand: Chiangmai, Nan, Kalasin and Buri Ram province (Figure 3.1).

Figure 3.1 Research Area

Source: Sunyaluk Boonmas, 2016.

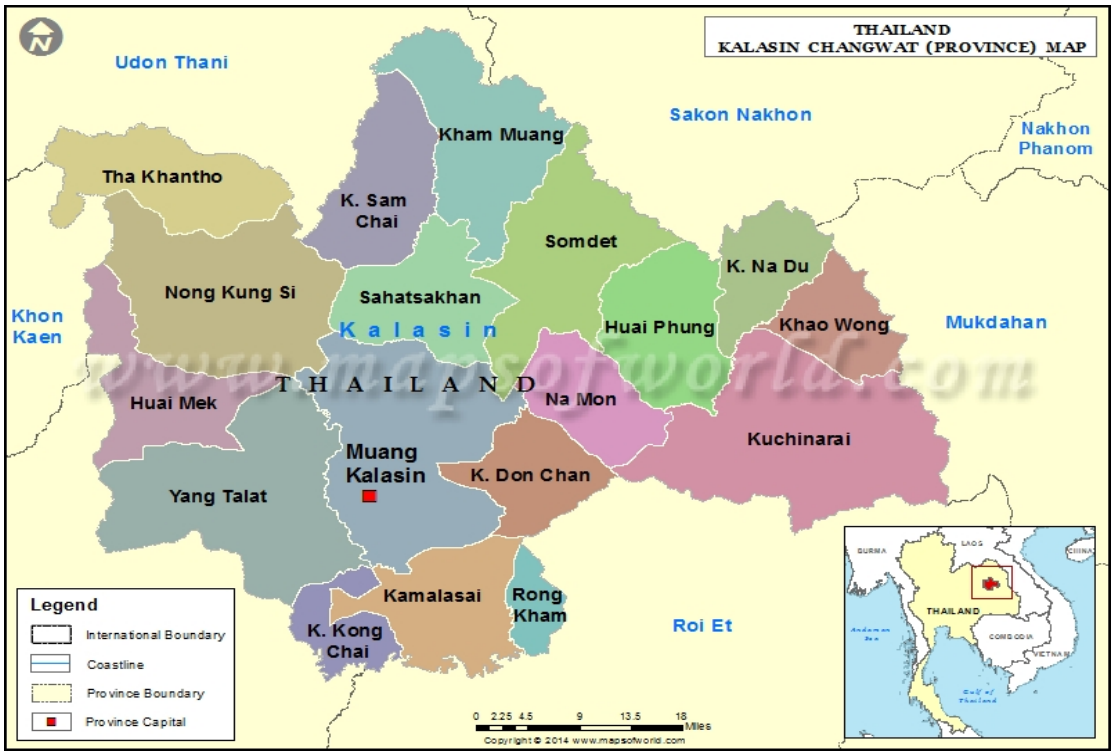
Figure 3.1 Research Area (Continue)

Chiangmai province

Nan province

Figure 3.1 Research Area (Continue)

Kalasin province



Buriram province

Source: Maps of World, 2016.

What is even more interesting than the GDP figures for the whole of Thailand, are the data for the different regions and provinces of the country. The static data for 2012 (as provided by the Office of the National Economic and Social Development Board of Thailand (NESDB), show that there are great differences in Gross Domestic Product (GDP) per capita between the different regions and provinces. The Gross Provincial Product in the Northeast and to a lesser extent in the north is substantially lower than in Bangkok, the Central and the Eastern region. The Gross Provincial Product of the Southern and Western regions is situated in between. GDP in Bangkok and surrounding provinces is 5 to 6 times bigger than in the poorest northeastern region of Thailand. 12 of the 15 provinces with the lowest GDP per capita are located in the Northeastern Region of Thailand. The remaining three are located in the Northern Region (Guido Vanhaleweyk, 2014). In addition, it can be seen that Kalasin, Nan and Burriram province had by far the lowest GDP per capita in Thailand (Table 3.7).

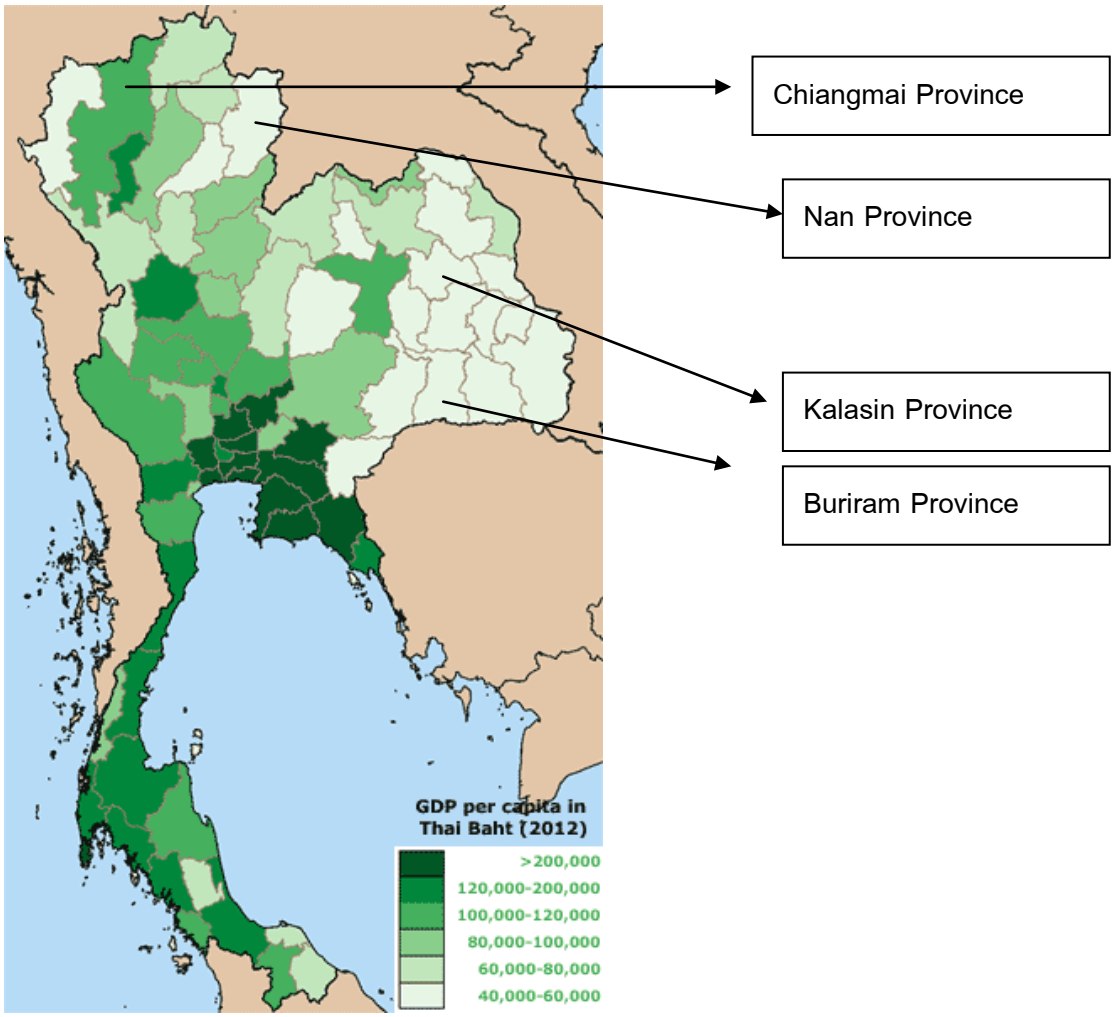
Table 3.7 GDP per capita growth and population in 2012

Province :	**GDP per capita**	**Population: (thousands)**
Central Region	226,501	3,127
Bangkok and Vicinity	359,798	15,007
Eastern Region	414,568	5,329
Southern Region	124,914	8,985
Western Region	121,651	3,581
Northern Region	**91,922**	11,589
North Eastern Region	**67,888**	18,874
Province :	**GDP per capita**	**Population: (thousands)**
Chiang Mai	104,838	1,729
Nan	54,676	450
Kalasin	52,204	934
Buriram	55,318	1,267

Source: NESDB, 2012.

Note: Data in 2012 (Last available in mid 2014).

Figure 3.2 GDP per Capita in Thai Baht in 2012 Classified by Provinces



Source: NESDB, 2012.

3.2 Methodology

The research methodologies in this study are qualitative and quantitative method. The qualitative method applies focus group discussion, which arrange in the field area to find out the risk of household and the changing of livelihood strategies to cope with risk. After that, questionnaires are distributed to the research area. After obtaining all of the distributed questionnaires back, process of checking, encoding, and analyzing data are initiated. The statistical treatment of data is the use of both descriptive and inferential statistics, such as the frequency, percentage, mean and

standard deviation to describe household characteristic. Finally, the quantitative method applies the econometrics model. The model is shown in equation 3.1-3.19.

Feasible generalized least square is one of the methodologies, which will employ to find out the vulnerability measurement.

If the generalized least squares estimator has been written in an alternative form that involves the error covariance matrix rather than the transformed variables. To develop this alternative fore we begin by specifying our linear statistical model as

$$y = X\beta + e \tag{3.1}$$

Where X is of dimension $(T \times K)$,

$$E[e] = 0 \quad \text{and} \quad \text{cov}(e) = E[ee'] = W = \sigma^2 V \tag{3.2}$$

The results that derive are the results that hold for any general linear statistical model where $E[ee'] \neq \sigma^2 I_T$ Thus, W in equation 2 can be any nonsingular covariance matrix where $W \neq \sigma^2 V$. By writing $W = \sigma^2 V$, it can say that sometimes it is convenient to factor a constant σ^2 out of the matrix W and write it in the alternative form $\sigma^2 V$. For example, for the model considered in Section …., V and W are defined as follows:

$$\operatorname{cov}(e) = E[ee'] = W = \begin{bmatrix} \sigma^2 x_1 & 0 & \cdots & 0 \\ & \sigma^2 x_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \sigma^2 x_T \end{bmatrix} = \sigma^2 \begin{bmatrix} \sigma^2 x_1 & 0 & \cdots & 0 \\ & \sigma^2 x_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \sigma^2 x_T \end{bmatrix} = \sigma^2 V$$

(3.3)

From a theorem in matrix algebra, it is always possible to find what is called a transformation matrix P such that the transformed error vector defined by

$$e^* = Pe \tag{3.4}$$

Has covariance matrix

$$\operatorname{cov}(e^*) = E\left[e^* e^{*'} \right] = \sigma^2 I_T \tag{3.5}$$

The P transformation matrix is of dimension $(T \times T)$. Its precise nature-the elements that it contains-depends on the elements in the error covariance matrix $W = \sigma^2 V$. We will consider some examples of P transformation matrices shortly. For the moment, it is sufficient to be aware that a matrix P with the properties in equations 2 and 3 does exist.

We examine the consequences of using P to transform not just the error vector e, but the complete model in equation 1. Premultiplying this model by the matrix P yields

$$Py = PX\beta + Pe \tag{3.6}$$

Or

$$y^* = X^*\beta + e^* \tag{3.7}$$

Where $y^* = Py$ the vector of transformed observations on the dependent variable is, $X^* = PX$ is the matrix of transformed explanatory variables, and $e^* = Pe$ is the transformed error vector. From equation 7, transformed model 9 has errors that are homoskedastic and uncorrelated. The presence of the "well-behaved" errors means that the least squares estimator $\hat{\beta} = (X^{*'}X^*)^{-1}X^{*'}y^*$, which uses the transformed observation y^* and X^*, will be the best linear unbiased estimator for β. The transformed variables y^* and X^* can be defined in terms of specific P transformation matrices.

In addition, a matrix P that yields a homoskedastic uncorrelated error vector e^* always has the property that

$$P'P = V^{-1} \tag{3.8}$$

Consequently, the best linear unbiased estimator $\hat{\beta} = (X^{*'}X^*)^{-1}X^{*'}y^*$ can also be written as

$$\hat{\beta} = (X^{*'} X^{*})^{-1} X^{*'} y^{*} = (X'P'PX)^{-1} X'P'Py = (X'V^{-1}X)^{-1} X'V^{-1}y \quad (3.9)$$

The right side of this equation is an alternative convenient form for writing the generalized least squares estimator.

In this research, the feasible generalized least square applies to analyze the vulnerability to poverty of household.

The key to estimating a household's vulnerability to poverty is to obtain an estimate of the household's variance of consumption expenditure. A reliable estimate of consumption expenditure variance can be obtained from panel data collected over a sufficiently long period. However, as noted by Jalan and Ravallion (2000), most of the available standard data sources are based on a 'single visit' (cross-sectional) household survey and cannot be used for this purpose. Hence, there is a need to develop a method for estimation household consumption expenditure variance from cross-section data. This, however, obviously requires relatively strong assumptions about the stochastic process generation consumption (Suryahadi and Sumarto 2001).

Chaudhuri (2002) has developed a methodology to estimate vulnerability of a household to poverty using cross sectional data by using Philippines data for 1997. Chaudhuri and Datt (2001) find that they are able to predict which households will be poor in 1998. Suryahadi and Sumarto (2001) have adopted this methodology to identify households that are vulnerable to poverty and to identify the chronic poor in Indonesia. They do this by making use of information on vulnerability to poverty based on current consumption, the estimated degree of vulnerability and the estimated expected consumption. Five categories of households are developed. These are poor, non-poor, high vulnerability to poverty, low vulnerability to poverty and the total vulnerable group. The total vulnerable group includes non-poor households. These are households that are currently non-poor but are expected to become poor in the future. The critical vulnerability level that is adopted in their study is 0.5. A household is described as being highly vulnerable to poverty if the probability that it will be poor is equal to or greater than 0.5 (Abena D. Oduro and Bernardin Senadza, 2005).

The vulnerability level of a household at time t is the probability that it will be consumption poor at time t+1 thus:

$$V_{ht} = \Pr(C_{ht+1} \leq z) \quad (3.10)$$

Where C_{ht+1} is the household's consumption expenditure at time t+1 and z is the poverty line.

Consumption expenditure is determined by observable household characteristics X_h, the state of the economy at time t S_t, unobserved time invariant household level effects α_h, and any idiosyncratic factors that contribute to differential welfare outcomes for households that are otherwise observationally equivalent, ε_{ht}. Thus

$$C_{ht} = c(X_h, \beta_t, \alpha_h, \varepsilon_{ht}) \quad (3.11)$$

With cross-sectional data there is not enough information to include changes in the structure of the economy and idiosyncratic shocks to household. Thus, we begin by assuming that the stochastic process generation the consumption of a household *h* is given by:

$$Lnc_h = X_h\beta + \varepsilon_h \quad (3.12)$$

Where c_h is per capita consumption expenditure, X_h represents a bundle of observable household characteristics such as household size, education of household head, etc., β is a vector of parameters, and ε_h is a mean-zero

disturbance term that captures idiosyncratic factors (shocks) that contribute to different per capita consumption levels for households that are otherwise observationally equivalent.

In addition the variance of ε_{ht} is allowed to depend on observable household characteristics. We assume that the variance of ε_h is given by:

$$\sigma^2_{\varepsilon,h} = X_h\theta \tag{3.13}$$

Estimates of β and θ are obtained using a three step feasible generalized least squares procedure. We estimate equation (13) using an ordinary least squares (OLS) procedure. We use the estimated residuals from equation (13) to estimate:

$$\hat{\varepsilon}^2_{OLS,h} = X_h\theta + \eta_h \tag{3.14}$$

The OLS estimate, $\hat{\theta}_{OLS}$ is then used to transform as:

$$\frac{\hat{\varepsilon}^2_{OLS,h}}{X_h\hat{\theta}OLS} = \left(\frac{Xh}{X_h\hat{\theta}OLS}\right)\theta + \frac{\eta_h}{X_h\hat{\theta}OLS} \tag{3.15}$$

This transformed equation is estimated using OLS to obtain an asymptotically efficient FGLS estimate, $\hat{\theta}FGLS$. Note that $X_h \hat{\theta}FGLS$ is a consistent estimate of $\sigma^2_{e,h}$, the variance of the idiosyncratic component of household consumption. Then, we transform equation (15) as below:

$$\frac{\ln c_h}{\sqrt{X_h \hat{\theta}FGLS}} = \left(\frac{X_h}{\sqrt{X_h \hat{\theta}FGLS}} \right) \beta + \frac{\varepsilon_h}{\sqrt{X_h \hat{\theta}FGLS}} \qquad (3.16)$$

OLS estimation of equation (16) yields a consistent and asymptotically efficient estimate of β. The standard error of the estimated coefficient, $\hat{\beta}FGLS$, can be obtained by dividing the reported standard error by the standard error of the regression.

Using the estimates and that we obtain we are able to directly estimate expected log consumption:

$$\hat{E}\left[\ln c_h \middle| X_h\right] = x_h \hat{\beta} \qquad (3.17)$$

And the variance of log consumption for each household *h*:

$$\hat{V}\left[\ln c_h \middle| X_h\right] = \hat{\sigma}^2 \varepsilon, h = X_h \hat{\theta} \tag{3.18}$$

By assuming that consumption is log-normally distributed, we are then able to use these estimates to form an estimate of the probability that household with the characteristics, X_h, will be poor, i.e, to estimate the household's vulnerability level. Letting $\phi(.)$ denote the cumulative density of the standard normal.

The estimates of β and θ are used to obtain estimates of expected log consumption and the variance of log consumption for each household. The estimates of log consumption and the variance of log consumption are used to form an estimate of the probability that a household with characteristics X_h will be poor, i.e. the household's vulnerability level.

$$\hat{V}h = \hat{\Pr}(\ln c_h < \ln c | X_h) = \phi\left[\frac{\ln c - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}}\right] \tag{3.19}$$

To deal with measurement error it is recommended that the estimates are applied at a disaggregated level (Chaudhuri, 2000).

As the available data for the estimation of vulnerability consist of a single cross-section, identifying the household characteristics that are associated with vulnerability necessitates making strong assumptions about the stochastic process that generates consumption (Chaudhuri, 2000). Probably the most important and strongest

identifying assumption is that cross-sectional variance can be used to estimate intertemporal variance. Most likely cross-sectional variance can explain a part of inter-temporal variance, mostly due to idiosyncratic components or cluster-specific shocks. However, the model will miss the impact of inter-temporal or aggregate (household-invariant but time-variant) shocks. In other words, the model will probably produce good estimates of vulnerability for the situations where the distribution of risks and the risk-management instruments are similar in all periods of time. As there is probably some error in the measurement of consumption, this may have resulted in significant overestimation of the variance of consumption, and thus of vulnerability. An advantage of the estimation strategy used in this paper – using a FGLS approach to estimate the variance of the idiosyncratic component of household consumption – is that it yields a consistent estimate of the true variance of consumption even when consumption is measured with error unless the measurement error varies systematically with some household characteristics (Tesliuc, and Lindert, 2002).

Chapter 4

Qualitative and Quantitative Analysis of Vulnerability to Poverty of Rural Household

This chapter presents two sections. The first section is descriptive analysis of farm household. The second section discusses about the results of study derived from the quantitative analysis. In the first section has fourteen parts: part one introduces household demography; part two describes education of household member; part three presents the absent of household members; part four identifies employment and family Income; part five talks about unemployed Family Members; part six explains livelihood assets: natural assets; part seven shows physical assets: crop production; part eight investigates physical assets: livestock; part night represents physical assets: agricultural tools, housing and basic household equipment; part ten analyzes financial assets; part eleven examines group membership and social networks; part twelve illustrates individual risks, shocks, risk management and emerging costs; part thirteen depicts livelihood strategies; the final part provides demand on government assistance. The ending of this chapter describes about the quantitative analysis of vulnerability to poverty of farm household in northeastern and northern regions of Thailand.

4.1 Descriptive Analysis of Household

From the carrying out of the interviews, it has come out some interesting points regarding vulnerability to poverty of household. All the information collected in the questionnaires has not been analyzed in this chapter since a lot of the questions. This section describes about the livelihoods of farm household in northern and northeastern region of Thailand, for example, education of household members, absent

household members, employment and family income, unemployed family members, livelihood assets, physical assets, financial assets, group membership and social network, individual risks, shocks and emerging costs, expected asset risks and ranking of risks and livelihood strategies.

4.1.1 Household Demography

The household is defined as all people living in this dwelling and being part of the same economic entity. They ought to have lived together for more than 9 months during the last 12 months or regularly provided the household with remittances during the last 12 months. This section describes household information. According to the household status, the respondents mostly estimate their wealth in the moderate level (70%). About 23 percent of total households are poor status (table 4.1).

Table 4.1 Household Status Classified by Region

	District							
Household Status	**Burriram**	**Kalasin**	**Northeast Region**	**Nan**	**Chiangmai**	**North Region**	**Total**	**% of Total**
			% within status			**% within status**		
1.Very poor	9	3	0.9%	2	12	1.0%	26	1.9%
2.Poor	75	63	9.9%	59	118	12.6%	315	22.5%
3.Moderate	240	269	36.4%	277	201	34.1%	987	70.5%
4.More than moderate	25	15	2.9%	12	17	2.1%	69	4.9%
5.Very rich	1	0	0.1%	0	2	0.1%	3	0.2%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Housing appearance is the roughly way to scan the wealth of household by physically. Data presented on the table 4.2 shows that more than a half of household's house appearances are not rather old or new, whereas around one fourth of total housing appearances are quite old.

Table 4.2 Housing Appearance

	District							
House	**Burriram**	**Kalasin**	**Northeast Region**	**Nan**	**Chiangmai**	**North Region**	**Total**	**% of Total**
			% within house			**% within house**		
1.Very old	10	7	1.2%	7	13	1.4%	37	2.6%
2.Old	83	86	12.1%	64	114	12.7%	347	24.8%
3.Medium	229	234	33.1%	256	204	32.9%	923	65.9%
4.New	26	23	3.5%	22	17	2.8%	88	6.3%
5.Very new	2	0	0.1%	1	2	0.2%	5	0.4%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Zooming into the household data, household size between 4-6 persons account for a little bit more than a half of overall households. The next biggest category is the size between 1-3 persons account for around one third of total households (table 4.3). About the disable in household, almost the entire household member has a small number of the disable person (table 4.4).

Table 4.3 Household Size

Household Size	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiang mai	North Region		
			% within size			%within size		
1-3 persons	64	158	15.8%	164	144	22.0%	530	37.9%
4-6 persons	232	168	28.6%	178	174	25.2%	752	53.7%
7-9 persons	49	18	4.8%	8	22	2.1%	97	6.90%
> 10 persons	5	6	0.9%	0	10	0.7%	21	1.60%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Table 4.4 Number of Disable Person in Household Classified by Region

Number of disable	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiang mai	North Region		
			% within disable			% within disable		
No disable	343	344	49.1%	346	350	49.7%	1,383	98.8%
1 disable	7	6	0.9%	3	0	0.2%	16	1.1%
2 disables	0	0	0.0%	1	0	0.1%	1	0.1%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

According to the household head information, it has been shown that most of the household head's genders are male, accounting for 76%. In both regions, there are not many female household heads (table 4.5).

Table 4.5 Gender of Household Head

Gender	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within gender			% within gender		
1.Male	282	297	41.4%	260	229	34.9%	1,068	76.3%
2.Female	68	53	8.6%	90	121	15.1%	332	23.7%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

According to the table data 4.6, the percentage of total age of household head is greatest in the range between 41 and 60 years (64.6%). The finding indicates that household head age is in the labor force, which can sustain the income flow of household. It is interesting that the aging household head age between 61-70 years is 16.6% and age more than 70 years old is 5.7%, totally 22.3%. Generally, the elders are difficulty to apply work to smooth their income. Above and beyond, elderly household head income may rely on the other family member.

Table 4.6 Age of Household Head

Age	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within age			% within age		
< 30 years	6	0	0.4%	3	16	1.4%	25	1.8%
31-40 years	55	17	5.1%	23	63	6.1%	158	11.3%
41-50 years	120	121	17.2%	95	120	15.4%	456	32.6%
51-60 years	99	102	14.4%	155	92	17.6%	448	32.0%
61-70 years	47	89	9.7%	53	44	6.9%	233	16.6%
> 70 years	23	21	3.1%	21	15	2.6%	80	5.7%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

The given table 4.7 depicts the education of household head plays an important role on the internal household management. Higher education household head may have the possibility to set household direction well such as financial plan, education of other family member, etc. The result presents that household head on the average graduate primary school at 58%, secondary school at 23% and below primary school at 10%.

Table 4.7 Education of Household Head

Education of household head	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within education			% within education		
1.Below primary school	41	21	4.4%	36	43	5.6%	141	10.1%
2.Primary school	217	225	31.6%	228	145	26.6%	815	58.2%
3.Secondary school	59	70	9.2%	67	130	14.1%	326	23.3%
4.Vocational school	10	17	1.9%	4	26	2.1%	57	4.1%
5.Bachelor degree and above	23	17	2.9%	15	6	1.5%	61	4.4%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

As is presented in table 4.8, main occupation of household head is agricultural work account for 66.6%. The next main occupation is hiring work, which can be count for 19.6%. Hiring work is the work that the employee work for some purpose to receive income. For example, in case of housing construction, the employer hires labor to work. Another example is some family members work on other farm and receive income from hiring. The third main occupation is selling, amounting for 6.3%. Many household head work on their own small grocery in village. There is a small percentage of household head work as government officer and state enterprise.

Concerning to the unemployed household head, about 3.9% of household heads are under unemployment position. Northern household head are more unemployed than household head of the northeast region.

Table 4.8 Main Occupation of Household Head

Main Occupation (Rank)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within occupation	Nan	Chiangmai	North Region % within occupation		
1.Agricultural work	249	214	33.1%	176	293	33.6%	932	66.6%
2.Hiring work	44	75	8.5%	115	40	11.1%	274	19.6%
3.Selling	26	29	3.9%	21	12	2.4%	88	6.3%
4.Government officer and state enterprise	26	16	3.0%	6	3	0.6%	51	3.6%
5.Unemployed	8	18	1.5%	47	2	2.5%	75	3.9%
Total	350	350	50%	350	350	50%	1,400	100%

Source: Own calculation.

4.1.2 Education of Household Member

The impact of parental income and education on the schooling of their children differ between families. High income and well educated parent can support the schooling of their children at the higher level. However, schooling costs have an impact on household income. The greater the number of students, the higher the cost of family expenses will be. According to the education of children in household, it presents that half of overall households have children still going to school. This means that half of the household have spending leakage on these costs at present. However, the effect of achieved level of education on the income situation of households is going to be better off. In the future, the higher level of education of the household members imply the higher income of themselves and households as well (table 4.9).

Table 4.9 Number of Household that have Children Go to School

Children Education (Number of Household)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within education	Nan	Chiangmai	North Region % within education		
1.Have student	249	163	29.4%	113	184	21.1%	709	50.6%
2.Do not have student	101	187	20.6%	237	166	28.8%	691	49.4%
Total	350	350	50%	350	350	50%	1,400	100%

Source: Own calculation.

Within these households, each household have at least 1-2 students, which family must support school cost, amount for 44%. About 6% of households with student, have 3-4 students in household (table 4.10).

Table 4.10 Number of Children Go to School

Children Education	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within education	Nan	Chiangmai	North Region % within education		
Children go to school per household								
1-2 students	212	141	25.2%	103	155	18.4%	611	43.6%
3-4 students	35	20	3.9%	7	23	2.1%	85	6.1%
> 5 students	2	2	0.3%	3	6	0.6%	13	0.9%
Total	249	163	29.4%	113	184	21.1%	709	50.6%

Source: Own calculation.

We can observe from the given information that, families in the northeast have high number of students. Hence, their spending on education is higher than families in the north. School cost per year that family must support is about less than 10,000 Baht, account for 58.7%, and following with the rank of 100,001-200,000 Baht with 22.3% (table 4.11).

Table 4.11 Cost of school per year

School Cost	District							
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region	Total	% of Total
			% within cost			% within cost		
< 10,000 Baht	150	90	57.7%	78	98	42.3%	416	58.7%
10,001-20,000 Baht	52	47	62.7%	12	47	37.3%	158	22.3%
20,001-30,000 Baht	17	11	50.9%	8	19	49.1%	55	7.8%
30,001-40,000 Baht	9	1	47.6%	4	7	52.4%	21	3.0%
40,001-50,000 Baht	6	4	47.6%	7	4	52.4%	21	3.0%
> 50,000 Baht	15	10	65.8%	4	9	34.2%	38	5.4%
Total	249	163		113	184		709	

Source: Own calculation.

Among the household that have children, there are a very small number of children not go to school due to family has not enough money, children with disabilities, children get married, and children are not healthy. Main cause of children are not going school is parents think their children are still too young and some families require children to work (table 4.12). About the communication within household, main language use in household is Thai, Lao and Cambodia language, respectively (table 4.13).

Table 4.12 Cause of Children Not Attend the School

Children Education (Number of Children)	District: Burriram	Kalasin	Northeast Region % within cause	Nan	Chiangmai	North Region % within cause	Total	% of Total
Cause of children not go to school								
1.Too young	27	8	79.6%	9	0	20.5%	44	73.3%
2.Must work	3	0	42.9%	4	0	57.1%	7	11.7%
3.No money	0	0	0.0%	3	1	100.0%	4	6.7%
4.Disabilities	2	0	100.0%	0	0	0.0%	2	3.3%
5.Married	1	0	50.0%	1	0	50.0%	2	3.3%
6.Poor health	1	0	100.0%	0	0	0.0%	1	1.7%
Total	34	8	70.0%	17	1	30.0%	60	100%

Source: Own calculation.

Table 4.13 Main Language Use in Household

Main Language	District: Burriram	Kalasin	Northeast Region % within language	Nan	Chiangmai	North Region % within language	Total	% of Total
1.Thai	250	317	40.5%	342	348	49.3%	1,257	89.8%
2.Lao	100	31	9.4%	7	2	0.6%	140	10.0%
3.Cambodia	0	2	0.1%	1	0	0.1%	3	0.2%
Total	350	350	50%	350	350	50%	1,400	100%

Source: Own calculation.

4.1.3 The Absent of Household Members

Table 4.14 represents the number of absent member in household. An absent of household member is a person who is away from home for a specific purpose but intends to return to the home once a specific activity has commenced. For example, he or she absent for school attendance, vacation, employment or job search, natural disaster, military service, hospitalized, personal or family emergency, visits with non-custodial parents, hospitalized auto newborn. Note to the absent member in household, most household members have small number of absent members. Around 17% of households have 1-2 absent members.

Table 4.14 Number of Absent Member in Household

Number	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within sickness			% within sickness		
0 person	247	301	39.1%	331	278	43.5%	1,157	82.6%
1-2 persons	101	47	10.6%	19	69	6.3%	236	16.9%
> 3 persons	2	2	0.3%	0	3	0.2%	7	0.5%
Total	350	350	50%	350	350	50%	1,400	100%

Source: Own calculation.

The supplied table data illustrates they have been absent average 2 months due to work in other region, studies and hospitalization (e.g. accident, infectious disease). The northeast members contain a higher number of absent than the north member. Nearly a half of absent members contribute money to support their family. Their contribution is less than 10,000 Baht per year (table 4.15).

Table 4.15 Absent Member Contribute Money per Year to Household

Money	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within money	Nan	Chiangmai	North Region % within money		
Number Household that has absent member								
	103	**49**	**63%**	**19**	**72**	**37%**	**243**	**100%**
1. Absent member who do not contribute money to family								
	75	46	88%	17	0	12%	138	56.8%
2. Absent member who contribute money to family (Baht per year)								
	28	3	29.5%	2	72	70.5%	105	43.2%
Range of money that absent member send to family								
< 10,000 Baht	14	1	17.2%	1	71	82.8%	87	
10,001-30,000	5	1	85.7%	0	1	14.3%	7	
> 30,001 Baht	9	1	90.9%	1	0	9.1%	11	

Source: Own calculation.

4.1.4 Employment and Family Income

The occupations of each family member are different from person to person. Most of household occupations are farm related. Agricultural work in research area consists of planting rice, potato (plant in Brriram and Kalasin), rubber (plant in these four provinces), and sugar cane (plant in Kalasin). Vegetables that plant in research area are corn, bean, garlic, chayote, sweet pepper or bell pepper, cabbage, Chinese white cabbage, snap beans or bush bean, Chinese kale, carrot, onion, ground nut or peanut, lettuce, eggplant, soy beans, etc. Many kinds of these vegetables are planted in the north. Flowers grow in the north such as Chrysanthemum, Gerbera. Fruits grow widely such as mango, banana, except litchi and orange grow well in the north.

As is observed, agricultural work of households are classified into: 1) doing full time farm on family farm, 2) doing full time farm work on other farm, 3) doing part time farm work on family farm, and 4) doing part time farm work on other farm. It is 46% of total household work is doing full time farm on family farm. The next biggest categories are doing part time farm work on family farm (42%), doing part time farm work on other farm (10%) and doing full time farm work on other farm (2%), respectively (table 4.16).

Regarding farm working of household, it divides into work on the farm during low season (November to April) and high season (May to October). High season period cover the time during the rainy season, which is the popular period for agricultural work (64%), while the rest (36%) seem not do agricultural work on this period. So, farms are busier at certain times of the year, many hire seasonal workers to work specifically during these seasons. The farming during the dry season has a similar proportion between these groups. Farmers in the northeast region do farm on dry season more than the northern farmers (table 4.17).

Table 4.16 Agricultural work of Household

Farm Work	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within farm	Nan	Chiangmai	North Region % within farm		
1.Full time on family farm	180	153	51.5%	124	189	48.5%	646	46.1%
2.Full time on other farm	14	3	63.0%	8	2	37.0%	27	1.9%
3.Part time on family	126	187	53.7%	213	57	46.3%	583	41.6%
4.Part time on other	30	7	25.7%	5	102	74.3%	144	10.3%
Total	350	350		350	350		1,400	100

Source: Own calculation.

Table 4.17 Season of Agricultural Work

Farm Work	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within farm	Nan	Chiangmai	North Region % within farm		
Do farm on high season								
1.Yes	294	241	59.6%	190	172	40.4%	897	64.1%
2.No	56	109	32.8%	160	178	67.2%	503	35.9%
Total	350	350		350	350		1,400	
Do farm on low season								
1.Yes	293	189	62.7%	125	162	37.3%	769	54.9%
2.No	57	161	34.5%	225	188	65.5%	631	45.1%
Total	350	350		350	350		1,400	

Source: Own calculation.

It is quite clear that household income is average less than 50,000 Baht per month account for over 80%. The second income range is between 50,001-100,000 Baht per month. The highest income range above 200,000 Baht is only 1.7% (table 4.18).

Table 4.18 Household Income

Household	District						Total	% of
	Burri	Kala	Northeast	Nan	Chiang	North		
(Baht per month)			% within income			% within income		
< 50,000	336	314	55.1%	328	202	44.9%	1,179	84.2%
50,001-100,000	10	29	31.7%	19	64	67.5%	123	8.8%
100,001-150,000	2	6	16.7%	2	38	83.3%	48	3.4%
150,001-200,000	1	1	7.7%	0	24	92.3%	26	1.9%
> 200,001	1	0	4.2%	1	22	95.8%	24	1.7%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

The provided table 4.19 reveals main incomes of households are mostly come from monthly income from main occupation, business, and agricultural work. Most household do not get money or things from the other aids. As could be observed in table 4.20, household expenditure is also less than 50,000 Baht per month.

Table 4.19 Household Income Classified by Income sources

Income (Baht per month)	District: Burriram	Kalasin	Northeast Region % within income	Nan	Chiang mai	North Region % within income	Total	% of Total
Monthly income								
<50,000	344	339	49.5%	348	350	50.5%	1,381	98.6%
50,001-100,000	2	11	86.7%	2	0	13.3%	15	1.1%
100,001-150,000	4	0	100.0%	0	0	0.0%	4	0.3%
Total	350	350		350	350		1,400	
Income from business								
<50,000	312	348	50.8%	350	290	49.2%	1,300	92.9%
50,001-100,000	37	1	46.9%	0	43	53.1%	81	5.8%
100,001-150,000	0	1	6.7%	0	14	93.3%	15	1.1%
> 150,000	1	0	25.0%	0	3	75.0%	4	0.3%
Total	350	350		350	350		1,400	
Income from agriculture								
<50,000	297	333	51.8%	341	245	48.2%	1,216	86.9%
50,001-100,000	16	14	30.3%	7	62	69.7%	99	7.1%
100,001-150,000	37	3	64.5%	1	21	35.5%	62	4.4%
> 150,000	0	0	0.0%	1	22	100.0%	23	1.6%
Total	350	350		350	350		1,400	
Money get from others' aids								
No	254	207	43	288	331	57	1,080	77.1
1-10,000	49	141	71	61	17	29	268	19.1
10,001-15,000	47	2	94	1	2	6	52	3.7
Total	350	350		350	350		1,400	
Things get from without paid								
No	307	269	47	312	349	53	1,237	88.4
1-10,000	43	81	77	36	1	23	161	11.5
10,001-20,000	0	0	0	2	0	100	2	0.1
Total	350	350		350	350		1,400	

Source: Own calculation.

Table 4.20 Household Expenditure

Expenses (Baht per month)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within expense	Nan	Chiang mai	North Region % within expense		
< 50,000	349	349	50.4%	346	340	49.5%	1,385	98.9%
50,001-100,000	0	1	9.1%	4	6	90.9%	11	0.8%
100,001-150,000	1	0	50%	0	2	100%	2	0.1%
150,001-200,000	0	0	0%	0	1	100%	1	0.1%
> 200,001	0	0	0%	0	1	100%	1	0.1%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Earnings from family members' part time self employment can help to lighten their family burden. It is good if each family member have a great chance to make some extra money with a second job. The provided table 4.21 compare the household with and without the members who participate in part time self employment between the regions. About the part time self employment of family member, it is 63% of total household have family member spend time on their part time self employment. However, there are 11% of family members, who have part time self employment, contribute money to family. They contribute money to family for purposes such as married, ordination ceremony, funeral, religious ceremony, and family assistance.

As is presented as the dead person in family in the given table 4.22, if the dread is the main income earners for the family, family will face financial problem. Losing a family member is hard at any age. Handling a death in the family is always difficult. The financial burden has been placed on family members in full or in part. In research area, there are 3% of families loose a family member. Therefore, the impact of death burden may not much.

Table 4.21 Part Time Self Employment of Family Member

Part time self employment	District							
	Burriram	Kalasin	Northeast Region	Nan	Chiang mai	North Region	Total	% of Total
			% within occupation			% within occupation		
1.Have part time self employment	212	268	54%	244	162	46%	886	63.3%
2.Do not have part time self employment	138	82	42.8%	106	188	57.2%	514	36.7%
Total	350	350		350	350		1,400	100%
3.Members, who have part time self employment, contribute money to family								
	68	9	79.4%	10	10	20.6%	97	11%

Source: Own calculation.

Table 4.22 Dead person in family last year

Dead people	District							
	Burriram	Kalasin	Northeast Region	Nan	Chiang mai	North Region	Total	% of Total
			% within dread			% within dread		
1.Do not have dread person	334	348	50.1%	340	339	49.9%	1,361	97.2%
2.Family have the dread person	16	2	46.2%	10	11	53.8%	39	2.8%
Total	350	350		350	350		1,400	100

Source: Own calculation.

As the data are given in table 4.23, expenditure on the dread contained high percentage in the range less than 10,000 Baht in the year of 2015. The expenditure in the range of 10,001-20,000 Baht, 20,001-30,000 Baht and 40,001-50,000 Baht had the same percentage around 18%. The highest amount of money, which family paid for the dread is 100,000 Baht (table 4.23).

Table 4.23 Expenditure on the Dread

Expenditure	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within cost	Nan	Chiangmai	North Region % within cost		
< 10,000 Baht	3	2	62.5%	2	1	37.5%	8	20.5%
10,001-20,000 Baht	2	1	42.9%	2	2	57.1%	7	17.9%
20,001-30,000 Baht	6	0	85.7%	0	1	14.3%	7	17.9%
30,0001-40,000 Baht	3	0	60%	0	2	40%	5	12.8%
40,001-50,000 Baht	0	0	0%	6	1	100%	7	17.9%
50,001-60,000 Baht	1	1	66.7%	0	1	33.3%	3	7.7%
60,001-100,000 Baht	2	0	100%	0	0	25%	2	5.1%
Total	17	4		10	8		39	100%

Source: Own calculation.

4.1.5 Unemployed Family Members

The International Labor Organization definition of unemployment covers people who are: out of work, want a job, have actively sought work in the previous four weeks and available to start work within the next fortnight; or out of work and have accepted a job that they are waiting to start in the next fortnight (ILO, 2017). Any household has high number of the unemployed, that household will face with the income shortage. The data on table 4.24 is divided into two groups of employment; nearly 73% of total household are employed, while the rest of 27% of households have some family members be unemployed. Focusing on the unemployed, there is at least an unemployed in household, account for 64%. A quarter of these households have two unemployed persons. Overall, the number of unemployed in the northeast is higher than the north region.

Table 4.24 The Household with the Unemployed Family Member

	District							
Unemployed	**Burriram**	**Kalasin**	**Northeast Region**	**Nan**	**Chiang mai**	**North Region**	**Total**	**% of Total**
			% within unemployed			**% within unemployed**		
1.Yes	176	97	72.0%	74	32	28.0%	379	27.1%
2.No	174	253	41.8%	276	318	58.2%	1,021	72.9%
Total	350	350		350	350		1,400	
The number of unemployed in household								
1 person	109	61	69.7%	48	26	30.3%	244	64.4%
2 persons	38	33	73.2%	20	6	26.8%	97	25.6%
3 persons	15	2	81.0%	4	0	19.0%	21	5.5%
4 persons	9	1	83.3%	2	0	16.7%	12	3.2%
5 persons and above	5	0	100%	0	0	0%	5	1.3%
Total	176	97		74	32		379	

Source: Own calculation.

As it can be seen on table 4.25, causes of unemployment are varied. One reason for unemployment is the elderly age. When the employees are getting old, some are laid off. It is harder for the elder than the younger entering a job market even they are not in the retired age. So, workers with age 50-60 years old have the challenge to get the job position. The cause become the first rank, account for 42.7%.

The second cause is other reasons, amount for 33.5%. For example, some persons try to find the job but they do not have ability to look for job. Some new persons enter the workforce. That includes students who graduate from high school, college or any higher degree program. They look for a job that fits their new skills and qualifications. Some persons quit unfulfilling jobs. They want to search job until they find just the right opportunity.

The third cause is maternity. It is about 14.8%. Some female workers are pregnant. They must quit their work in order to take care of children. The fourth cause is health problem. Some workers have health problem such as they get prolong sickness and they must take long time to recover their health. The last cause is the disability. If the person is disabled, and unable to work, then he will have to quit his job, resulting in being unemployed.

Table 4.25 Reasons of Unemployment

	District							
Reasons	**Burriram**	**Kalasin**	**Northeast Region**	**Nan**	**Chiangmai**	**North Region**	**Total**	**% of Total**
(Rank)			**% within reason**			**% within reason**		
1.Elder/Pensioner	75	63	85.2%	23	1	14.8%	162	42.7%
2.Others:No jobs	42	23	51.2%	32	30	48.8%	127	33.5%
3.Maternity	42	2	78.6%	11	1	21.4%	56	14.8%
4.Sickness	10	3	72.2%	5	0	27.8%	18	4.7%
5.Disabled	7	6	81.3%	3	0	18.8%	16	4.2%
Total	176	97		74	32		379	

Source: Own calculation.

Table 4.26 describes most of the unemployed in household currently are looking for work account for 87%. It is very high percentage of unemployed in the northeast region attempt to find a job.

Table 4.26 Household that the Unemployed Look for Job

Job searching	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within unemployed			% within unemployed		
1.Yes	163	82	74.7%	74	9	25.3%	328	86.5%
2.No	13	15	54.9%	0	23	45.1%	51	13.5%
Total	176	97		74	32		379	

Source: Own calculation.

Data presented on table 4.27 identify that there is not much contribution of the unemployed to family. Only some of them send money to family. Almost all of them send money to family around less than 5,000 Baht per month.

Table 4.27 Money that the Unemployed send to family

Money (Baht per month)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within money			% within money		
<5,000 Baht	38	3	93.2%	2	1	6.8%	44	91.7%
5,001-10,000 Baht	2	0	100%	0	0	0%	2	4.2%
>10,000 Baht	1	0	50%	0	2	100%	2	4.2%
Total	41	3		2	3		48	

Source: Own calculation.

Although he or she has been unemployed and has been looking for a job, he or she has been performing some activities for cash or in kind. Within household, there is some households have the unemployed who perform activity for cash, accounts for 18.5% (table 4.28).

Table 4.28 The Unemployed Perform Activity for Cash

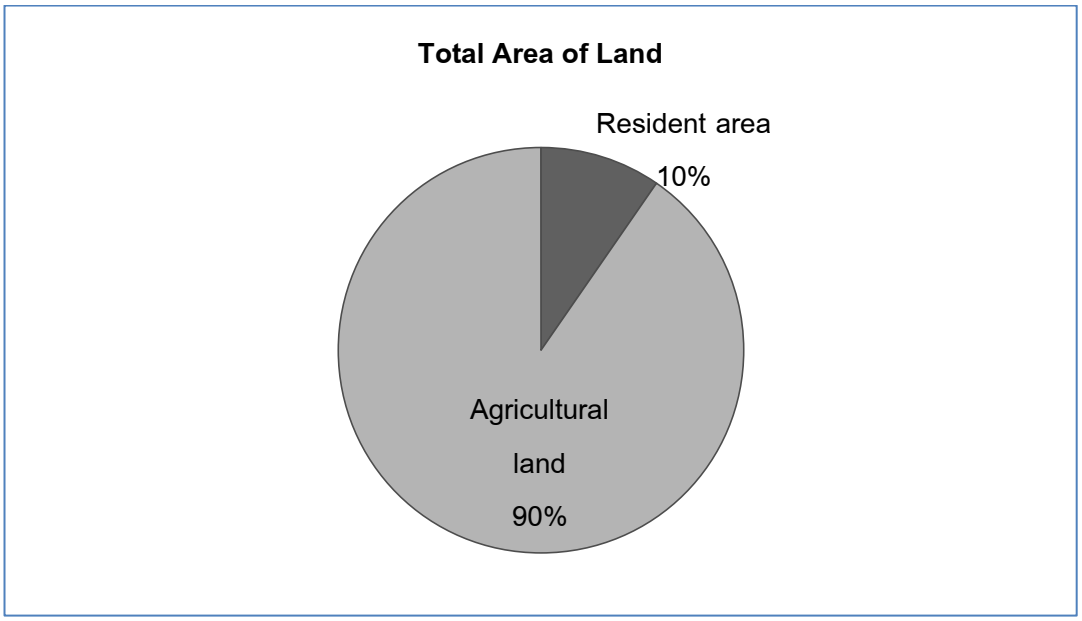
Activity	District							
	Burriram	**Kalasin**	**Northeast Region**	**Nan**	**Chiangmai**	**North Region**	**Total**	**% of Total**
			% within activity			**% within activity**		
1.Have	36	5	58.6%	14	15	41.4%	70	18.5%
2.Do not have	140	92	75.1%	60	17	24.9%	309	81.5%
Total	176	97		74	32		379	

Source: Own calculation.

4.1.6 Livelihood Assets: Natural Assets

Livelihood assets compose of natural assets, physical assets, and financial assets. In this part concentrate on natural assets, which discuss about total area of land, area owned by household member, rented or leased land, cost of rent or lease, land buying and land selling. The farm land in the north and northeast region are different depend on the kind of plant. However, the same kind of plant in both regions is paddy fields. Diagram 4.1 express the land uses, one-tenth of total area is resident area. Nine-tenths of total area is agricultural land, which consist of paddy fields, agricultural land, fruit tree, home garden, ponds, forest, pastures, fallow, etc.

Figure 4.1 Land uses

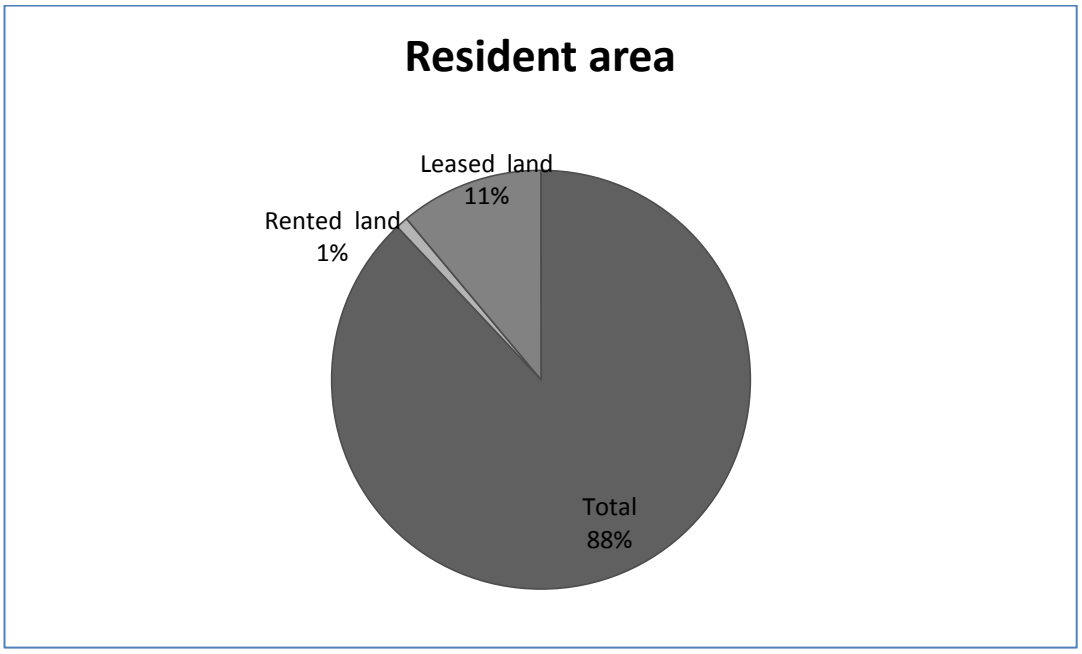


Source: Own calculation.

Chart 4.2 enumerates the resident area, which classify into rented land, leased land, and own land. Renting, also known as hiring or letting, is an agreement where a payment is made for the temporary use of a good, service or property owned by another. A lease is a contractual arrangement calling for the lessee to pay the lesser (owner) for use of an asset. About one percent of the total households in the sample rent land, whereas leased land is on an account of one tenth of total land.

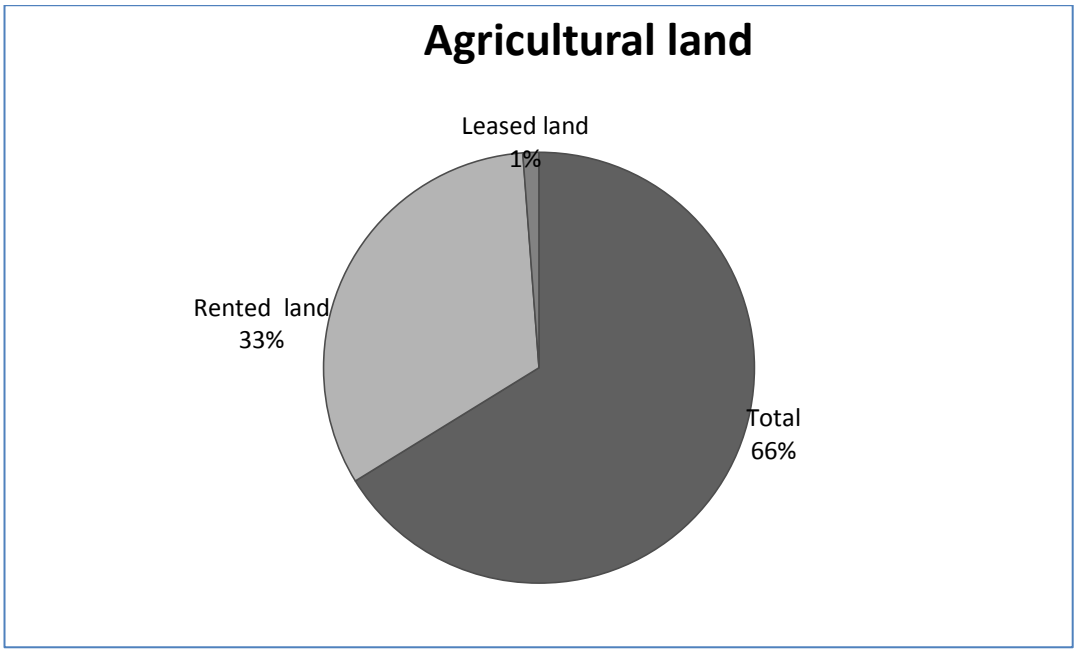
The following diagram 4.3 is similar to one that you have seen above. It denotes the agricultural land. It demonstrates that rented land cover one third of total land. On the one hand, leased land is only one tenth of total land. It expresses that many households have a fix land renting cost.

Figure 4.2 Resident Area



Source: Own calculation.

Figure 4.3 Agricultural Land



Source: Own calculation.

The information on table 4.29 provides the percentage of land buying and land selling of household. It represents that the purchasing and selling of land account for about 3%. In summary, each household has not much these transactions.

Table 4.29 Land Buying and Selling in Last Year

	District							
	Burriram	**Kalasin**	**Northeast Region**	**Nan**	**Chiangmai**	**North Region**	**Total**	**% of Total**
			% within buying			**% within buying**		
Land buying								
1.Yes	14	4	51.4%	17	0	48.6%	35	2.5%
2.No	336	346	50.0%	333	350	50.0%	1,365	97.5%
Total	350	350		350	350		1,400	
Land Selling								
1.Yes	15	3	43.9%	23	0	56.1%	41	2.9%
2.No	335	347	50.2%	327	350	49.8%	1,359	97.1%
Total	350	350		350	350		1,400	

Source: Own calculation.

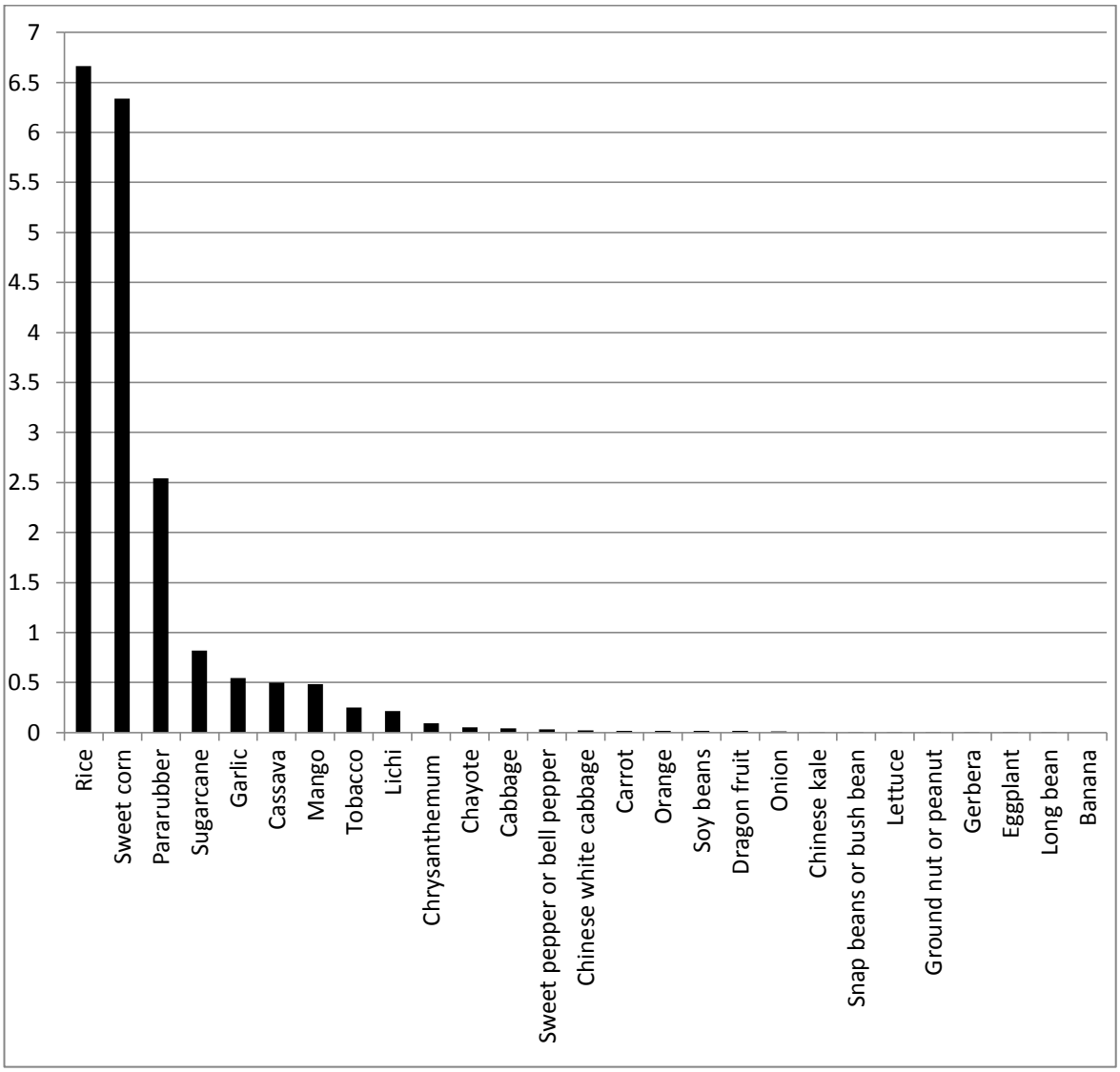
4.1.7 Physical Assets: Crop Production

The agriculture in Thailand diversifies among region. In the northern region, the area is surrounding with the mountainous upland area. The crops planted in the north are upland rice, field crops like soybean, corn. The fruits that are growing are lychee, longan, and mango. Flowers are planted widely. The lowland is the irrigated area. Rice is planted in the wet season. During the dry season, some crops are planted such as dry season rice, soybean, peanut, tobacco, sweet corn, onion, garlic, tomato, etc. All in all, cropping system in the north are rice-based cropping systems and fruit tree-based cropping system.

In the northeastern region, main crop is rainfed rice, which are grown once a year. The land in the northeast is the semi-arid plateau with sandy infertile soil. Popular crop planted is cassava, which is a cash crop. The lowland under irrigation, wet season rice is grown. In the dry season, dry season rice, soybean, peanut, and some vegetable are planted. Some kinds of fruit are planted such as mango, banana, papaya, etc. Therefore, cropping system in the northeast are rice-based cropping systems and field crop-based cropping systems.

Physical assets classify into productive assets or crop production, livestock, agricultural tools, housing and basic household equipment. The supplied bar graph 4.4 gives data on planted area of main crops. Main crop productions in research area are paddy rice, sticky rice, sweet corn, para rubber, sugarcane, garlic, cassava, mango, tobacco, litchi, chrysanthemum, chayote, cabbage, sweet pepper, Chinese white cabbage, etc. Rice is the most important crop, follow by corn or maize, pararubber and sugarcane, respectively. The average area of rice planting per household is 6.5 rai, which are classified into the small size plot. Some farmers change the type of crop planting to cash crop such as pararubber. Some farmers diversify crop planting because of market opportunity.

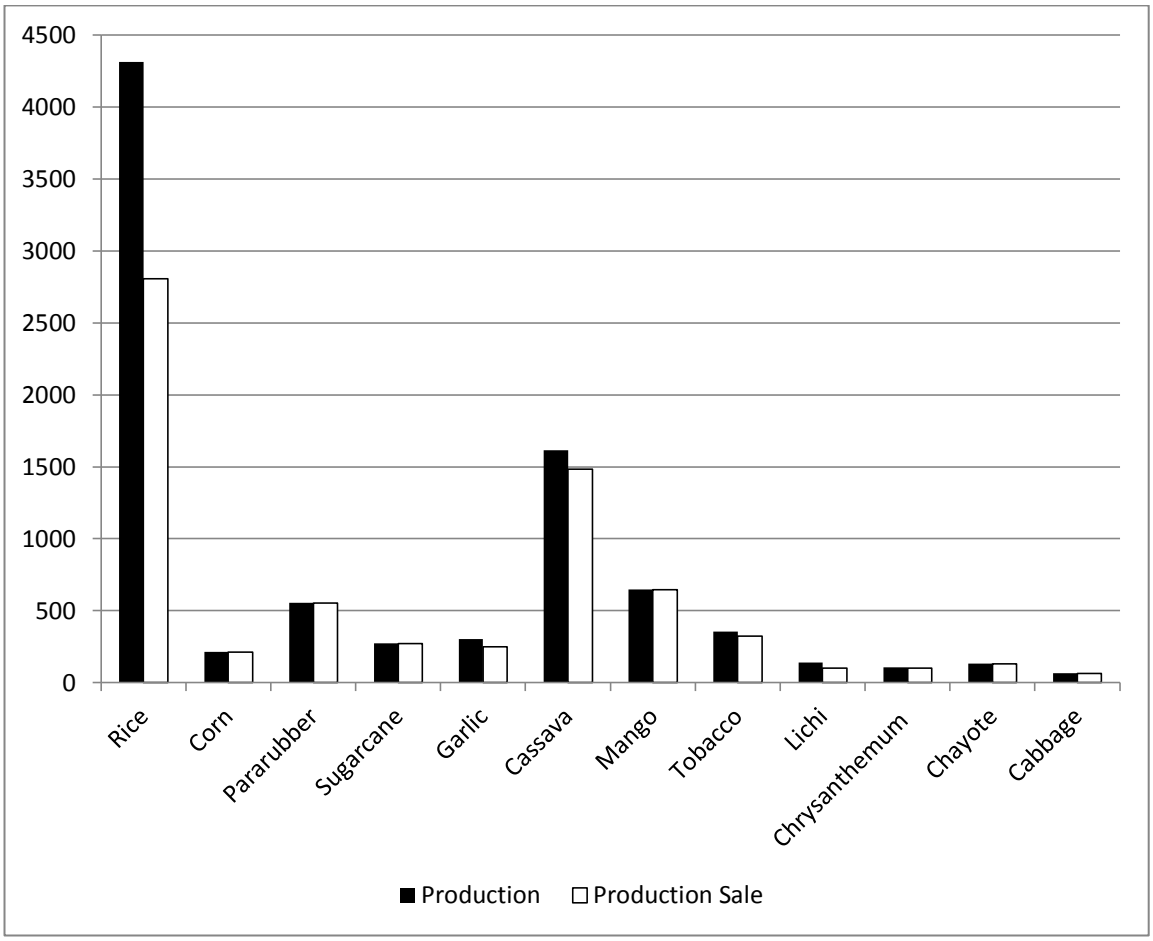
Figure 4.4 Planted Area of Main Crop



Source: Own calculation.

It is clear when looking the bar chart 4.5 comparatively that there are some difference between crop production and crop sale. Total quantity harvest of main crop compare with the total quantity of harvest sale is balanced in some kind of crops such as para rubber, sugarcane, chayote and cabbage. However, the productions of many kinds of crop are sold less than harvested quantity. The rest of productions have been kept in the storage for own consumption, sell in the proper time, give to relatives and friends. Some crop productions loss due to weather, insect, etc.

Figure 4.5 Main Crop Productions and Production Sale



Source: Own calculation.

4.1.8 Physical Assets: Livestock

Livestock feeding in research area is growing very quickly and plays an important role not only for internal household consumption but also for commercial. It has changed from backyard animals and integrated crop-livestock farming systems to industrial livestock farming system. Household in research area feed many kind of animals or poultry such as buffalos, cows, cattle, goats, sows, piglets (less than 12 kilograms), fattening pigs (more than 25 kilograms), chicken, ducks, other poultry, fish, etc. A great number of livestock feeding in research area are chickens and ducks. The high values of livestock feeding are pigs, buffalos and cows.

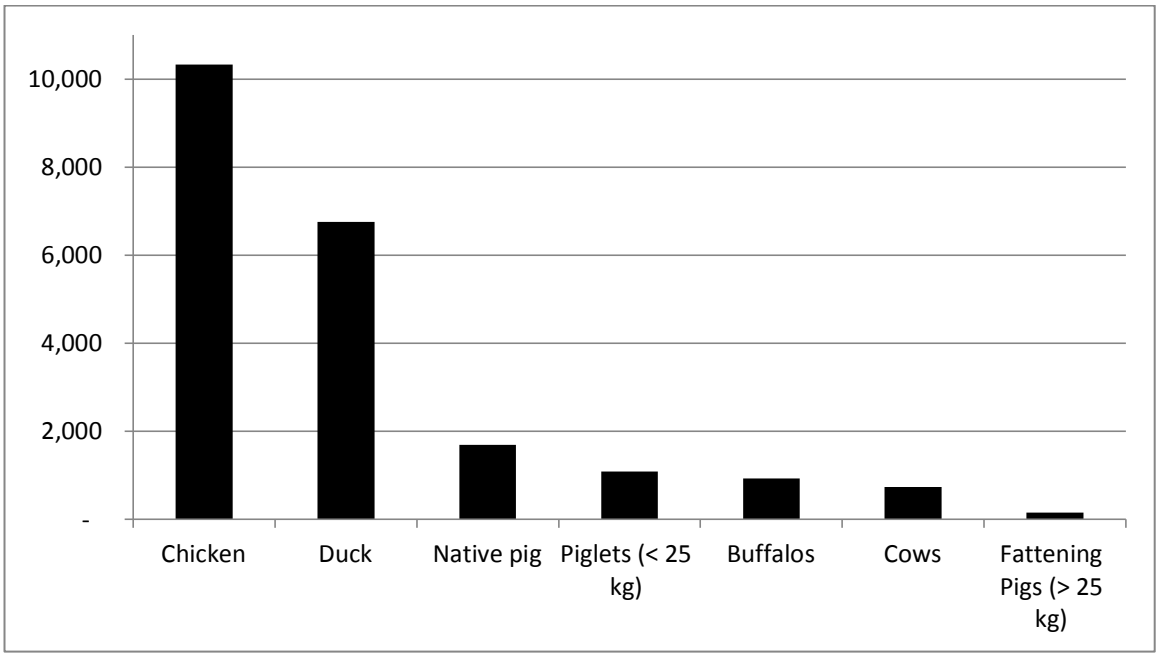
Chickens are predominantly raised by communities, representing the greatest number of livestock. Raising chickens have low cost, not complicate to feed and have high demand on production. The average number of chickens per household is 7 head.

Ducks are also feeding widely. They are easily to feed. The average number of ducks per household is 5 head. In the northern region, most farm household feed local livestock like native pigs.

Native pigs are raised by people in many villages. Farm household in the hill tribe communities raise a few indigenous pigs in order to follow local custom and religion. Native pigs are contrary to commercial pigs. Thai native grow slowly. However, they adapt to hot and humid climate, tolerate low-quality feed and are probably resistant to foot-and-mouth disease and internal parasites very well. They can stand for disease.

In contrast to the pig feeding, the importance of beef cattle and buffaloes is still low in spite of the fact that they are mostly raised by smallholders in rural areas rather than by companies (figure 4.6).

Figure 4.6 Number of Livestock Feed in Research Area



Source: Own calculation.

4.1.9 Physical Assets: Agricultural Tools, Housing and Basic Household Equipment

Agricultural tools play an important role as productive assets. For example, special building (stable, storage), processing (rice mill, food processing tools), agricultural machinery or equipment (ploughs, seeding machine, sprayer, threshing machine, water pump), means of transport (pickup car, tractor, trailer, cart, motorbike, bicycle), others (loom, generator, water tank, fishpond). Physical assets, which represent the wealth of household, are the following consumer goods: car, motorbike, bicycle, television, mobile phone, jewels, refrigerator, electric or gas cooker, housing, furniture, etc.

4.1.10 Financial Assets

A financial asset is a non-physical asset whose value is derived from a contractual claim, such as bank deposits, bonds, and stocks. Financial assets are usually more liquid than other tangible assets, such as commodities or real estate, and may be traded on financial markets (Wikipedia, 2017). Financial assets outline into credit and saving. In this first part, the study starts firstly with the access to financial services and credit. Credits are important to farmers. It can be said that credits are coupled with agricultural occupation.

The agricultural occupation is important for Thai economy as a source of foreign currency earning. It also employed the majority of the population. Howbeit, the problem with the agricultural occupation is poverty. Farmer's income is less than other occupations, and this disparity grew every year. Furthermore, the disparity in farm income by region is remarkable; especially the difference between farmers in developed central region and farmer in the less developed north and northeast region. Farmers in the north and northeast region have problem with lack of water resource, dry and cold weather, soil fertility, and logistic. Thereafter, farmers face the problem of production loss, deficit and finance. The credit problems of farmers are exacerbated by the bad weather. According to credit, household's debt is average 45% of total household. Many farmers have difficulty paying off loan (table 4.30).

Table 4.30 Debt

	District							
.Debt	Burriram	Kalasin	Northeast Region % within debt	Nan	Chiangmai	North Region % within debt	Total	% of Total
1.No	179	214	51.0%	227	151	49.0%	771	55.1%
2.Yes	171	136	48.8%	123	199	51.2%	629	44.9%
Total	350	350		350	350		1,400	

Source: Own calculation.

The purposes of loan divide into agricultural loan and non agricultural loan. Agricultural loan can be help when farmers are shortage capital to operate farm. Agricultural loans are categorized as short-term, intermediate-term or long-term, depending on their maturity. Lenders often define loans by the terms of loan such as a short term loan usually matches the length of agricultural production cycle (e.g., 3 to 18 months). The research result illustrates the purpose of loan is mostly for agriculture work, stand at 74%. Most household in the northern region borrow for agricultural work (65%), while the northeastern household borrow for non agricultural work (88%). Non agricultural loan, for example, some household ask for loan to relief household spending such as car loan, housing loan, education loan, etc (table 4.31).

Table 4.31 Purpose of Borrowing

Purpose	District						Total	% of Total
	Buriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within borrow			% within borrow		
1.Borrow for agriculture work	80	84	35.2%	113	189	64.8%	466	74.1%
2.Borrow for non agriculture work	91	52	87.7%	10	10	12.3%	163	25.9%
Total	171	136		123	199		629	100

Source: Own calculation.

Formal financial institutions are known well by household. Farmers can obtain loans from government financial institutions for agriculture, commercial banks and private money lenders in Thailand. Nevertheless, small-scale farmers encounter the limitation of loan access, and high interest rate. The Bank for Agricultural and Agricultural Cooperatives (BAAC) is the only government agricultural bank to provide loans for small scale farmers with low interest rate. That is why there are a numerous famers apply loan from BAAC reach to the highest percentage at 79%. The next

popular source of loan is commercial bank. It also employed about 8% of the total. The other loan sources are village fund, money lender, cooperatives, family, relatives and friends, government housing bank, village headman, middle trader, government saving bank, credit or saving group, etc. In this study, borrowing relies on private capital or informal credit, about 4.9% (table 4.32).

Table 4.32 Source of Loan

Source of debt (Rank)	District						Total	% of Total
	Buriram	Kalasin	Northeast Region % within debt	Nan	Chiangmai	North Region % within debt		
1.Bank for agricultural and agricultural co-operatives (BAAC)								
	88	128	43.3%	122	161	56.7%	499	79.3%
2.Commercial bank	28	2	57.7%	1	21	42.3%	52	8.3%
3.Village fund	21	3	100%	0	0	0%	24	3.8%
4.Bussiness man, money lender								
	13	1	100%	0	0	0%	14	2.2%
5.Cooperatives	11	1	100%	0	0	0%	12	1.9%
6.Family, relatives and friends								
	7	1	80%	0	2	20%	10	1.6%
7.Government housing bank	0	0	0%	0	8	100%	8	1.3%
8.Village headman	0	0	0%	0	5	100%	5	0.8%
9.Middle trader	2	0	100%	0	0	0%	2	0.3%
10.Government saving bank	0	0	0%	0	2	100%	2	0.3%
11.Credit/saving group	1	0	100%	0	0	0%	1	0.2%
Total	171	136		123	199		629	

Source: Own calculation.

Within this survey group, a little bit more than a half of farm households have no debt. Main reason of not borrowing is having enough own money, about 75%. The other reasons are afraid of debts, no enough collateral, no guarantee person, not trust the bank, complicate lending condition or conditions are too difficult or not acceptable, no investment possibilities, illiterate (table 4.33).

Table 4.33 Reason of Not Borrowing Money

Reason (Rank)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within reason	Nan	Chiangmai	North Region % within reason		
1.Have enough own money	140	159	51.9%	192	85	48.1%	576	74.7%
2.Afraid of debts	29	39	62.4%	27	14	37.6%	109	14.1%
3.No /not enough collateral	5	10	30.0%	2	33	70%	50	6.5%
4.No guarantee person	0	3	30.0%	6	1	70%	10	1.3%
5.Not trust the bank	1	0	10.0%	0	9	90.0%	10	1.3%
6.Complicate lending condition or not acceptable	2	3	71.4%	0	2	28.6%	7	0.9%
7.No investment possibilities	1	0	20.0%	0	4	80%	5	0.6%
8.Illiterate	1	0	25.0%	0	3	75%	4	0.5%
Total	179	214		227	151		771	

Source: Own calculation.

Debt is all liabilities that require payment or payments of interest to the creditor at a date in the future. The lowest range of debt is the range below 50,000 Baht, account for 51.4%. The highest range of debt is the range above 500,001 Baht, amount for 0.6%. The debt in the range of 50,001-100,000 Baht is quite high at 36.4% (table 4.34).

Table 4.34 Total Debt

Debt (Baht)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within debt	Nan	Chiangmai	North Region % within debt		
< 50,000	112	71	56.7%	67	73	43.3%	323	51.4%
50,001-100,000	31	45	33.2%	43	110	66.8%	229	36.4%
100,001-150,000	2	10	66.7%	4	2	33%	18	2.9%
150,001-200,000	10	5	71.4%	4	2	29%	21	3.3%
200,001-250,000	4	1	50%	3	2	50%	10	1.6%
250,001-300,000	1	3	33.3%	2	6	66.7%	12	1.9%
350,001-400,000	2	0	50%	0	2	50%	4	0.6%
450,001-500,000	6	1	87.5%	0	1	13%	8	1.3%
> 500,001	3	0	75%	0	1	25%	4	0.6%
Total	171	136		123	199		629	100%

Source: Own calculation.

In lending agreement, collateral is a borrower's pledge of things (property, land, consumer goods, etc) to lender, to secure repayment of loan. The collateral serves as a lender's protection against a borrower's default. It can be used to offset the loan if the borrower fails to pay the principal and interest rate. The most favorite collateral uses are land and property at 42%, and guarantee person at 39%. A 17.5% of total respondents access credit without collateral. The other kinds of collateral are requested for these credits are agricultural production, consumer goods and animals (table 4.35).

Table 4.35 Collateral for Credit

	District							
Collateral (Rank)	**Burriram**	**Kalasin**	**Northeast Region % within collateral**	**Nan**	**Chiangmai**	**North Region % within collateral**	**Total**	**% of Total**
1.None	44	8	47.3%	11	47	52.7%	110	17.5%
2.Land, property	67	71	52.1%	38	89	47.9%	265	42.1%
3.A guarantee person	56	53	44.3%	74	63	56%	246	39.1%
4.Agricultural production	1	3	100%	0	0	0%	4	0.6%
5.Consumer Goods	2	1	100%	0	0	0%	3	0.5%
6.Animals	1	0	100%	0	0	0%	1	0.2%
Total	171	136		123	199		629	100%

Source: Own calculation.

Debt is a common feature of farm works. Yet, the timing of debt payoff date is the critical and pressure time. The debtor feels pressure to pay off in finite time. Luckily, nearly 50% of the borrowers are able to pay back the credit in time. Only 3% of them are already paid. On the other hand, about 27.5% of total borrowers fail to pay

back the credit in time. Lastly, the other borrowers feel uncertainly to repay debt in time, providing for 20.3% (table 4.36).

Table 4.36 Ability to Pay Back the Credit In Time

Pay back	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within pay			% within pay		
1.No	34	27	35.3%	37	75	64.7%	173	27.5%
2.Yes	92	81	56%	65	71	44%	309	49.1%
3.Maybe	43	26	53.9%	20	39	46%	128	20.3%
4.Already paid	2	2	21.1%	1	14	79%	19	3%
Total	171	136		123	199		629	100

Source: Own calculation.

Being in debt isn't great. Being unable to pay debt is even worse. There are many reasons why some respondents may not be able to pay their debts. Looking at the information in table 4.37 in more detail, we can see that the most unable to pay debt reason is no cash available, amounting for 53.5%. The next hardship reason is they must pay back to another moneylender since they may apply for more than one source of credit, account for 14%. Some of the other hardships are: must pay for social cost, too high expenses for education, must pay for factor of production, failed business or can not sell harvest, high diary expenses, must give money to family, bad harvest, property damage and must pay for construction work, unexpected medical bills, unexpected animal loss and died and high Interest rate. The consequences if they do not pay back the credit in time, their security rather be seized, or do not get new credit.

Table 4.37 Reason of Unable to Pay Back

Pay back (Rank)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within pay	Nan	Chiangmai	North Region % within pay		
1.No cash available	32	30	38.5%	47	52	61.5%	161	53.5%
2.Paid back moneylender	10	1	26.2%	0	31	73.8%	42	14%
3.Must pay for social cost	2	0	11.8%	0	15	88.2%	17	5.6%
4. Too high expenses for education	7	9	100%	0	0	0%	16	5.3%
5.Must pay for factor of production	5	4	60%	4	2	40.0%	15	5.0%
6.Failed business or can not sell harvest	6	1	53.8%	0	6	46.2%	13	4.3%
7. High diary expenses	4	1	50%	0	5	50%	10	3.3%
8.Must give money to family	2	6	100%	0	0	0%	8	2.7%
9.Bad harvest	3	1	57.1%	3	0	42.9%	7	2.3%
10.Property damage and must pay for construction work	3	0	50%	0	3	50.0%	6	2%
11.Unexpected medical bills	2	0	50%	2	0	50.0%	4	1.3%
12.Unexpected animal loss and died	0	0	0%	1	0	100.0%	1	0.3%
13.High Interest rate	1	0	100%	0	0	0%	1	0.3%
Total	77	53		57	114		301	

Source: Own calculation.

This second part of financial assets is the accessing to financial services and savings. Saving is the difference between a disposable income (wages, income of the self employed and net property income) and its consumption (expenditure on goods and services). The family with the greater savings is in a much better financial situation. Table 4.38 summarizes that approximately half of the survey people have saving at the moment.

Table 4.38 Saving

Saving	District						Total	% of Total
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region		
			% within saving			% within saving		
Yes	207	125	47.9%	173	188	52.1%	693	49.5%
No	143	225	52.1%	177	162	47.9%	707	50.5%
Total	350	350		350	350		1,400	

Source: Own calculation.

Table 4.39 outlines the amount of cash savings is mostly in the range below 50,000 Baht, about 77.5%. The next second range is 50,001-100,000 Baht with 13.7%. There is a smaller percentage of respondents who have saving in the higher saving range.

Saving and insurance are related. At present, there are many different insurance plans. Some special type of insurance plan such as insurance savings plans offer both protection and are a disciplined way to save regularly. Generally, insurance is a pattern of risk management primarily used to hedge against the risk or uncertain loss. Therefore, it is a means of protection from financial loss. However, according to this survey, table 4.40 presents information about the insurance member. It is realized that the insurer is the smaller group than the non insurer, providing for 41% of total respondents.

Table 4.39 Total saving

Saving (Baht)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within saving	Nan	Chiangmai	North Region % within saving		
< 50,000	169	85	47.3%	135	148	52.7%	537	77.5%
50,001-100,000	21	23	46.3%	26	25	53.7%	95	13.7%
100,001-150,000	7	8	75.0%	1	4	25.0%	20	2.9%
150,001-200,000	2	1	18.8%	7	6	81.3%	16	2.3%
200,001-250,000	1	0	100.0%	0	0	0.0%	1	0.1%
250,001-300,000	1	2	42.9%	1	3	57.1%	7	1.0%
300,001-350,000	1	0	50.0%	0	1	50.0%	2	0.3%
350,001-400,000	0	2	66.7%	1	0	33.3%	3	0.4%
400,001-450,000	0	2	100.0%	0	0	0.0%	2	0.3%
450,001-500,000	3	2	62.5%	2	1	37.5%	8	1.2%
> 500,001	2	0	100.0%	0	0	0.0%	2	0.3%
Total	207	125		173	188		693	100%

Source: Own calculation.

Table 4.40 Insurance

Insurance (Baht)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within insurance	Nan	Chiangmai	North Region % within insurance		
No	130	130	31.6%	258	305	68.4%	823	58.8%
Yes	220	220	76.3%	92	45	23.7%	577	41.2%
Total	350	350		350	350		1400	

Source: Own calculation.

4.1.11 Group Membership and Social Networks

Socials are crucial for human. Human and social can not separately. Human is social animal. Social animal interact highly with other animals in the same species. Human stay in group, have the relationships between individuals and help together. A social group defines as two or more people who interact with one another, share similar characteristics, and have a sense of unity. When social are larger, more social groups connecting together become social network. A social network is a group of connections between two or more people based on variety of relationships. The network connections are based on kinship, labor exchanges, same rice mill using, agricultural equipment and temples sharing. These networks transfer the information flows between people, across households, and between villages. Kinship network is a typical social network, which connect ties based on relationship of blood or marriage. Other social networks types are more loosely.

The table 4.41 below shows the respondent or any other household members join any group or network. The most popular social group is agricultural group, which reveal 55% of total respondents since main occupation of them is agricultural work. The second popular group is housewife group, counting for 21%. For the reason that in many local villages, there are the housewife group joining together to produce local product such as basket, dried fruit, silk cloth, etc. The third group is village committee group, which is about 19%. The rest groups are Tambon administration group, elderly group, bank credit group, village head group, one Tambon one product group (OTOP), informal credit group, village agricultural product storage group.

Human beings may sometimes enter very difficult times. The group can help them to solve the difficulties. That is why people come together to join the group. As is observed from the given data in table 4.42, nearly a half of sample join the group because his neighbors or friends are members. About 31% of survey people participates the group since they want to get the information. It is 11% of them give the reason that advantage of group is giving them the opportunity to meet other people. Besides, there is 5% of interviewee’s answer that they can exchange product when

they join the group. Around 2% of overall group members think that group can help if problem occurs. The others 1% of members gain benefits from the group due to group can help to access credit. The other respondents think that they join the group since family or relatives are members and they can access inputs.

Table 4.41 Family Members Join in Group

Group (Rank)	District						Total	% of Total
	Buriram	Kalasin	Northeast Region % within group	Nan	Chiangmai	North Region % within group		
1.Agriculture group	100	124	45.7%	87	179	54.3%	490	54.7%
2.Housewife group	45	24	36.7%	90	29	63.3%	188	21.0%
3.Village committee group	12	39	30.7%	115	0	69.3%	166	18.5%
4.Tambon administration group	4	1	17.2%	0	24	82.8%	29	3.2%
5.Elderly group	6	0	100%	0	0	0%	6	0.7%
6.Bank credit group	4	1	100%	0	0	0%	5	0.6%
7.Village head group	3	0	75.0%	0	1	25.0%	4	0.4%
8.OTOP	3	0	100%	0	0	0%	3	0.3%
9.Informal credit group	1	0	33.3%	0	2	66.7%	3	0.3%
10.Village agricultural product storage group	1	0	100%	0	0	0%	1	0.1%
Total	179	189		292	235		895	

Source: Own calculation.

Table 4.42 Reason of Joining the Group

Reasons (Rank)	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within reason	Nan	Chiangmai	North Region % within reason		
1.Neighbors/friends are members	1	81	19.2%	249	96	80.8%	427	47.7%
2.Get information	72	91	58.6%	43	72	41.4%	278	31.1%
3.Opportunitiy to meet other people	78	5	82.2%	0	18	17.8%	101	11.3%
4.Exchange of product	6	1	15.6%	0	38	84.4%	45	5.0%
5.Other people help if problem occurs	5	6	57.9%	0	8	42.1%	19	2.1%
6.Access to credit	9	2	78.6%	0	3	21.4%	14	1.6%
7.Family/relatives are members	4	2	100%	0	0	0%	6	0.7%
8.Access to inputs (seeds, fertilizer, pesticides)	4	1	100%	0	0	0.0%	5	0.6%
Total	179	189	41.1	292	235	58.9	895	100%

Source: Own calculation.

As is presented in table 4.43, initially, among the persons who are joining the group, they have no contribution for joining the group, account for 21.5%. On the contrary, there are a lot of group members contribute for joining the group by spending time for group (35.3%), being the committee (31.5%), paying membership fee (8%), and helping in other ways (3.7%).

Table 4.43 Contribution for Joining the Group

Help to group	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within help	Nan	Chiangmai	North Region % within help		
1.No contribution	0	4	2.1%	187	1	97.9%	192	21.5%
2.Spend time for group	79	141	69.6%	21	75	30.4%	316	35.3%
3.Be the committee	42	35	27.3%	75	130	72.7%	282	31.5%
4.Pay membership fee	42	4	63.9%	0	26	36.1%	72	8.0%
5.Others: hosting, give services, help some group's work for free	16	5	63.6%	9	3	36.4%	33	3.7%
Total	179	189		292	235		895	

Source: Own calculation.

4.1.12 Individual Risks, Shocks, Risk Management and Emerging Costs

This part describes about individual risks, shocks and emerging costs occurred to household and the reaction of household on selecting the adaptive and coping strategies to manage risks. Furthermore, the severity of risks and the number of risk attack households are also discussed.

The discussion classified by time line, beginning with the experienced asset, risks or shocks and emerging costs of household during last year, last five years, and expected risk occurred in the future.

Vulnerability and risk are deeply associated, as Alwang, Siegel and Jorgensen state: “households are vulnerable to suffering an undesirable outcome, and this vulnerability comes from exposure to risk. Risk is characterized by a known or unknown probability distribution of events. These events are themselves characterized by their magnitude (including size or spread), their frequency and duration, and their history; all of which affect vulnerability from the risk” (Alwang et al. 2002: p. 3).

There were more than one risk hit households in each period. The analysis of risks show only the first risk refers most by households. The most occurred risks experienced by households during the last year are natural, physical and financial risks. Human and social risks are also rank in top ten risks as well.

The provided graph compares top ten risks hit household of four provinces namely Burriram, Kalasin, Nan and Chiangmai for the year 2013. Figure 4.7 and table 4.44 provides the risk which happened to household in last year classified by province. It presented the ranking of main experienced risks of farm household in last year (2013). Sudden moving away of working family member and breaking ties (no money flow) is the top household concern, with 23% saying that this is what they worry about most. Crop loss from insect and plant diseases is next, with 20%. Theft of crops (12%), Land slide (9%), loss of house from flood (6%), fire (5%), crop loss from weather (4%), damage of house from weather (4%), flood (4%), and low crop production (2%) complete the top ten local concerns. The other important risks, which are also important but those are not range in top ten risks hit household, are damage

of storage, theft of goods, local heavy wind, hailstone, theft of livestock, local heavy rainfall, drought, costs for other ceremonies, prolonged sickness of household head, self-financed for death of pig (disease), credit-financed for death of duck, birth of son, divorce costs and funeral costs.

Figure 4.7 Main Risks of Farm Household in last year (2013)

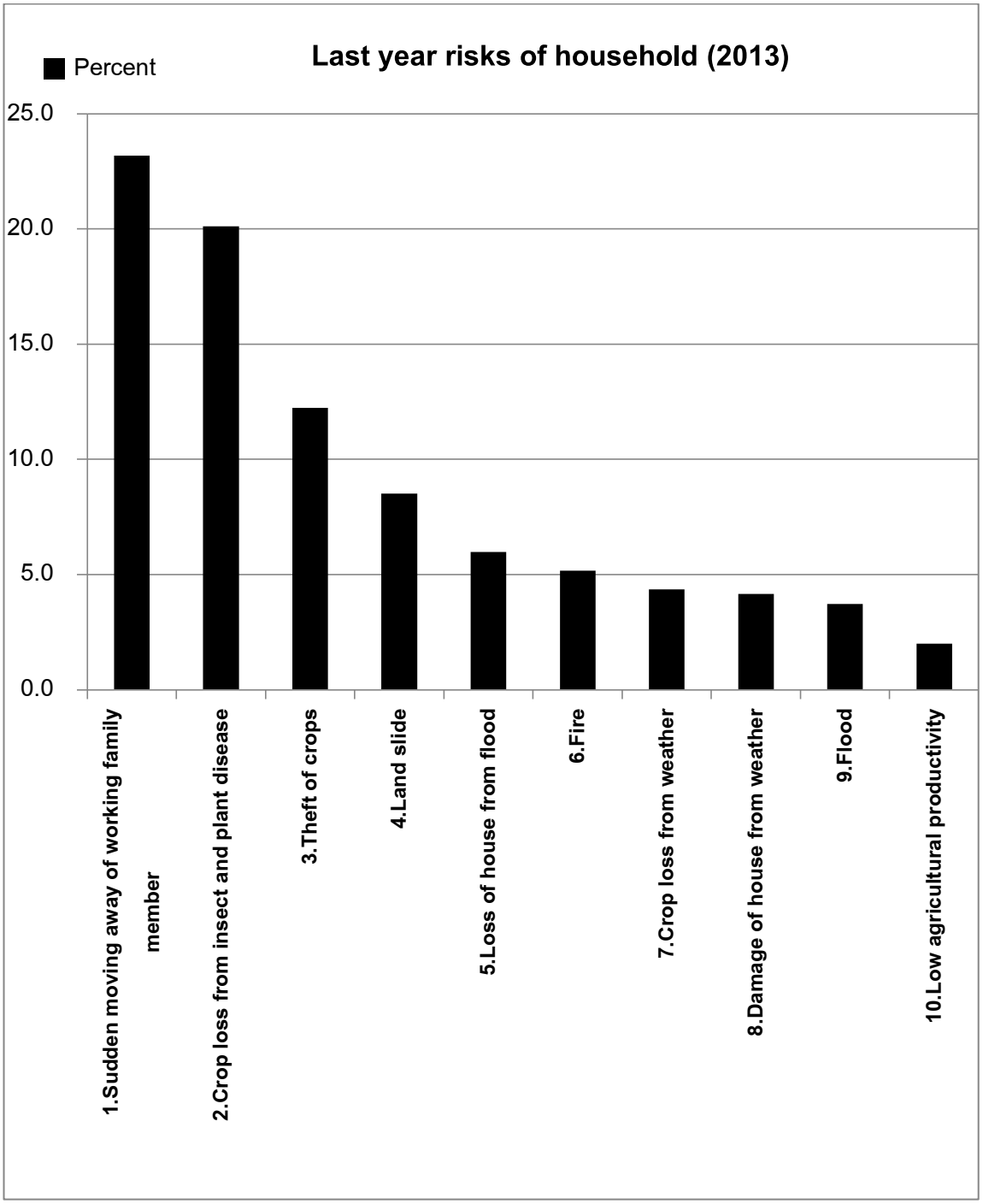


Table 4.44 Last Year Risks

Last year risk	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
1.Sudden moving away of working family member	104	87	40	25	256	23.2%
2.Crop loss from insect and plant disease	17	46	110	49	222	20.1%
3.Theft of crops	0	27	87	21	135	12.2%
4.Land slide	38	7	5	44	94	8.5%
5.Loss of house from flood	37	1	8	20	66	6.0%
6.Fire	11	0	0	46	57	5.2%
7.Crop loss from weather	18	11	14	5	48	4.3%
8.Damage of house from weather	14	14	3	15	46	4.2%
9.Flood	30	5	1	5	41	3.7%
10.Low agricultural productivity	3	4	8	7	22	2.0%
11.Damage of storage	1	2	1	18	22	2.0%
12.Theft of goods	11	6	5	0	22	2.0%
13.Local heavy wind	7	0	0	11	18	1.6%
14.Hailstone	12	2	0	1	15	1.4%
15.Theft of livestock	3	0	0	8	11	1.0%
16.Local heavy rainfall	7	0	0	0	7	0.6%
17.Drought	4	0	0	1	5	0.5%
18.Costs for other ceremonies	0	2	2	0	4	0.4%
19.Prolonged sickness of household head	0	3	1	0	4	0.4%
20.Self-financed for death of pig (disease)	0	0	1	1	2	0.2%
21.Credit-financed for death of duck	0	2	0	0	2	0.2%
22.Birth of son	1	1	0	0	2	0.2%
23.Divorce costs	0	1	0	1	2	0.2%
24.Funeral costs	0	1	0	0	1	0.1%
Total	**318**	**222**	**286**	**278**	**1,104**	

Source: Own calculation.

As it can be seen in figure 4.8 and table 4.45, main risks hit farm households in last five year during 2009 to 2013 were crop loss due to insect and plant diseases, drought, low agricultural productivity, flood, theft of producer goods, high input price, low price of production, crop loss from weather, theft of crop and working disability (accident) of household head.

Figure 4.8 Main Risks of Farm Household in Last Five Year (2009-2013)

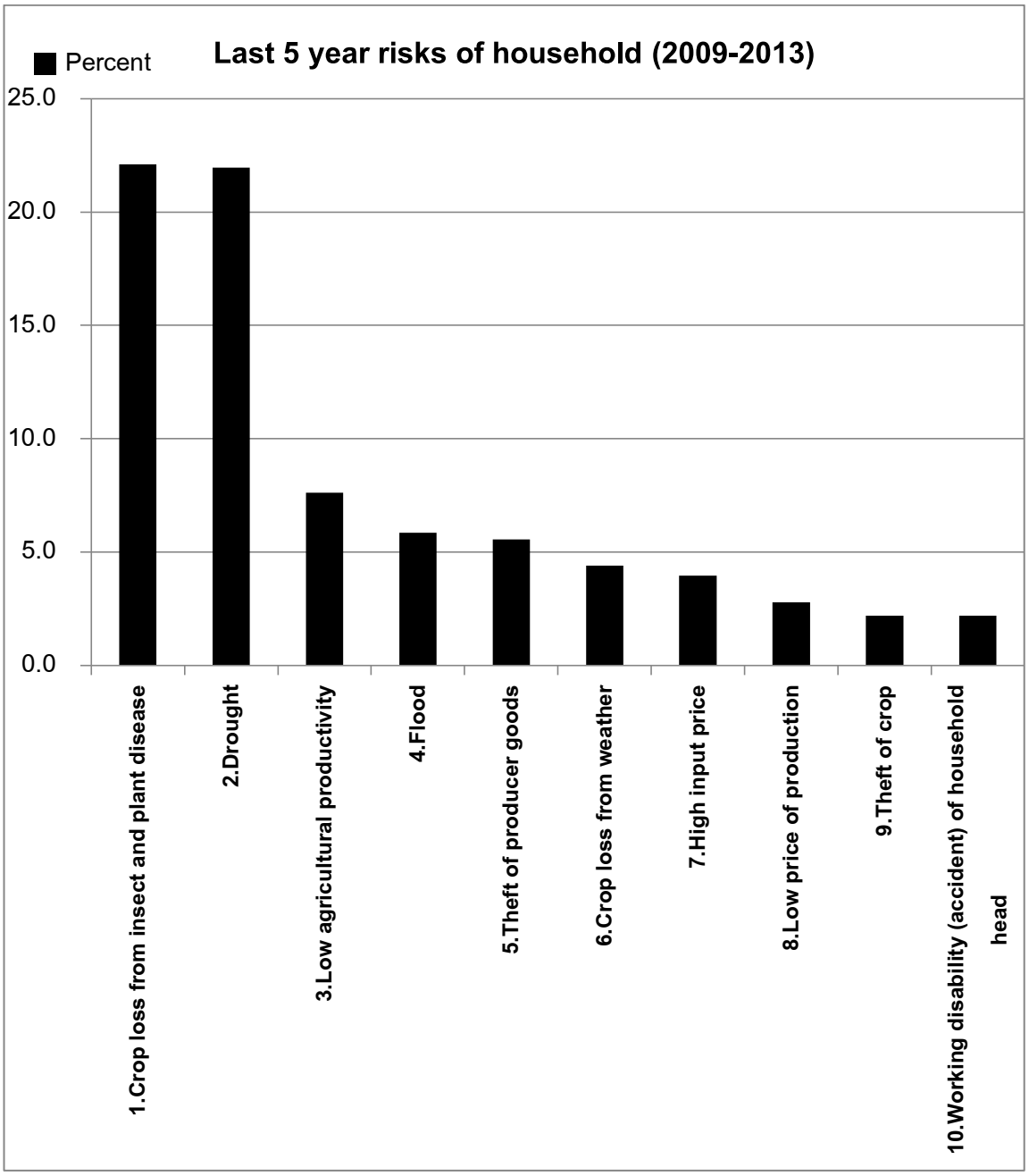


Table 4.45 Last Five Year Risks

Last five year risk	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
1.Crop loss from insect and plant disease	22	11	71	47	151	22.1%
2.Drought	49	46	29	26	150	22.0%
3.Low agricultural productivity	11	6	31	4	52	7.6%
4.Flood	23	10	3	4	40	5.9%
5.Theft of producer goods	2	0	0	36	38	5.6%
6.Crop loss from weather	12	0	0	21	33	4.8%
7.High input price	20	0	8	2	30	4.4%
8.Low price of production	17	1	4	5	27	4.0%
9.Theft of crop	0	0	0	15	15	2.2%
10.Working disability (accident) of household head	2	0	0	13	15	2.2%
11.Local heavy wind	7	4	3	0	14	2.0%
12.Unemployment	9	3	1	0	13	1.9%
13.Divorce costs	0	0	0	11	11	1.6%
15.Death of other working family member	1	6	3	0	10	1.5%
16.Working disability (accident) of other family member	2	0	0	8	10	1.5%
17.Local heavy rainfall	8	0	0	1	9	1.3%
18.Other: debt, no land, be cheated	2	0	0	7	9	1.3%
19.Working disability (disease) of household head	0	0	0	7	7	1.0%
20.Chronic disease of household head	0	4	0	2	6	0.9%
21.Sudden moving away of working family member	5	0	0	0	5	0.7%

Table 4.45 Last Five Year Risks (Continue)

Last five year risk	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
22.Chronic disease of other family member	2	1	0	2	5	0.7%
23.Damage of storage	0	0	0	4	4	0.6%
24.Death of household head	2	0	0	1	3	0.4%
25.Land slide	2	0	0	0	2	0.3%
26.Fire	2	0	0	0	2	0.3%
27.Loss of house from flood	0	1	1	0	2	0.3%
28.Theft of livestock	0	2	0	0	2	0.3%
29.Wedding costs	1	0	0	1	2	0.3%
30.Costs for other ceremonies	2	0	0	0	2	0.3%
31.Old age	2	0	0	0	2	0.3%
32.Prolonged sickness of household head	0	0	0	2	2	0.3%
33.Drug problems	0	0	0	2	2	0.3%
34.Damage of house	1	0	0	0	1	0.1%
35.Birth of son	1	0	0	0	1	0.1%
36.Funeral costs	1	0	0	0	1	0.1%
37.Ethnic discrimination	0	0	0	1	1	0.1%
38.Alcohol problems of household head	1	0	0	0	1	0.1%
39.Drug problems of household head	0	0	0	1	1	0.1%
40.Gambling of household head	1	0	0	0	1	0.1%
41.Gambling of other family member	1	0	0	0	1	0.1%
Total	211	95	154	223	683	

Source: Own calculation.

The expected asset, risks and ranking of risks/shocks are discussed in figure 4.9. The result shows that crop loss from insect and plant diseases is ranked in the first place. The others risks that farm household forecast may encounter in the future are drought, unemployment, old age, low agricultural productivity, high input price, low price of production, crop loss from weather, theft of producer goods, and flood.

It identifies that the risks that attack households in the past affect on the decision of households on their future livelihood. According to top ten risks forecast to face in the future, there are two of human and social risks expect to occur to households, which are, unemployment, and old age situation.

According to human and social risk, unemployment is ranked first. A lot of households concern about the unemployment situation in local area perhaps a reflection of changing economic and social structure following the financial crisis. Unemployment in rural farm household occurs from many cases such as technological unemployment, casual unemployment, seasonal unemployment, graduate unemployment and voluntary unemployment from failure of farms. At present, widespread advances in technology and smart machine on farm work may displace certain types of work. The losses of works that are caused by technological change call technological unemployment. New technologies can lead to a lasting decline in the total number of workers in employment.

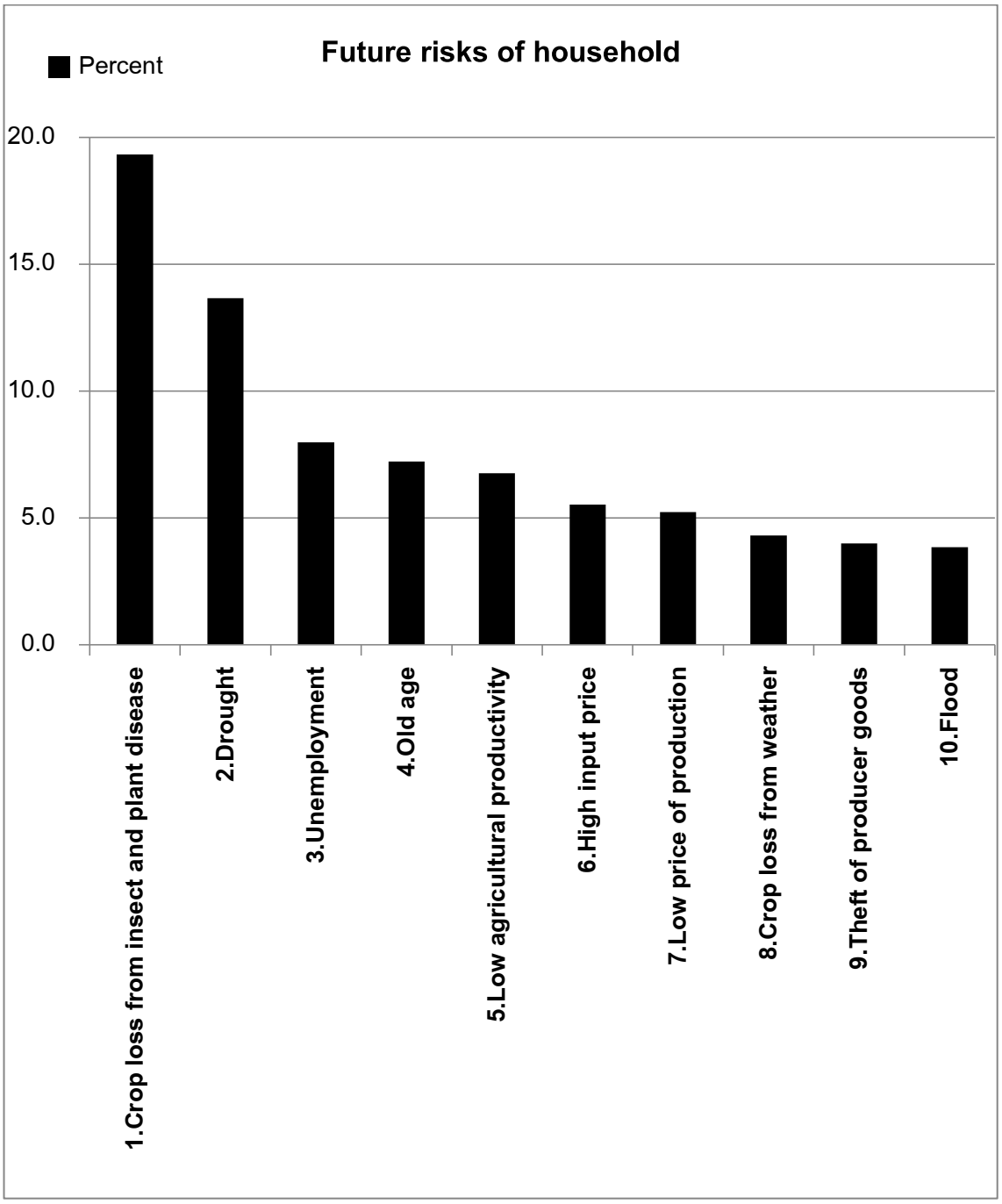
In addition, catering or agriculture work that workers are employed on a day-to-day basis, there are chances of casual unemployment occurring due to short term contracts, which are terminable any time. Therefore, when a worker’s contract ends after the completion of some farm work, he has to find a job elsewhere. Likewise, seasonal unemployment in farm work, which farmers work for only a certain period of time in a year. They work at the time of ploughing and then engage in unemployment. The problem of seasonal unemployment of farmers can be solved by making agriculture a full-time work through irrigation, fertilizers and mechanization. Another way to solve this problem, for example, doubles cropping, mixed farming, dry farming, intensive cultivation, etc.

For students, graduate employment is a major trigger of mental distress. They are worrying about getting a job but it is less opportunity to get work in rural area. The young generation selects to work on off farm occupation because their knowledge is not matching on their parent farm work. Most of them emigrate to urban or to the cities. Young people who intend to abandon farming do not help their family farm. That is why there is the decreasing in agricultural output, farm income and the number of farmers.

Furthermore, since the nature of farm work is hard, complicate, costly, and uncertainty. Farmers must to bare a catastrophic event, steady erosion or a slow coming to erosion. Farmers spend years crunching numbers, tweaking production methods, and trying to stay ahead of market trends. Despite their exhaustive efforts, the farm business is not making money. Farmers stand on the finances stabilizing in ten years. They feel that is a long time to sit in the hold and work to get out of the red. Most farmers do not decide to step away from their farm lightly but sometimes it is the only economic choice that makes sense. Thereafter, the unemployed farmers seek out off farm occupation.

Concerning to human and social risk, the research finds that the number of elder in household is in the second rank of overall top ten future risks. Many household worries about old age situation for the reason that the changing in working-age household has a significant impact on agricultural output. Additionally, the rising numbers of elder in household impose a heavy burden of old age supported by household. The more old age wave household income lower and pose challenges to the vulnerable rural household. The interviewed farm households express the opinion that it is a great challenge of government to reform the old age security system because we are going into the aging society. The rapid aging at a low-income level effects household finance shapely. Most of those old people are at the age of dis-saving.

Figure 4.9 Main Expected Risks of Farm Household in future



Source: Own calculation.

Table 4.46 Future Risks

Future risk	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
1.Crop loss from insect and plant disease	23	8	53	42	126	19.3%
2.Drought	25	27	24	13	89	13.7%
3.Unemployment	14	22	4	12	52	8.0%
4.Old age	21	18	8	0	47	7.2%
5.Low agricultural productivity	3	6	30	5	44	6.7%
6.High input price	20	4	10	2	36	5.5%
7.Low price of production	21	5	4	4	34	5.2%
8.Crop loss from weather	9	0	0	19	28	4.3%
9.Theft of producer goods	1	0	0	25	26	4.0%
10.Flood	16	7	0	2	25	3.8%
11.Other: debt, no land, be cheated	7	0	0	14	21	3.2%
12.Divorce costs	0	0	0	18	18	2.8%
13.Working disability (accident) of household head	0	0	0	13	13	2.0%
14.Theft of crop	0	0	0	11	11	1.7%
15.Local heavy wind	2	4	4	0	10	1.5%
16.Sudden moving away of working family member	10	0	0	0	10	1.5%
17.Working disability (disease) of household head	1	2	1	6	10	1.5%
18.Chronic disease of other family member	1	4	2	3	10	1.5%
19.Local heavy rainfall	4	1	1	1	7	1.1%
20.Wedding costs	0	1	0	5	6	0.9%
21.Chronic disease of household head	0	3	0	2	5	0.8%
22.Working disability (disease) of other family member	0	0	0	5	5	0.8%

Table 4.46 Future Risks (Continue)

Future risk	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
23.Damage of storage	0	0	0	4	4	0.6%
24.Death of household head	2	0	0	1	3	0.5%
25.Land slide	2	0	0	0	2	0.3%
26.Loss of house from flood	0	1	1	0	2	0.3%
27.Birth of son	2	0	0	0	2	0.3%
28.Drug problems of other family member	1	0	0	1	2	0.3%
29.Fire	1	0	0	0	1	0.2%
30.Self-financed for death of cow	0	0	0	1	1	0.2%
31.Self-financed for death of duck	1	0	0	0	1	0.2%
32.Dealth of other working family member	1	0	0	0	1	0.2%
Total	188	113	142	209	652	

Source: Own calculation.

All in all, to solve a risk we must understand what the risk is, including its severity. According to research result, crop loss from insect and plant diseases, drought, low agricultural productivity, crop loss from weather, theft of crops, and flood are also raised as the most significance risks during last year, last five year as same as future. Therefore, the policy maker can design the policy to help households to outreach from these problems.

To start with crop losses caused by pests affecting major crops grown in research area. Pests are any kind of insect, plant disease, or weed that hurt farmer's profits. Almost all of farmers spray to mitigate crop damage caused by pests. The use of toxic pesticides to manage pest problems has become a common. Nonetheless, pesticides are not only harmful and poison for human but also environment. Many farmers find out the solution by planning crop planting. Some crops can naturally withstand pest damage and grow well. Another way is crop rotation. Some farmers

grow different crops and wait for a few years before growing the same crop on the same field. Currently, organic farm is popular in Thailand. Some organic farmers also tend to spray less pesticide on their field than other farmers. It is the best way to protect crops by using a natural method. For instance, farmers keep pests away from field. Some farmers grow the plants that naturally keep the pest out, surrounding their main crops. Another way is they use a natural enemy or insects that eat that pests but do not hurt their crop. Some farmers burn diseased crops in order to stop the pest spreading to healthy crops. The next example is a lot of farmers use plastic bag to wrap mango to protect the mango skin, or to bump against the branches and also to protect disease and insect.

Then, the important risk rank is drought. Agriculture in Thailand is rain-dependent agriculture. The frequency and severity of such droughts occurs certainty. Drought problems in areas of low rainfall or planted area in northeastern region of Thailand are very seriously. Agricultural drought begins when the lack of water starts killing crops and livestock. One of the major tests of a government has been how it deals with water uncertainty. From the past, farmers use groundwater, pond. For the government sides, the irrigation project is applied to decrease drought risk. Dam project will be advantaged to keep a great amount of water during raining season. However, weather-driven production shocks or crop loss from uncertain climate or weather is really difficult to find out the solving solution. Thus, the alternative way is farmers should plan drought-tolerant plant; protect landscape during time of drought, efficient watering practices to conserve water.

Next, the third significance risk is low agricultural productivity. Quality of soil is a cause of this problem. Many farmers select the way of shifting cultivation. Shifting cultivation is the way to cultivate crop temporarily, then abandoned and revert to natural vegetation whereas the cultivator moves on to another plot. Some farmers slash and burn straw and grass but some farmers clear land without burning. After producing vegetable and grain crops on cleared land for a few years, farmers abandon it for another plot. They slash trees, bushes and forests, and burn the remaining vegetation. The ashes increase potash to soil. The seeds are sown when it rains. However, there are other causes of low agricultural productivity. Farmers input high factor of production but they get low production. The understanding of the influence of

agricultural productivity is significant, which lead to the way to solve low agricultural productivity problem. Patmasiriwat and Suewattana (2010) found there are seven factors relative to the growth of the agricultural productivity which are education, agricultural capital stock, cultivated land, price of fertilizer, expected crop price, irrigation and agricultural research expenditure, and crop location. Therefore, these factors would be the major focus for the policy makers and development workers in improving the total factor productivity. For this reason, the suggestion policy for improving agricultural productivity should firstly concentrate on farmer's education, knowledge and skill on their specific farm. Besides, government can help to support the price of fertilizer.

Afterward is crop loss from weather. Climate and weather influence their crop production year to year. The empirical research work is also finding that many farm households have problem with crop loss, which is directly related to unfavorable weather such as drought, floods, heavy rain, hail storms, too cold and too hot weather. In the north Thailand, farmers face with cold and dry weather but it is not so much problem because they substitute to plant crop that can stand on cold weather already. However, problem of variation of monsoonal rainfall and rainfall accumulation rate in June to July, typically peak in Northeast Thailand, effects on the planting in rainfed lowland rice cropping. It is far beyond the ability of general households to deal with it. In contrast, some farmers attempt to reduce the uncertainty of future climate change impacts on crop production by improving knowledge of climate influences on and management contributions to cropping area and intensity. They use climate adaptation strategies through work calendar and field workability. Additionally, some farmers improve the ability to operate farm machinery. Therefore, farmers should learn together how to response with these problems.

Lastly, theft of crops, livestock, consumer goods and producer goods are incremental important. Thieves are in barns, sheds and outbuildings. They often stole crops, cattle, tools, generators and welders. In small village, everyone knows each other. Farmers can join with community and rural neighbors to switch farm watch. For large village, each farmer has to rely on himself. As a matter of fact, farmers raise their dog to guard their field and property. The elderly parents are essentially to help

to survey and secure farm. Interestingly, modern farm apply using technology network like a video camera or smart phone to catch the theft. To sum up, the best way to prevent theft are taking stock of stuffs, locking storage, placing bright lights or motion sensor lighting around outside the house, and securing gates with chains and locks.

Table 4.47 denotes the number of household that do not have risks. It was about 80% of total household encounter with risks in last year. Half of them experienced risk during last five year. Nearly half of them expect to face future risk.

Table 4.47 Number of Household that Do Not Have Risks

	District					**% of**
No risks in	**Burriram**	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**N= 1,400**
Last year	32	128	64	72	296	21.1
Last 5 years	139	255	196	127	717	51.2
Future	162	237	208	141	748	53.4

Source: Own calculation.

The ranking of the risks in general have analyzed. After that, the calculation of the number of months that households take to recover from the above risks is discussed. The provided table 4.48 reveals most households spend short time (below one year) to recover from those risks, amount for 91.2%. The rest of them, 8.8% spend more than one year to recover from risks. It is 5.4% infer the severed risks, which will take most time to recover.

Table 4.48 Number of Month for Recovery from the Risks

Month	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within month	Nan	Chiangmai	North Region % within month		
< 1 month	2	1	2.9%	100	0	97.1%	103	7.4%
3 months	120	309	43.2%	215	350	56.8%	994	71.0%
6 months	87	17	83.9%	20	0	16.1%	124	8.9%
12 months	32	8	74.1%	14	0	25.9%	54	3.9%
18 months	45	4	98%	1	0	2%	50	3.6%
> 18 months	64	11	100%	0	0	0%	75	5.4%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Table 4.49-4.51 present risk cost at different time period. Each households face different risks. After ranking the experienced risks, households are further indicating the cost of risk. High cost of risk management implies high severity of the risks. Cost of risks are separated into last year risk cost, last five year risk cost and future risk cost. Most households express the opinion that they do not spend money on managing that all risks, occurring in different time period.

For the last year risk cost, 602 out of 1,400 households spent money to manage risks. Most of them spent around 1-10,000 Baht, at 32.5%. For the last five year risk cost, about 70% of households did not spend budget to manage risk. About 22% paid 1-10,000 Baht on those risks. For the future time, it’s hard to expect for the future. The costs of the expected risk are zero at 77% because households can not prepare or provide budget to safe themselves for the future risk.

Table 4.49 Last year risk cost

Cost	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
No cost	172	280	207	139	798	57.0%
< 10,000 Baht	138	66	142	109	455	32.5%
10,001-20,000 Baht	22	1	0	34	57	4.1%
20,001-30,000 Baht	8	1	1	20	30	2.1%
30,001-40,000 Baht	3	1	0	8	12	0.9%
40,001-50,000 Baht	1	1	0	12	14	1.0%
50,001-60,000 Baht	1	0	0	3	4	0.3%
60,001-70,000 Baht	0	0	0	3	3	0.2%
70,001-80,000 Baht	0	0	0	0	0	0%
80,001-90,000 Baht	0	0	0	0	0	0%
90,001-100,000 Baht	4	0	0	11	15	1.1%
> 100,001 Baht	1	0	0	11	12	0.9%
Total	350	350	350	350	1,400	

Source: Own calculation.

Table 4.50 Last Five Years Risk Cost

Cost	District				Total	% of Total
	Burriram	Kalasin	Nan	Chiangmai		
No cost	234	307	266	163	970	69.3%
< 10,000 Baht	88	36	82	98	304	21.7%
10,001-20,000 Baht	16	4	1	27	48	3.4%
20,001-30,000 Baht	8	2	1	14	25	1.8%
30,001-40,000 Baht	0	0	0	6	6	0.4%
40,001-50,000 Baht	1	0	0	11	12	0.9%
50,001-60,000 Baht	0	0	0	4	4	0.3%
60,001-70,000 Baht	0	0	0	1	1	0.1%
70,001-80,000 Baht	2	1	0	3	6	0.4%
80,001-90,000 Baht	0	0	0	3	3	0.2%
90,001-100,000 Baht	0	0	0	0	0	0.0%

> 100,001 Baht	1	0	0	20	21	1.5%
Total	350	350	350	350	1,400	

Table 4.51 Expected Future Risk Cost

	District					% of
Cost	**Burriram**	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**Total**
No cost	277	322	291	185	1075	76.8%
< 10,000 Baht	54	25	58	77	214	15.3%
10,001-20,000 Baht	15	1	0	35	51	3.6%
20,001-30,000 Baht	2	0	0	15	17	1.2%
30,001-40,000 Baht	1	0	0	6	7	0.5%
40,001-50,000 Baht	1	0	0	8	9	0.6%
50,001-60,000 Baht	0	2	1	2	5	0.4%
60,001-70,000 Baht	0	0	0	2	2	0.1%
70,001-80,000 Baht	0	0	0	2	2	0.1%
80,001-90,000 Baht	0	0	0	0	0	0.0%
90,001-100,000 Baht	0	0	0	8	8	0.6%
> 100,001 Baht	0	0	0	10	10	0.7%
Total	350	350	350	350	1,400	

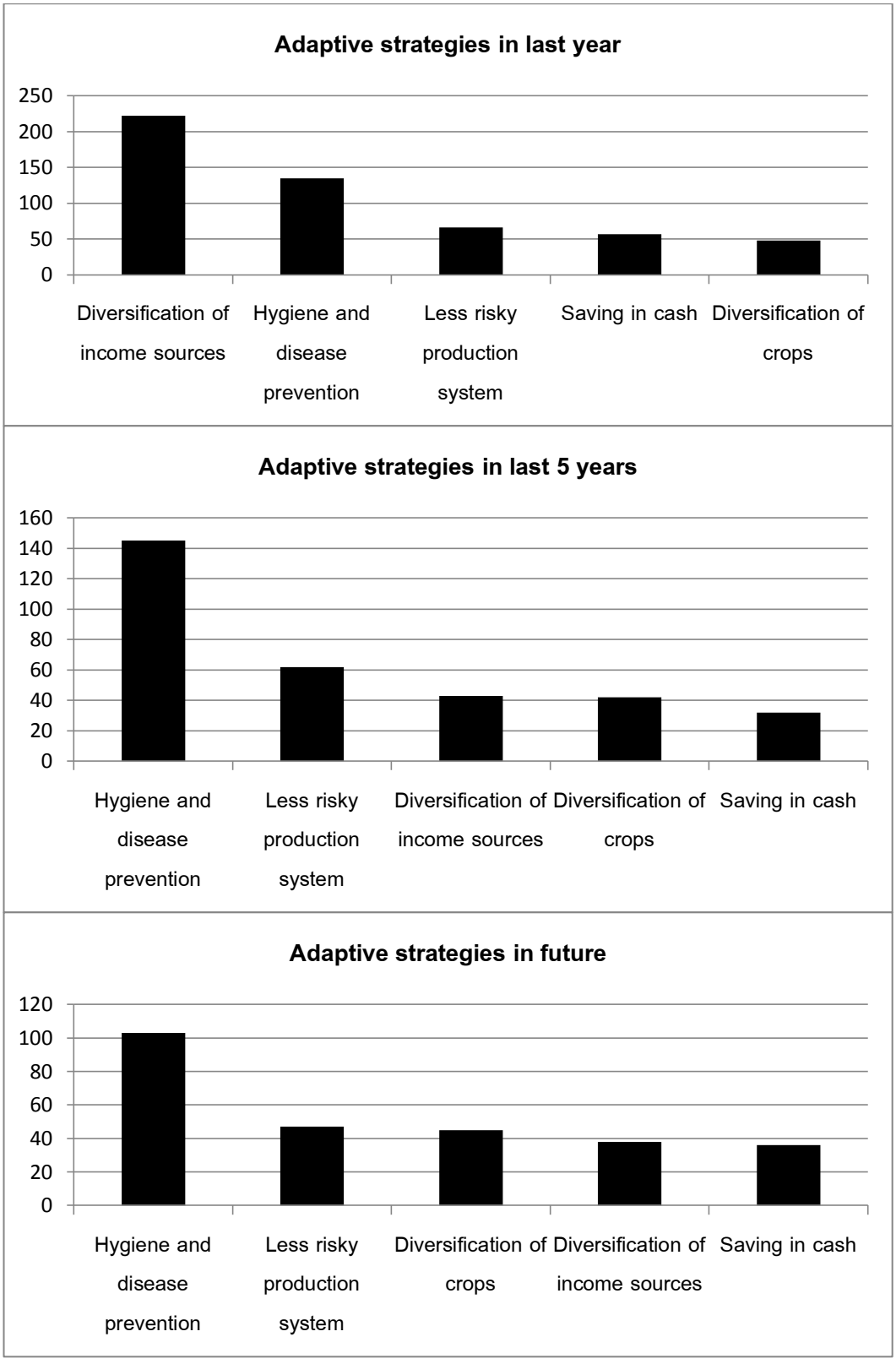
Source: Own calculation.

4.1.13 Livelihood Strategies

The livelihood strategies are classified in adaptive strategies and coping strategies. The bar graph 4.10 deals with adaptive strategies, which household implemented to cope with risk. The highest adaptive strategy in last year was diversification of income source. The other strategies were hygiene and disease prevention, less risky production system, saving in cash and diversification of crops. The top five of adaptive strategies in last five years were hygiene and disease prevention, less risky production system, diversification of income source, diversification of crops and saving in cash, respectively. The top three strategies

expect to face in the future are quite similar to the strategies that respondents were selected in last five years.

Figure 4.10 Adaptive Strategies



Source: Own calculation.

Tables 4.52-4.54 present adaptive strategies that household use in different time period classified by province. According to last year strategies, there were 380 out of 1,104 households that use strategies, not preparing any strategies to manage risk. The reason may because they do not have the ability to ask for the credit from any financial institution or no collateral assets. Moreover, some of them fail on managing those risks again and again. Therefore, some households select no risks response.

The most popular adaptive strategy that household used in last year was diversification of income source, about 31%. There is nothing more dangerous than relying upon one or two employers to support household's income needs. Diversifying income, or adding multiple income streams, is a great way to secure them from the volatility of cash flows. Diversifying income streams reduces risk and positions farmers against the unknowns, for example, unemployment, a downturn in the market, farm business failure, and more. It also gives them the chance to take advantage of new opportunities and explore their interests.

After that, hygiene and disease prevention is the second order, account for 18.6%. If household are successfully in disease prevention, it can decrease many human and social risks, which are, death of other working family member, working disability caused by disease of family member, chronic disease and prolong disease of other family member.

Next, less risky production system strategy is applied for 9%. In research area, farmers make decision rather on crop planting or livestock feeding to reduce production risk. In the northeast, farmers grow fast-growing crops such as cassava, pineapple, and sugar cane and grow crops that are resistant to drought and disease.

In addition, it follows that saving in cash strategy is used with 8%. When households have saving, it is a guarantee for their wealth stability and they can run any activities related on their farm work or for any other purposes. Many households expect to save more in order to compensate for the different types of risk which they are exposing to themselves and their family. On the one hand, saving in cash alone is not enough, the survey household select saving in variety kind like livestock, crop and consumer goods.

Lastly, diversification of crops is in the fifth ranked, amount for 6.6%. This strategy can minimize low production price risk before it cause loss to farmers. Farmers shift from the regional dominance of one crop to regional production of a number of crops. The changing from cultivating low value crop to high value crop mix cause the economic returns from different value-added crops and better marketing opportunities.

Main adaptive strategies, which households applied in last five years, were ranked in orderly, which were hygiene and disease prevention, less risky production system, diversification of income sources and diversification of crops.

Finally, there are 748 of total household expect no risk happen in the future. About 217 households are not preparing any strategies to manage risk. The adaptive strategies that household expect to use are hygiene and disease prevention (24%), less risky production system (11%), diversification of crops (10%), diversification of income sources (9%), Saving in cash (8%), diversification of livestock (8%), membership in groups or networks (6%) and use of extension service (6%).

Table 4.52 Adaptive Strategies for Last Year Risk

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	No risks in last year	32	128	64	72	296	
	No strategy at all	145	107	54	74	380	
	Adaptive Strategies						
1	Diversification of income sources	17	46	110	49	222	30.7%
2	Hygiene and disease prevention	0	27	87	21	135	18.6%
3	Less risky production system	37	1	8	20	66	9.1%
4	Saving in cash	11	0	0	46	57	7.9%
5	Diversification of crops	18	11	14	5	48	6.6%
6	Use of extension service	14	14	3	15	46	6.4%
7	Saving in kind (crops)	30	5	1	5	41	5.7%
8	Ask for help from social networks: family/relatives	7	0	0	11	18	2.5%
9	Diversification of livestock	7	6	5	0	18	2.5%
10	Ask for help from social networks: friends	12	2	0	1	15	2.1%
11	Health check-up	0	0	0	15	15	2.1%
12	Adoption of new production technology	3	0	0	8	11	1.5%
13	Shifting cultivation	3	1	3	4	11	1.5%
14	Saving in kind (livestock)	7	0	0	0	7	1.0%
15	Membership in groups/networks	1	2	1	3	7	1.0%
16	Proper weaning and feeding practices	4	0	0	0	4	0.6%
17	Ask for help from social networks: neighbors	2	0	0	1	3	0.4%
	Total strategies	173	115	232	204	724	

Source: Own calculation.

Table 4.53 Adaptive Strategies for Last Five Year

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	No risks in last 5 years	139	255	196	127	717	
	No strategy at all	96	42	26	68	232	
	Adaptive Strategies						
1	Hygiene and disease prevention	0	33	88	24	145	32.2%
2	Less risky production system	30	1	10	21	62	13.7%
3	Diversification of income sources	4	0	13	26	43	9.5%
4	Diversification of crops	22	6	10	4	42	9.3%
5	Saving in cash	1	0	1	30	32	7.1%
6	Use of extension service	10	7	1	9	27	6.0%
7	Saving in kind (crops)	21	3	0	2	26	5.8%
8	Health check-up	2	0	0	14	16	3.5%
9	Ask for help from social networks: family/relatives	1	2	1	9	13	2.9%
10	Shifting cultivation	3	0	4	4	11	2.4%
11	Adoption of new production technology	1	0	0	8	9	2.0%
12	Ask for help from social networks: friends	8	0	0	0	8	1.8%
13	Diversification of livestock	8	0	0	0	8	1.8%
14	Membership in groups/networks	0	1	0	3	4	0.9%
15	Saving in kind (livestock)	3	0	0	0	3	0.7%
16	Ask for help from social networks: neighbors	0	0	0	1	1	0.2%
17	Proper weaning and feeding practices	1	0	0	0	1	0.2%
	Total strategies	115	53	128	155	451	

Table 4.54 Adaptive Strategies for Future Risk

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	Expect no risk in future	162	237	208	141	748	
	No strategy at all	86	41	29	61	217	
	Adaptive Strategies						
1	Hygiene and disease prevention	0	24	69	10	103	23.7%
2	Less risky production system	23	3	6	15	47	10.8%
3	Diversification of crops	27	6	8	4	45	10.3%
4	Diversification of income sources	2	0	12	24	38	8.7%
5	Saving in cash	2	0	0	34	36	8.3%
6	Diversification of livestock	6	15	1	12	34	7.8%
7	Membership in groups/networks	1	16	9	2	28	6.4%
8	Use of extension service	12	5	2	6	25	5.7%
9	Saving in kind (crops)	12	1	0	3	16	3.7%
10	Shifting cultivation	4	0	4	5	13	3.0%
11	Adoption of new production technology	1	2	1	8	12	2.8%
12	Health check-up	0	0	0	12	12	2.8%
13	Ask for help from social networks: family/relatives	1	0	0	9	10	2.3%
14	Ask for help from social networks: friends	8	0	0	1	9	2.1%
15	Saving in kind (livestock)	3	0	1	1	5	1.1%
16	Ask for help from social networks: neighbors	0	0	0	2	2	0.5%
	Total strategies	102	72	113	148	435	

Source: Own calculation.

The pictorial 4.11 give the information on coping strategy that household most select to handle risks. Household member is facilitating risk-coping in the aftermath or shocks and crisis. The first and second strategies, which are reduce food consumption and dis-saving, are the same in every time period. The other important strategies are credit from bank and credit from family and relatives.

Table 4.55 demonstrates data about coping strategies for last year risk. Risk coping strategies are implemented after a shock to deal with the impacts. Food consumption reducing is the single most important component, accounting for 46% of total households' strategies. Households report a variety of coping strategies over the last twelve months preceding the interview. There are 947 out of 1,400 household or 68% of household reporting using these strategies. Households report most frequently used strategy is related to reduction in food consumption, followed by dis-saving, with 23%. A substantial proportion of households also report permanent migrating to manage unemployment risk. Credit from bank, credit from family/relatives, take children out of school, pawned good, new/additional work of household head, sale of assets, and ask for charity are the coping strategy household use.

Table 4.56 describes coping strategies used by household in last 5 years. The risks, which households experienced during the last five years cause them looked for the strategies to manage on them. The strategies they prepare for risks and react to risks are advantaged to learn. The lesson of the past strategies that household has applied until present indicated that strategies is successful and best uses. Half of household report no risks in last 5 years. The most frequently used strategy is reduction in food consumption: one third of households (32%) report spending less food consumption. The second most commonly used strategy is dis-saving: more than a quarter of households (28%) report not saving presently. So, they may hard to deal with risk. Loan from bank, family and relatives, friends, money lender and other sources are used by about 15.8% of the households that using strategies. Also 8.8% of households report using sale of assets in kind of livestock, crops, standing crop, consumer goods and others. It is only 3% of household report removing children from school to manage risk. Some households think that school cost is so high and they want to cut the expenditure. The average education of family member is at primary school. Higher education study must spend a higher budget. So, it is higher

probabilities to reduce school cost burden. Most of them expect their children helping farm work. On the other hand, 8% of the households report using no coping strategy in the five years prior to the survey.

Table 4.57 provides results from the questionnaire analyses the use of coping strategy in the future. In future, households think that they will have to solve many risks. Households will prepare the strategies to manage and cope with risks. The coping strategies, which most households select to manage risks in the future are reduced food consumption (32%), dis-saving (23%), ask loan from all sources (14.9%), sale all kind of assets (11.8%), and additional work of household head and other adult family members (6.2%) respectively.

Reduced food consumption is the primary strategies. Household deals with the consequences ex post of income risk by self enforcing consuming reduction. In the future, household expect to face the fluctuation in consumption. Consumption reduction will affect on nutrition, health and education. The next interesting category is dis-saving. Each household choose the way to adjust themselves firstly by losing saving opportunities. Loss of precautionary savings and insurance arrangements will cause the fail of coping strategy when common shocks occur. As a result, these households may loss their self protection. Asking loan is the next choice, especially, Bank of Agriculture and Cooperatives (BAAC), ranks first with 79% (table 4.32). Ex-post risk coping strategies include formal credit, which appear to contribute to reduce income risk and its consequences. The fourth of future coping strategy rank is sale all kind of assets. Assets are easier to be sold in the case of valuable assets, not only consumer goods but also crop or livestock. For instance, sales of productive assets are usually in the form of livestock sales, which have high demand. This is the possibility way to allocate income easily to compensate the loss. Finally, the future coping strategy that household prepare to cope with risk is the promoting the labor force participation of household head and other adult family members.

Figure 4.11 Coping Strategies

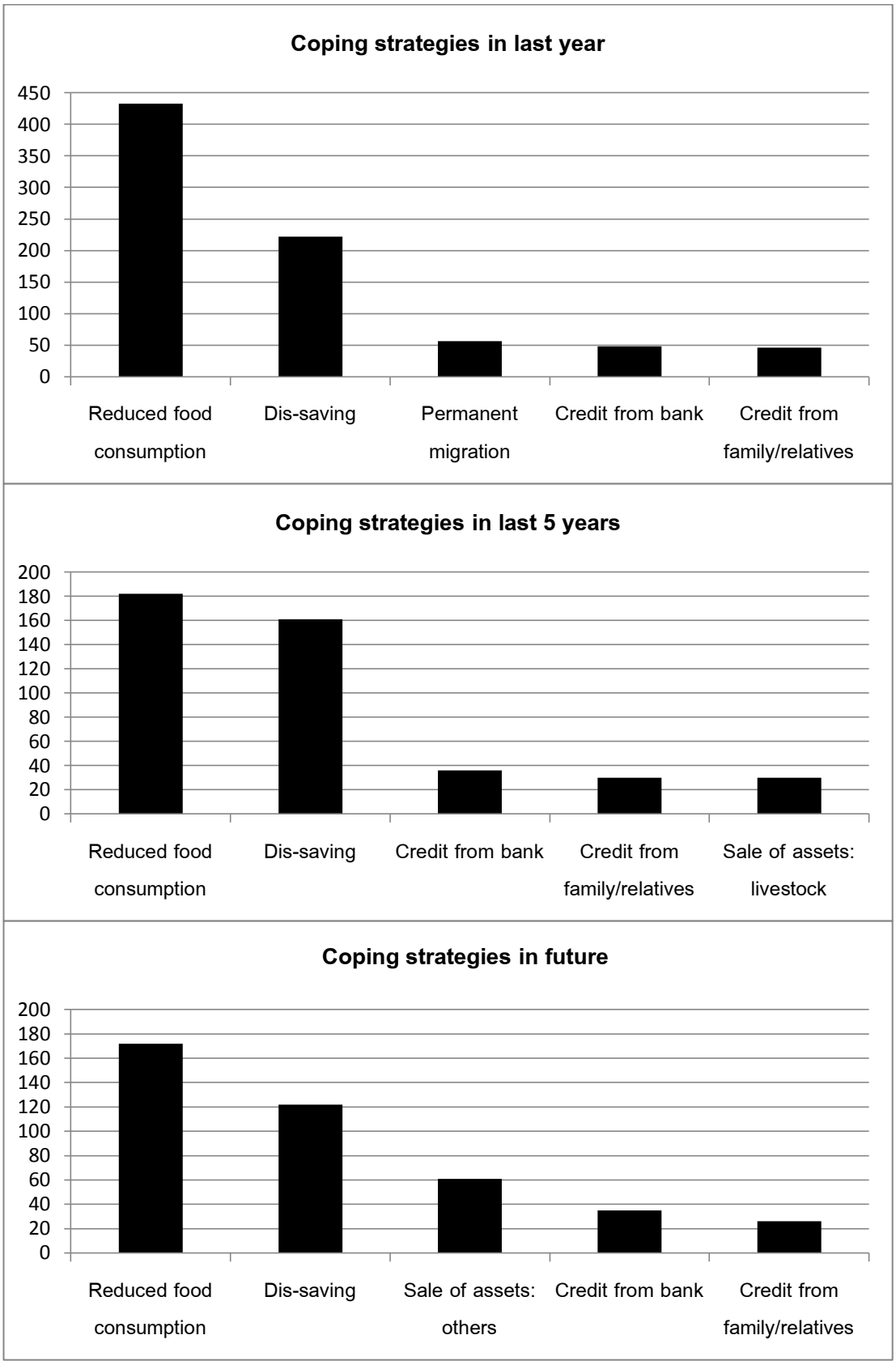


Table 4.55 Coping Strategies for Last Year Risk

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	No risks in last year	32	128	64	72	296	
	No strategy at all	67	34	15	41	157	
	Coping Strategies						
1	Reduced food consumption	88	113	170	62	433	45.7%
2	Dis-saving	48	35	76	63	222	23.4%
3	Permanent migration	25	16	2	13	56	5.9%
4	Credit from bank	4	0	0	44	48	5.1%
5	Credit from family/relatives	23	3	10	10	46	4.9%
6	Take children out of school	5	6	6	2	19	2.0%
7	Pawned good	12	3	0	1	16	1.7%
8	New/additional work of household head	0	0	0	14	14	1.5%
9	Sale of assets: others	10	2	1	1	14	1.5%
10	Ask for charity (from temple)	11	2	0	0	13	1.4%
11	Credit from friends	9	0	1	1	11	1.2%
12	New/additional work of other adult family members	3	0	0	7	10	1.1%
13	Sale of assets: consumer goods	3	4	2	0	9	1.0%
14	Sale of assets: crops	2	2	0	4	8	0.8%
15	Credit from money lender	1	0	0	6	7	0.7%
16	Credit from other sources	0	0	1	5	6	0.6%
17	Temporary migration	5	0	0	1	6	0.6%
18	Public assistance	0	2	2	2	6	0.6%
19	Make children work	1	0	0	0	1	0.1%
20	Sale of assets: livestock	0	0	0	1	1	0.1%
21	Sale of assets: standing crop	1	0	0	0	1	0.1%
	Total strategies	251	188	271	237	947	

Table 4.56 Coping Strategies for Last Five Year Risk

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	No risks in last 5 years	139	255	196	127	717	
	No strategy at all	58	9	7	43	117	
	Coping Strategies						
1	Reduced food consumption	31	40	79	32	182	32.2%
2	Dis-saving	43	13	46	59	161	28.4%
3	Credit from bank	1	0	0	35	36	6.4%
4	Credit from family/relatives	10	2	10	8	30	5.3%
5	Sale of assets: livestock	1	15	1	13	30	5.3%
6	Ask for charity (from temple)	14	3	1	0	18	3.2%
7	Take children out of school	7	5	5	0	17	3.0%
8	New/additional work of household head	0	2	1	11	14	2.5%
9	Credit from friends	10	0	1	1	12	2.1%
10	New/additional work of other adult family members	4	0	0	8	12	2.1%
11	Sale of assets: others	9	2	1	0	12	2.1%
12	Pawned good	8	2	0	0	10	1.8%
13	Sale of assets: consumer goods	4	2	1	0	7	1.2%
14	Credit from other sources	0	0	1	5	6	1.1%
15	Temporary migration	5	0	0	1	6	1.1%
16	Credit from money lender	0	0	0	5	5	0.9%
17	Permanent migration	4	0	0	0	4	0.7%
18	Public assistance	0	0	0	2	2	0.4%
19	Make children work	1	0	0	0	1	0.2%
20	Sale of assets: standing crop	1	0	0	0	1	0.2%
	Total strategies	153	86	147	180	566	

Source: Own calculation.

Table 4.57 Coping Strategies for Future Risk

		District					
		Burriram	**Kalasin**	**Nan**	**Chiangmai**	**Total**	**% of Total Strategies**
	Expect no risk in future	162	237	208	141	748	
	No strategy at all	60	8	8	41	117	
	Coping Strategies						
1	Reduced food consumption	30	44	69	29	172	32.1%
2	Dis-saving	25	14	39	44	122	22.8%
3	Sale of assets: others	8	32	9	12	61	11.4%
4	Credit from bank	0	0	0	35	35	6.5%
5	Credit from family/relatives	8	3	8	7	26	4.9%
6	Ask for charity (from temple)	16	3	1	0	20	3.7%
7	New/additional work of other adult family members	8	0	0	9	17	3.2%
8	Take children out of school	4	5	5	2	16	3.0%
9	New/additional work of household head	0	0	0	16	16	3.0%
10	Permanent migration	7	2	0	0	9	1.7%
11	Credit from friends	5	0	1	1	7	1.3%
12	Credit from money lender	2	0	0	5	7	1.3%
13	Pawned good	5	1	0	0	6	1.1%
14	Credit from other sources	0	0	1	4	5	0.9%
15	Temporary migration	4	0	0	1	5	0.9%
16	Sale of assets: consumer goods	3	0	1	1	5	0.9%
17	Make children work	2	0	0	0	2	0.4%
18	Public assistance	0	1	0	1	2	0.4%
19	Sale of assets: livestock	0	0	0	1	1	0.2%
20	Sale of assets: standing crop	1	0	0	0	1	0.2%
	Total strategies	128	105	134	168	535	

Source: Own calculation.

4.1.14 Demand on Government Assistance

According to table 4.58-4.59 and figure 4.12, it indicates that household has high demand level on all policy that will be advantaged to farm household. Firstly, the highest demand from the ranking show that farm household wants government to help about the price guarantee on agricultural product. In fact, agricultural products are pretty low every year and it causes of low incentive to invest on the next crop production. Problem of agricultural works are mostly come from the natural disaster like heavy rainfall in rainy season and drought during summer. Another important problem is the insect attack on farm. Farmers are relying on the use of insecticide, which are very costly. Another reason come from the unplanned production system, some season farm households are promoted to produce the same kind of crop, after the harvest season there are a plenty of production lead the price decline and the farm households are completing to each other to sell the production. Therefore, there is no any guarantee for the production price. The uncertainty of the production price from many factors causes the farm households loss all the time. Furthermore, there is no anyone looks at the overall picture of the country's crop production. There is no system to calculate the demand matching to supply of production. So, the farm households have low opportunity to gain from farm occupation.

Secondly, the next aiding policy that farm household need is helping to guarantee fertilizer and factor price. It is certainly that fertilizer price play a substantial role on agricultural work. Production function is determined by the factor demand. That is the input. By the way, the input supply and input price are fluctuating. Farmers take a very high risk of scaring or lacking input supply to the farm and the risk of increasing input price. It is as the domino effects. When farm households have a high cost of factor of production, households must supply the production with the increasing cost as well.

Thirdly, drug and gambler reduction and control policy rank next biggest category. Households show the severity of drug and gamble problems, which people receive the effect of them. Many governments in the past used to promote this policy but it is hard to continue this policy because the drugs sellers have a great power and

large network. However, people still want some aids from government to help the drug addicted persons. When a family member is addicted drug, it means a household must loss a labor to do farm occupation and household must spend time and a lot of money to cure the sickness family member.

Fourthly, the next demand is the demand on funding circulates in village. To do farm work is taking a high risk. A lot of farm households loss continuity in many season but they must continue working on their farm to outreach the debt. Hence, they need the fund for new investment for the new cropping season. In some area, farmers work in group and join together. So, they need the village fund to help and share their risk on agricultural work.

Fifthly, the next category is demand on land allocation. Land allocation problem in Thailand have been raised and included in the policy in many governments. A lot of farmers in research area have no their own land. Farmers need their own farm land because some farmers must pay for the high rent cost in order to do their farm. Some must do the farm on other farm land and get only the hiring wage. It is uncertainly for the cash flow to sustain their living.

Sixthly, farmers want government to help solving agriculture work problem. Agriculture is hard work but income flow from the production sale is quite uncertainty. It seems a thousand problems hit farm household a year. For example, a numerous of farm household face the production loss, low production price, whereas cost of production increase since factor price increase. The agricultural work has high competition due to it change the pattern to agricultural business. Small farmers can not complete with the global competition. Hence, farmers become poorer every year.

Seventhly, many households want governments to solve unemployment problem. In rural area, income is mainly come from farm work, hiring work, constructing work and trading. It needs only a certain skilled labor more than high educated labor. There are a great number of unemployment and the employment problem of hiring the labor under their knowledge or under skilled employment. For example, the engineers and scientists have high skill and knowledge background, but they can not find work position in local area. Most of them must turn their aim in working in the factory to do their private occupation like fixing computer or migrate to

work in other region. Consequently, people need the policy to promote and create work in rural area. In addition, at present there are already a great number of legal and illegal migrants working in agriculture. Their wages are generally much lower than those of Thai workers. Hence, Thai farmers, who are the hire labor in farm, are unemployment.

Eighthly, it is the demand for water supply arrangement. Water is needed for all types of agricultural production. However, the specific quantities required differ among agricultural subsectors. Apart from the natural water requirement of “fisheries,” the crop sector is the most water intensive. Water supply for agriculture is very important because lack of water, it is hardly to plant any crop. At the research area in northeast region encounter of the frequency of the drought every year. Local state try to solve this problem but it is not long run successful. Government paid a great amount of budget on irrigation system but it can not cover all the extensive arable land. It helps the farm, which locates close to the irrigation area only. Likewise, this problem still happens and it will be the eternity problem.

Ninthly, farmer has demand on funding for their farm work. The result of low production price, low production cause low total revenue, while the cost of farm investment is so high, it leads farmer deficit. Thus, farmers need funding aid to support their farm work.

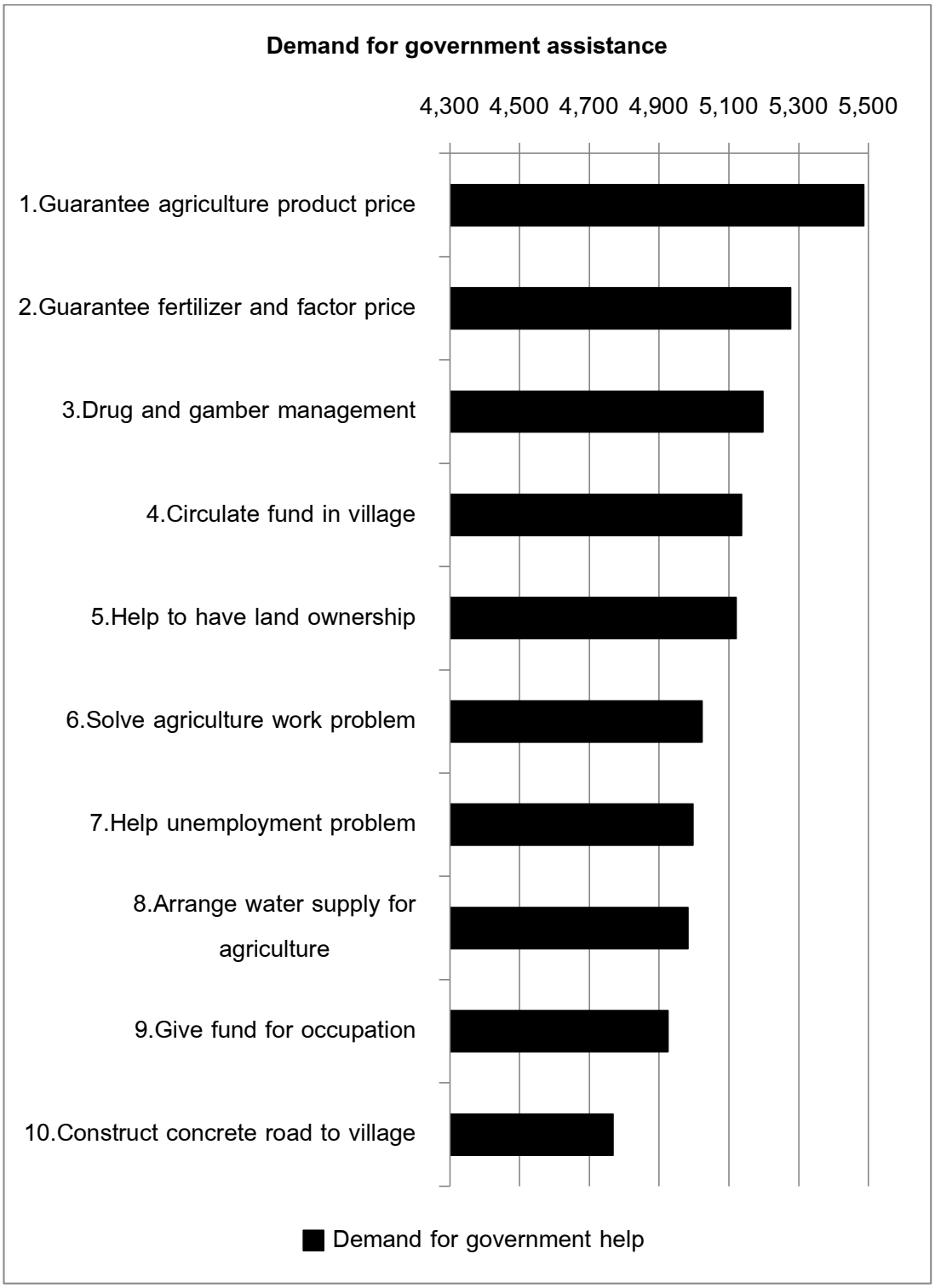
Finally, households in many areas face the difficulties to access the outsides because of the poor construction of the road. Therefore, many households show their demand on road construction. Good road can reduce travelling cost, transportation cost and it is easy to access to the market. Crop production is easy to rot. After harvesting, it needs to supply to the market fast. In the reality, farm households encounter the high competition of selling product with the crop from other region. Moreover, it is not easy to deliver production farther from the planted area because of high fuel cost. Some households’ loss half of their production due to the delivery process spends many days to customer. Therefore, the construction of road is very important aid policy to help farm households indirectly.

Table 4.58 Demand for Government Assistance

Demand for government help	Lowest	Low	Middle	High	Highest	Total	Total score	Rank
Weight	**1**	**2**	**3**	**4**	**5**			
1.Guarantee agriculture product price								
	240	26	130	216	788	1,400	5,486	1
2.Guarantee fertilizer and factor price								
	250	57	158	236	699	1,400	5,277	2
3.Drug and gambler reduction and controlling								
	278	50	183	175	714	1,400	5,197	3
4.Circulate fund in village								
	257	64	178	287	614	1,400	5,137	4
5.Help to have land ownership								
	307	53	147	198	695	1,400	5,121	5
6.Solve agriculture work problem								
	325	74	152	151	698	1,400	5,023	6
7.Help unemployment problem								
	246	73	234	332	515	1,400	4,997	7
8.Arrange water supply for agriculture								
	328	52	191	167	662	1,400	4,983	8
9.Give fund for occupation								
	287	86	219	230	578	1,400	4,926	9
10.Construct concrete road to village								
	321	71	260	215	533	1,400	4,768	10

Source: Own calculation.

Figure 4.12 Demand for Government Assistance



Source: Own calculation.

Table 4.59 Demand for Government Assistance Classified by Region

Demand	District							
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region	Total	% of Total
			% within demand			% within demand		
1.Guarantee agriculture product price								
Lowest	46	46	38.3%	135	13	61.7%	240	17.1%
Low	11	7	69.2%	8	0	30.8%	26	1.9%
Medium	30	57	66.9%	20	23	33.1%	130	9.3%
High	47	39	39.8%	29	101	60.2%	216	15.4%
Highest	216	201	52.9%	158	213	47.1%	788	56.3%
Total	350	350		350	350		1,400	100%
2.Guarantee fertilizer and factor price								
Lowest	42	50	36.8%	143	15	63.2%	250	17.9%
Low	26	10	63.2%	16	5	36.8%	57	4.1%
Medium	33	63	60.8%	17	45	39.2%	158	11.3%
High	63	42	44.5%	27	104	55.5%	236	16.9%
Highest	186	185	53.1%	147	181	46.9%	699	49.9%
Total	350	350		350	350		1,400	100%
3.Drug and gamber management								
Lowest	67	24	32.7%	172	14	66.9%	278	19.9%
Low	29	7	72.0%	11	4	30.0%	50	3.6%
Medium	48	13	33.3%	28	94	66.7%	183	13.1%
High	33	23	32.0%	18	101	68.0%	175	12.5%
Highest	173	283	63.9%	121	137	36.1%	714	51.0%
Total	350	350		350	350		1,400	100%
4.Circulate fund in village								
Lowest	62	30	35.8%	142	23	64.2%	257	18.4%
Low	25	11	56.3%	22	6	43.8%	64	4.6%
Medium	30	65	53.4%	49	34	46.6%	178	12.7%
High	76	64	48.8%	60	87	51.2%	287	20.5%
Highest	157	180	54.9%	77	200	45.1%	614	43.9%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Table 4.59 Demand for Government Assistance Classified by Region (Continue)

Demand	District						Total	% of Total
	Burriram	Kalasin	Northeast Region % within demand	Nan	Chiangmai	North Region % within demand		
5.Help to solve land ownership holding								
Lowest	56	45	32.9%	190	16	67.1%	307	21.9%
Low	25	17	79.2%	9	2	20.8%	53	3.8%
Medium	52	65	79.6%	19	11	20.4%	147	10.5%
High	67	36	52.0%	20	75	48.0%	198	14.1%
Highest	150	187	48.5%	112	246	51.5%	695	49.6%
Total	350	350		350	350		1,400	100%
6.Solve agriculture work problem								
Lowest	63	47	33.8%	201	14	66.2%	325	23.2%
Low	44	18	83.8%	12	0	16.2%	74	5.3%
Medium	63	59	80.3%	12	18	19.7%	152	10.9%
High	52	26	51.7%	17	56	48.3%	151	10.8%
Highest	128	200	47.0%	108	262	53.0%	698	49.9%
Total	350	350		350	350		1,400	100%
7.Help to solve unemployment problem								
Lowest	56	25	32.9%	131	34	67.1%	246	17.6%
Low	12	15	37.0%	37	9	63.0%	73	5.2%
Medium	44	69	48.3%	52	69	51.7%	234	16.7%
High	86	63	44.9%	54	129	55.1%	332	23.7%
Highest	152	178	64.1%	76	109	35.9%	515	36.8%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

Table 4.59 Demand for Government Assistance Classified by Region (Continue)

Demand	District							
	Burriram	Kalasin	Northeast Region	Nan	Chiangmai	North Region	Total	% of Total
			% within demand			% within demand		
8.Arrange water supply for agriculture								
Lowest	67	49	35.4%	187	25	64.6%	328	23.4%
Low	20	22	80.8%	6	4	19.2%	52	3.7%
Medium	41	55	50.3%	13	82	49.7%	191	13.6%
High	47	32	47.3%	16	72	52.7%	167	11.9%
Highest	175	192	55.4%	128	167	44.6%	662	47.3%
Total	350	350		350	350		1,400	100%
9.Give fund for occupation								
Lowest	36	29	22.6%	188	34	77.4%	287	20.5%
Low	16	35	59.3%	28	7	40.7%	86	6.1%
Medium	35	103	63.0%	48	33	37.0%	219	15.6%
High	64	35	43.0%	28	103	57.0%	230	16.4%
Highest	199	148	60.0%	58	173	40.0%	578	41.3%
Total	350	350		350	350		1,400	100%
10.Construct concrete road to village								
Lowest	79	44	38.3%	166	32	61.7%	321	22.9%
Low	29	9	53.5%	33	0	46.5%	71	5.1%
Medium	40	77	45.0%	60	83	55.0%	260	18.6%
High	52	38	41.9%	28	97	58.1%	215	15.4%
Highest	150	182	62.3%	63	138	37.7%	533	38.1%
Total	350	350		350	350		1,400	100%

Source: Own calculation.

4.2 Vulnerability to Poverty of Rural Farm Household in Northern and Northeastern Region of Thailand

4.2.1 Discussion of the Selection of the Indicators Used in the Model

The extent of vulnerability is dependent on a household's or a community's assets, for example their natural capital, social capital, human capital, physical capital, and financial capital. Moser (1996) elaborates this concept, stating that vulnerability is inextricably linked with asset ownership, where assets are as follows:

1. **Labor**, which is a valuable asset possessed by most poor people;

2. **Human capital**, such as education, skills, and health, which determine the ability to emerge from poverty and make enhanced use of the labor;

3. **Productive assets** such as land and housing, and tools for production;

4. **Household relations**, which determine the equitable distribution of resources within a family, for example, ensuring that women have equitable access to food and education; and

5. **Social capital**, the relationship between households and within communities based on kinship, religion, and mutual interdependence.

The selection of vulnerability indicators are applied from the indicator of increasing vulnerability and many different literature reviews. The potential Indicators of Increasing and Decreasing Vulnerability are demonstrated on Table 4.60.

This research work was conducted in Northern and Northeastern of Thailand. Primary data were collected in 4 provinces in Nan, Chiangmai, Buri Ram, and Kalasin province. The random sampling consists of 1,400 households. Data was collected during April to December 2014. The structure questionnaire was used. The selection of variable for the analysis of vulnerability to poverty is illustrated in Table 4.61.

Table 4.60 Potential Indicators of Increasing and Decreasing Vulnerability for an Individual, Household, and Community

Type of vulnerability	Indicator of increasing vulnerability	Indicator of decreasing vulnerability
	Individual	
Labor	-Loss of permanent job -Decline in secure wage employment -Increase in short-term, casual, minimum wage employment -Acquisition of physical disability	-Increase in household members working, especially women -Increase in home-based enterprises -Increase in jobs held by individual workers
Human capital	-Decline in access to or quality of social and economic infrastructure -Decline in school attendance or increase in the dropout rate -Decline in health clinic attendance	-Substitution of private for public services, such as water pumps, private health care, and private education
	Household	
Housing	-Increased perception of threat of eviction -Deterioration in housing stock -High level of overcrowding	-Resolution of tenure insecurity -Use of plot for intergenerational “nesting”
Household relations	-Erosion of household as a social unit due to change in structure, marital breakdown, or split households -Household extension that reduces the ratio of earners to non-earners—especially the addition of “hidden (unwed or separated mothers)” female household heads -Inability of women to balance multiple responsibilities and community participation -Older daughters undertaking child care -Elderly lacking caregiver -Increase in domestic violence	-Household extension that increases the ratio of earners to non-earners -Sharing of childcare, cooking, and space -Reduction in domestic violence
	Community	
Social capital	-Increasing public insecurity in public places -Decline in inter-household reciprocity -Erosion of community-level organization	-Community-based solutions to crime -Inter-household reciprocity -Active, community-based organizations

Source: Moser, 1996.

Table 4.61 Selection of Variable for the Analysis of Vulnerability to Poverty

Variables	Selected variables
Total consumption	
Consumption per capita	
Log consumption	
Log consumption per capita	
Total income per year	
Income per capita per year	
Agricultural income per year	
Total non agricultural income per year	
Household size (in numbers)	
Household size squared	/
Age of household head (years)	
Age of household head square	
Dependency ratio (NSO formula)	
Child dependency ratio (NSO formula)	
Age dependency ratio (NSO formula)	
Dependent population	
Number of children in the household	
Disabled person	/
Gender of household head	
Male household head	
Female household head	
Family member: Below primary education	/
Family member: Primary education	/
Family member: Secondary education	/
Family member: Vocational education	/
Family member: Bachelor and above	/
Number of children go to school	
Number of children not go to school	
School expense (year)	

Source: Own survey (2014).

Table 4.61 Selection of Variable for the Analysis of Vulnerability to Poverty (Continued)

Variables	Selected variables
Education of household head: Below primary education	/
Education of household head: Primary education	
Education of household head: Secondary education	
Education of household head: Secondary education and above	
Education of household head (year)	
Education of household head (level)	/
Literacy of household head: can read or write	
Literacy of household head: can not read or write	/
Employed household head	
Unemployed household head	
Non-farm occupation of household head	/
Number of employed	
Number of unemployed	/
Number of pensioners	
Non-farm full-time employees (adult)	/
Level of overcrowding[1]	
Resident land	
Cultivated land	
Owned land	
Own animals (1=have, 0=no)	/
Livestock value	
Monetary assets	/
Tangible asset value	/
Total borrowing in last 12 months	/

Source: Own survey (2014).

Note: 1. Level of overcrowding defines as household size more than the average household size or more than six people in a household.

Table 4.61 Selection of Variable for the Analysis of Vulnerability to Poverty (Continued)

Variables	Selected variables
Sector of residence of household head: 1=urban	
Sector of residence of household head: 1=rural	
Housing condition	
Ratio of rent in total expenditure	
Risk expenses in the last 5 years	/
Risk expense in last year	
Expected of risk expense in the future	
Drought, 2010-2013	
Drought, 2014	
Drought, future	
Crop loss: insect, plant disease, 2010-2013	
Crop loss: insect, plant disease, 2014	/
Crop loss: insect, plant disease, future	
Flood, 2010-2013	
Flood, 2014	
Flood, future	
Low production, 2010-2013	
Low production, 2014	
Low production, future	
Low production price, 2010-2013	
Low production price, 2014	
Low production price, future	
Unemployment, 2010-2013	
Unemployment, 2014	/
Unemployment, future	
Old age, 2010-2013	
Old age, 2014	
Old age, future	

Source: Own survey (2014).

Table 4.61 Selection of Variable for the Analysis of Vulnerability to Poverty (Continued)

Variables	Selected variables
Theft of producer goods, 2010-2013	/
Theft of producer goods, 2014	/
Theft of producer goods, future	
Local heavy wind, 2010-2013	
Local heavy wind, 2014	
Local heavy wind, future	
Crop loss (weather), 2010-2013	
Crop loss (weather), 2014	
Crop loss (weather), future	
Divorce costs, 2010-2013	
Divorce costs, 2014	
Divorce costs, future	
Higher input price, 2010-2013	
Higher input price, 2014	
Higher input price, future	
Working disability (accident) of household head, 2010-2013	/
Working disability (accident) of household head, 2014	
Working disability (accident) of household head, future	
Theft of crops, 2010-2013	/
Theft of crops, 2014	
Theft of crops, future	
Number of last 5 year risk occurred	
Number of last year risk occurred	
Number of future risk occur	
Severity of risk	/

Source: Own survey (2014).

4.2.2 Result of Estimating Vulnerability to Poverty with OLS and FGLS

Feasible generalized least square methodology was employed to find the vulnerability measurement in this study.

By assuming that consumption is log-normally distributed, the estimates can be used to form an estimate of the probability that a household with characteristics X_h will be poor, or the household's vulnerability to poverty level.

$$\hat{V}h = \hat{\Pr}(\ln c_h < \ln c | X_h) = \phi\left[\frac{\ln \mathrm{c} - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}}\right]$$

The data of household surveys in the end of the year of 2014 were used to estimate vulnerability at household level. The method (feasible generalized least squares-FGLS) is employed to determine how log consumption impacts the welfare status of households in the research area. It is recognized that one of the basic assumptions of ordinary least square (OLS) is that the error term must have a mean zero and constant variance, and that once this constant variance assumption is violated, there is bound to be heteroscedasticity. The relaxation of the constant variance assumption (Chaudhuri, 2000) is a method of determining how the variance of the error term (i.e., now a measure of log consumption) impacts overall well-being (proxies by expenditure on food and non-food items) (Oluwatayo, 2004).

An advantage of the estimation strategy used in this research – using a FGLS approach to estimate the variance of the idiosyncratic component of household consumption – is that it yields a consistent estimate of the true variance of

consumption even when consumption is measured with error unless the measurement error varies systematically with some household characteristic(s). It may in fact be the case that measurement error is correlated with some observable characteristic of the household. For instance, rural households derive a larger share of their food consumption from their own production than urban households evaluated at imputed (not reported or observed) prices. If this is the case, it is possible to obtain unbiased estimators of consumption variance by estimating separate models for rural and urban areas. Concerns about systematic measurement error are another reason for estimating separate models at as disaggregated a level as possible (Emil D Tesliuc, and Kathy Lindert, 2002).

The results of the model for the log consumption equation and variance of the log consumption (OLS) are shown in Table 4.62 below. Upon subjecting the data to analysis, the first stage of the OLS reveals that 48% of the variation in log consumption (a measure of well-being) can be explained by the following factors: household size square**,** family members: below primary education, family members: primary education, family members: secondary education, family members: vocational education, family members: bachelor education, education of household head: below primary education, level of education of household head level, literacy of household head: can not reads or write, non-farm occupation of household head, disable person, number of unemployed family member, non-farm full-time employees adult, the belonging of livestock, monetary asset, tangible asset value, total borrowing in last 12 months, expenditure on last five year risks, severity of risk, unemployment in 2014, theft of producer goods in 2014, theft of producer goods during 2010-2013, crop loss due to insect and plant disease in 2014, working disability by accident of household head during 2010-2013, theft of crops during 2010-2013. The rest, 52%, can be attributed to the disturbance term.

The low R^2 value is not uncommon, and is due to the measurement error (from unobserved and omitted variables) associated with the use of cross-sectional data in consumption studies. However, this measurement error indirectly accounts for the importance of the disturbance term, a variable capturing idiosyncratic factors (which includes risk associated with income) (Oluwatayo, 2004). All the variables included in the analysis have some influence on household well-being. For example,

education of family members, non-farm occupation of household head, disabled person, number of unemployed, animals belonging and unemployment in 2014, have a negative influence on the consumption expenditure of households in the study area.

Generally, most of the model's coefficients (log consumption and variance of log consumption) come up with expected signs. In all samples, household size square, education of household head: below primary education, education level of household head, literacy of household head, non-farm full-time employees, monetary asset, other asset value, total borrowing in last twelve months, expenditure on last five year risks, severity of risk, theft of producer goods in 2014, theft of producer goods during 2010-2013, crop loss due to insect and plant disease in 2014, working disability of household head because of accident during 2010-2013, theft of crops during 2010-2013, are positively significant in explaining welfare in the research area.

For instance, a strong relationship is apparent between log consumption and theft of crops during 2010-2013, where by the household which has theft of crop has a positive effect on log consumption. An increase in theft of crop leads to an increase in log consumption of 1.178 Baht. In recent years, theft from farms has become more of a common occurrence. Access to high value agricultural equipment, crops (paddy, fruit, vegetable) and cattle that can easily be turned into cash has sparked new interest from thieves. In particular, crop theft is increasing and leading to thousands of baht in uninsured losses by unsuspecting farmers. In several cases the thefts occur months before discovery of the loss and recovery almost impossible. For instance, in research area of Kalasin, the surging rice prices cause a widespread paddy theft of premium quality fragrant rice from farmer's granary. Therefore, households with high number times of being stolen have higher consumption expenditure than households without being stolen.

This example is as same as the relationship between log consumption and working disability of household head by accident and crop loss by insect and plant disease. In the uncertainly case of household head that face the accident and then being disability, he or she cannot work. As a result, it affects to household income directly. An increase in the number of working disability of household head by accident leads to an increase in the log consumption of 0.890 Baht. Their family member must pay for the hospital and other health cost to cure their household head. The next

important risk hit household is crop loss by insect and plant disease. An increase in crop loss by insect and plant disease leads to an increase in the log consumption of 0.867 Baht. In the area of study, farmer loses their high-value crops particularly rice, maize, vegetables and fruit to insect, pests and diseases every year. The damage and production loss lead to monetary losses. Inspire of increasing in pesticide use, the losses in all major crops still increased in relative term. Farmers take a risk of toxic contamination. Therefore, their consumption expenditure is also higher for the higher pesticide cost, the spending to compensate yield loss and the spending for taking care of their health.

On the other hand, unemployment in 2014 also has a strong relationship with log consumption, but in the negative direction. An increase of unemployment leads to a decrease in log consumption of 0.61 Baht. Households, which encounter high unemployment, have less consumption than households, which not encounter unemployment. In research area, households are hit by unemployment risk. Households, which expect that their family member may be lay off from factory in the future, have low present consumption, secure their income and plan to save for future.

In the same direction, household that has disabled family member has a strong relationship with log consumption in the opposite direction. An increase of the inability person leads to a decrease in log consumption of 0.435 Baht. Vulnerability is most often associated with poverty, but it can also arise when people are isolated, insecure and defenseless in the face of risk, shock or stress. In the case of disable persons in local area, all of them stay alone when family members go to work on farm. They eat less and must help themselves in all dairy activities. The disabled people do not work and can not earn own income. They are potentially vulnerable groups.

Table 4.62 Model for Estimating Vulnerability to Poverty by OLS

Variable	Total OLS			
	Log(ctn)	**P>|t|**	**Var(ctn)**	**P>|t|**
Household size square	0.013	0.000	0.001	0.816
	(0.002)		(0.005)	
Family members: below primary education	-0.370	0.000	0.086	0.315
	(0.032)		(0.086)	
Family members: primary education	-0.293	0.000	0.072	0.352
	(0.029)		(0.078)	
Family members: secondary education	-0.411	0.000	0.009	0.912
	(0.032)		(0.085)	
Family members: vocational education	-0.322	0.000	-0.205	0.117
	(0.049)		(0.131)	
Family members: bachelor education	-0.281	0.000	0.133	0.234
	(0.042)		(0.112)	
Education of household head: below primary education	0.447	0.000	0.235	0.159
	(0.063)		(0.167)	
Education of household head (level)	0.068	0.032	0.337	0.000
	(0.031)		(0.083)	
Literacy of household head: can not reads or write	0.320	0.000	1.424	0.000
	(0.088)		(0.234)	
Non-farm occupation of household head	-0.088	0.000	-0.070	0.210
	(0.021)		(0.056)	
Disable person	-0.435	0.028	-0.436	0.406
	(0.198)		(0.525)	
Unemployed family member	-0.164	0.000	0.074	0.336
	(0.029)		(0.077)	
Non-farm full-time employees (adult)	0.128	0.000	0.106	0.006
	(0.014)		(0.038)	
Own livestock (1=have, 0=no)	-0.120	0.014	0.508	0.000
	(0.049)		(0.130)	
Monetary asset	0.000	0.000	0.000	0.883
	(0.000)		(0.000)	

Source: Own calculation.

Table 4.62 Model for Estimating Vulnerability to Poverty by OLS (Continue)

Variable	Total			
	OLS			
	log(ctn)	P>|t|	Var(ctn)	P>|t|
Tangible asset value	0.000	0.002	0.000	0.215
	(0.000)		(0.000)	
Total borrowing in last 12 months	0.000	0.002	0.000	0.410
	(0.000)		(0.000)	
Expenditure on last five year risks	0.000	0.002	0.000	0.589
	(0.000)		(0.000)	
Severity of risk	0.236	0.000	-0.034	0.767
	(0.043)		(0.114)	
Unemployment, 2014	-0.610	0.008	0.800	0.193
	(0.231)		(0.615)	
Theft of producer goods, 2014	0.687	0.000	-0.380	0.426
	(0.180)		(0.477)	
Theft of producer goods, 2010-2013	0.487	0.003	-0.305	0.487
	(0.165)		(0.439)	
Crop loss (insect, plant disease), 2014	0.867	0.000	0.002	0.997
	(0.174)		(0.463)	
Working disability (accident) of household head,	0.890	0.000	-0.313	0.588
	(0.217)		(0.577)	
Theft of crops, 2010-2013	1.178	0.000	-1.085	0.061
	(0.218)		(0.578)	
Constant	13.432	0.000	-3.061	0.000
	(0.151)		(0.402)	
Observation				
R-squared	0.480		0.072	
Prob (F)	0.000		0.000	

Source: Own calculation.

Note: Log (ctn) = Log of consumption.

Var (ctn) = Variance of consumption.

Standard errors are in parenthesis.

The results of the regression model by FGLS are demonstrated in Table 4.63, which presents the determinants of vulnerability to poverty by FGLS and variance of consumption. The signs of the coefficients found that education of household head below primary school, theft of producer goods in 2014, and crop loss from insect and plant disease in 2014, have a positive impact on log consumption but a negative impact on variance of consumption.

Household size square has a negative impact on log consumption, as well as on variance of consumption. Family with large number of family member, the consumption expenditure is also high. When households pay a high expenditure, it causes them have less of money left for the other consumption items. If the households are attacked by natural risks, like drought or flood, it will as the result of crop loss, which is probably difficult for them to smooth consumption.

Family members education below primary education, primary education, secondary education, and vocational education, education level of household head, illiteracy of household head, non-farm occupation of household head, inability person, non-farm full-time employees (adult), monetary asset, tangible asset value, total borrowing in last twelve months, expenditure on last five year risks, severity of risk, unemployment in 2014, Theft of producer goods during 2010-2013, working disability by accident of household head during 2010-2013, theft of crops during 2010-2013, have a tendency to increase log consumption and also to increase consumption variance. For example, if households have more monetary assets, they will have more ability to consume and have enough assets to smooth their consumption during the difficult time. Therefore, households may either sell the assets or rent them out. Moreover, the accident incidence of household head as a kind of risk that hit households lead them to expense more to manage risks, which effected household consumption and its variance.

Table 4.63 Model for Estimation Vulnerability to Poverty by FGLS

Variable	Total			
	OLS			
	log	P>|t|	Var	P>|t|
Household size square	-0.034	0.000	-0.019	0.000
	(0.005)		(0.001)	
Family members: below primary education	0.575	0.000	0.329	0.000
	(0.078)		(0.016)	
Family members: primary education	0.845	0.000	0.416	0.000
	(0.067)		(0.014)	
Family members: secondary education	0.258	0.001	0.221	0.000
	(0.080)		(0.017)	
Family members: vocational education	0.109	0.389	0.147	0.000
	(0.126)		(0.026)	
Family members: bachelor education	-0.024	0.826	0.081	0.000
	(0.108)		(0.023)	
Education of household head: below primary	0.009	0.956	-0.107	0.001
education	(0.161)		(0.034)	
Education of household head (level)	0.993	0.000	0.357	0.000
	(0.076)		(0.016)	
Literacy of household head: can not reads or	1.914	0.000	0.662	0.000
	(0.222)		(0.046)	
Non-farm occupation of household head	0.350	0.000	0.152	0.000
	(0.053)		(0.011)	
Disable person	1.461	0.004	0.639	0.000
	(0.505)		(0.106)	
Number of unemployed	-0.075	0.313	0.003	0.830
	(0.075)		(0.016)	
Non-farm full-time employees (adult)	0.074	0.048	0.001	0.942
	(0.037)		(0.008)	
Own livestock (1=have, 0=no)	-0.015	0.904	0.025	0.333
	(0.125)		(0.026)	
Monetary asset	0.000	0.601	0.000	0.000
	(0.000)		(0.000)	

Source: Own calculation.

Table 4.63 Model for Estimation Vulnerability to Poverty by FGLS (Continue)

Variable	Total			
	OLS			
	log	P>|t|	Var	P>|t|
Tangible asset value	0.000	0.282	0.000	0.594
	(0.000)		(0.000)	
Total borrowing in last 12 months	0.000	0.605	0.000	0.023
	(0.000)		(0.000)	
Expenditure on last five year risks	0.000	0.028	0.000	0.008
	(0.000)		(0.000)	
Severity of risk	2.980	0.000	1.090	0.000
	(0.076)		(0.016)	
Unemployment, 2014	0.675	0.256	0.412	0.001
	(0.594)		(0.124)	
Theft of producer goods, 2014	0.090	0.845	-0.138	0.152
	(0.461)		(0.097)	
Theft of producer goods, 2010-2013	0.453	0.286	0.070	0.434
	(0.425)		(0.089)	
Crop loss (insect, plant disease), 2014	0.437	0.329	-0.062	0.512
	(0.448)		(0.094)	
Working disability (accident) of household head,	0.737	0.188	0.077	0.511
	(0.559)		(0.117)	
Theft of crops, 2010-2013	1.280	0.022	0.192	0.102
	(0.560)		(0.117)	
Constant	No constant		No constant	
Observation	1,400			
R-squared			0.993	
Prob (F)	0.000		0.000	

Source: Own calculation.

Note: Log (ctn) = Log of consumption.
Var (ctn) = Variance of consumption.
Standard errors are in parenthesis.

4.2.3 Relationship between Vulnerability to Poverty and Observed Consumption

The relationship between vulnerability and poverty is demonstrated in Figure 4.13. Figure 4.13 illustrates this relationship for the whole research area, while the remaining graphs focus on the extremely poor, very poor, poor and the non-poor. Each figure uses marginal box plots to illustrate the density of the two distributions (consumption and vulnerability) for the sample being considered.

All of the figures have a horizontal line at the 0.5 vulnerability level, separating those who are more likely to be poor – the vulnerable to be found in the upper part of the graph – from those less likely to be poor –the non-vulnerable to be found in the lower part of the graph.

The graphs have vertical lines at the level of extreme and total poverty lines (the left-hand line) and at the extreme poverty line (the upper right-hand graph). These lines separate the extremely poor from the moderately poor and the non poor.

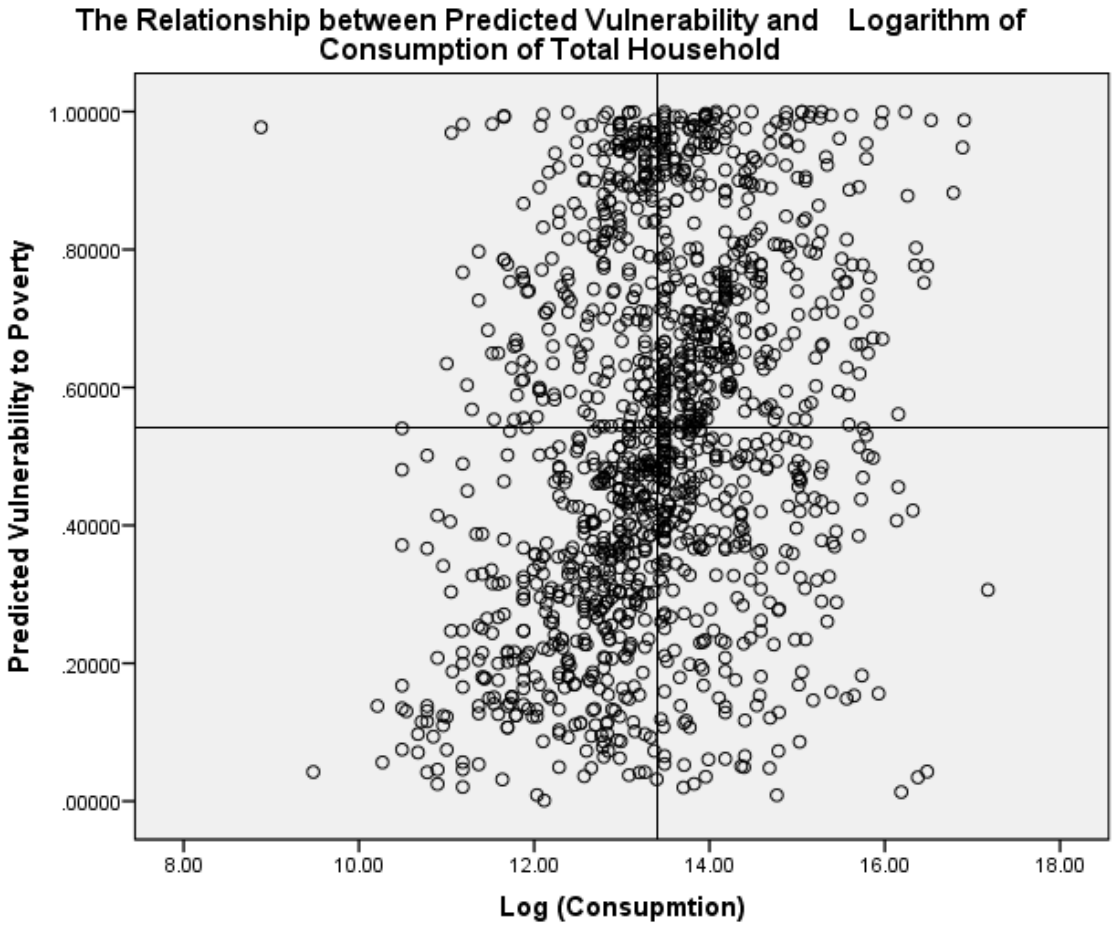
Figure 4.13 illustrates the positive relationship between vulnerability and (the logarithm of) consumption. The relationship between vulnerability and current consumption is positive, different from the expected. The expect direction of vulnerability and current consumption is positive because household, which has high current consumption indicates low vulnerability. This is because household has high power of purchasing.

However, the results of the study consist to the real situation of household livelihood. It means the more consumption the more vulnerability because the source of money spending on consumption is come from loan. On the background of farm households are vulnerable. Farm occupation take a high risks from unexpected weather, production price and other factors, while the returns are quite low. Doing farm is costly with the continuing increasing of input factor. It is not consist of the theory that high risk and high return. Although farm households take a high risk from

this variation, they must continue on their farm working and find out some part time job or secondary occupation to seek money to support family consumption. A lot of farm households change main occupation from farm working to do other kind of job like the hired construction worker, trading and so on. Moreover, there are a great number of farm households are in debt. The more consumption means the more vulnerability. Households must save a part of income for debt repaying, then the less left for consumption. Some households repay debt and borrow again because income is not matching or balancing with the expenditure. In other words, this may because the vulnerable households have limit income for spending. With the large household size and the small number of employees in a household, money receive must share for all family member for consumption. Hence, the increase in consumption causes the increase in vulnerability to poverty.

Figure 4.14 demonstrate the relationship between predicted vulnerability and logarithm of consumption of extreme poor. The graph zooms in on the “extremely poor” part of the previous graph. As expected, almost all of the extremely poor are among the highly vulnerable. Mean of predicted vulnerability to poverty of extreme poor household is at 0.89882. The marginal box plot of the graph signals that almost all households have a vulnerability index in excess of 0.76, with 25.06%. The rate of exit from the extreme poverty pool is extremely low. This means that the majority of the extremely poor in 2014 were also poor in 2015. This segment of the population should be supported through the social programs that increase their human capital and their other assets.

Figure 4.13 The Relationship between Predicted Vulnerability and Logarithm of Consumption of Total Household

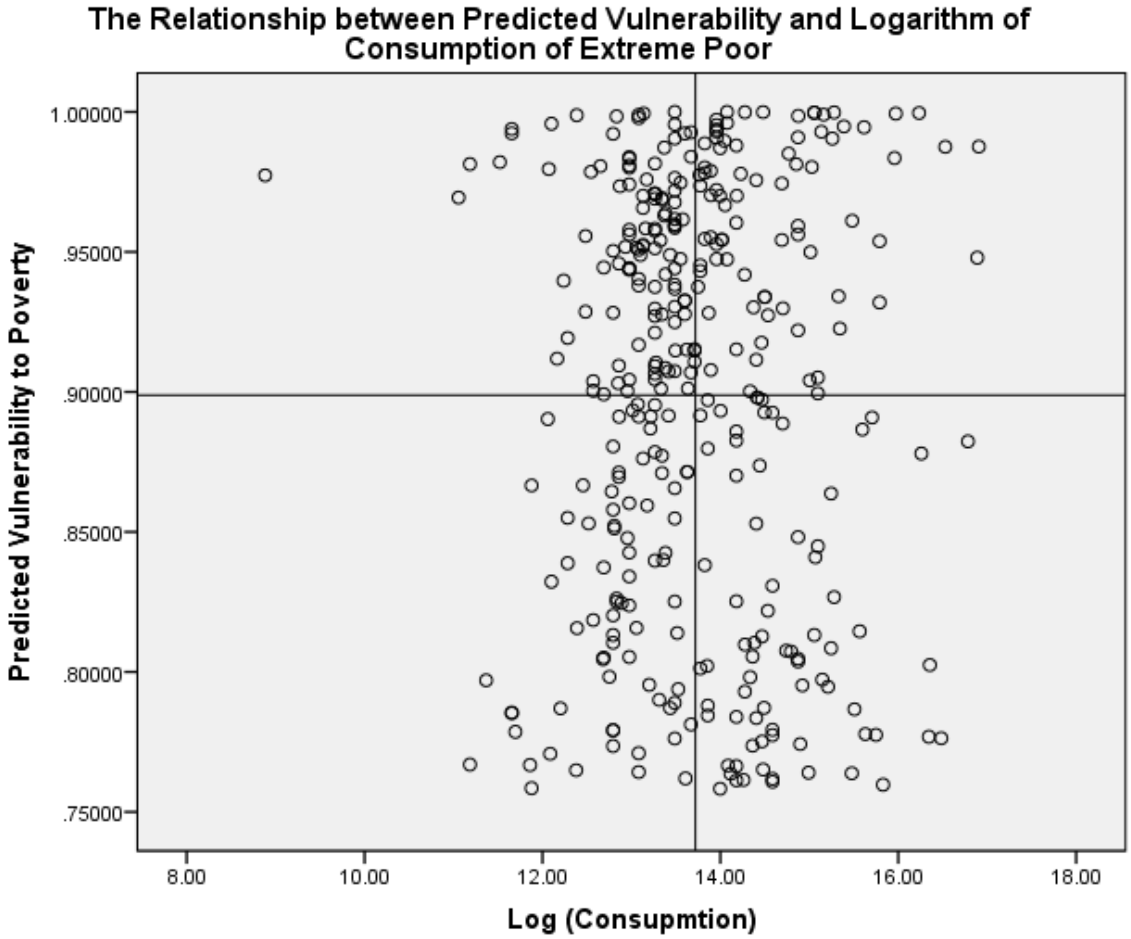


Source: Own calculation.

Note: Mean of log consumption is at 13.40366.

Mean of predicted vulnerability to poverty is at 0.54166.

Figure 4.14 The Relationship between Predicted Vulnerability and Logarithm of Consumption of Extreme Poor



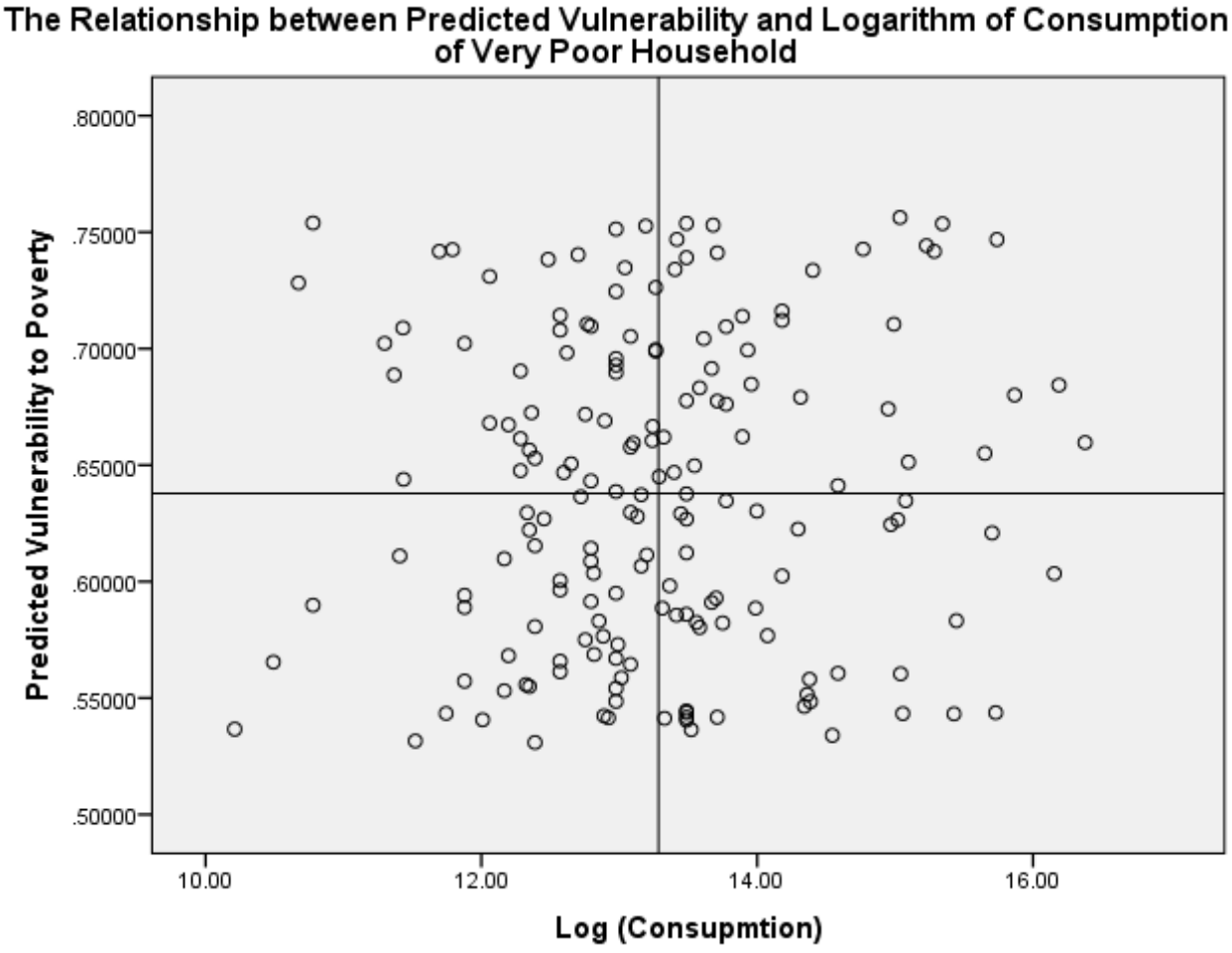
Source: Own calculation.

Note: Mean of predicted vulnerability to poverty of extreme poor household is at 0.89882.

Figure 4.15 shows the relationship between predicted vulnerability and logarithm of consumption of very poor household. The graph presents the joint distribution of vulnerability and current consumption among the very poor group. From

the marginal box plot, it can be seen that the very poor household have a vulnerability index in excess of 0.33 but less than 0.75. Mean of predicted vulnerability to poverty of very poor household is at 0.63782. This means that the currently poor households will still be poor in the next period.

Figure 4.15 The Relationship between Predicted Vulnerability and Logarithm of Consumption of Very Poor Household

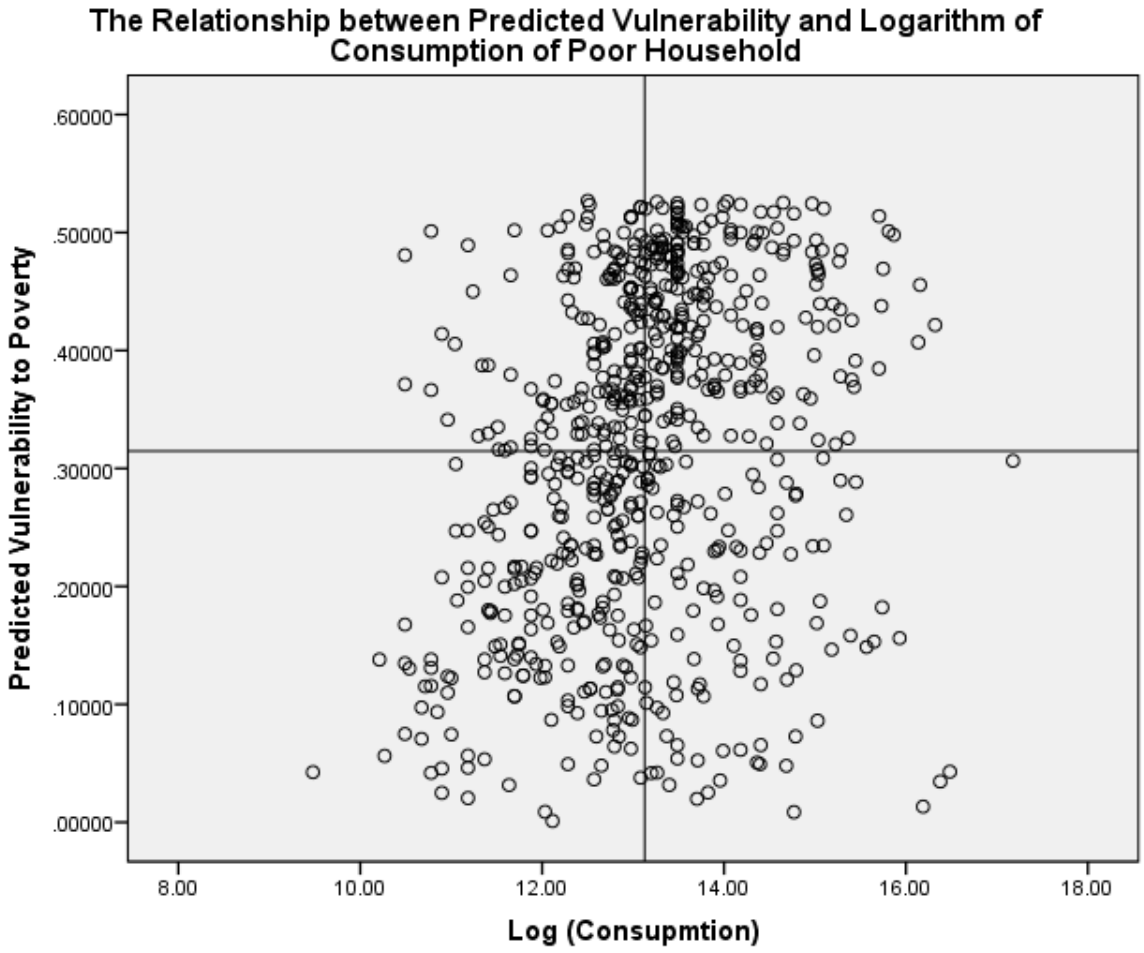


Source: Own calculation.

Note: Mean of predicted vulnerability to poverty of very poor household is at 0.63782.

Figure 4.16 presents the relationship between predicted vulnerability and logarithm of consumption of poor household. The graph presents the joint distribution of vulnerability and current consumption among the poor household. From the marginal box plot, it can be seen that the poor household have a vulnerability index in excess of 0.33 but below 0.528. These poor households have 14.29% be vulnerability to be poorer in the future.

Figure 4.16 The Relationship between Predicted Vulnerability and Logarithm of Consumption of Poor Household

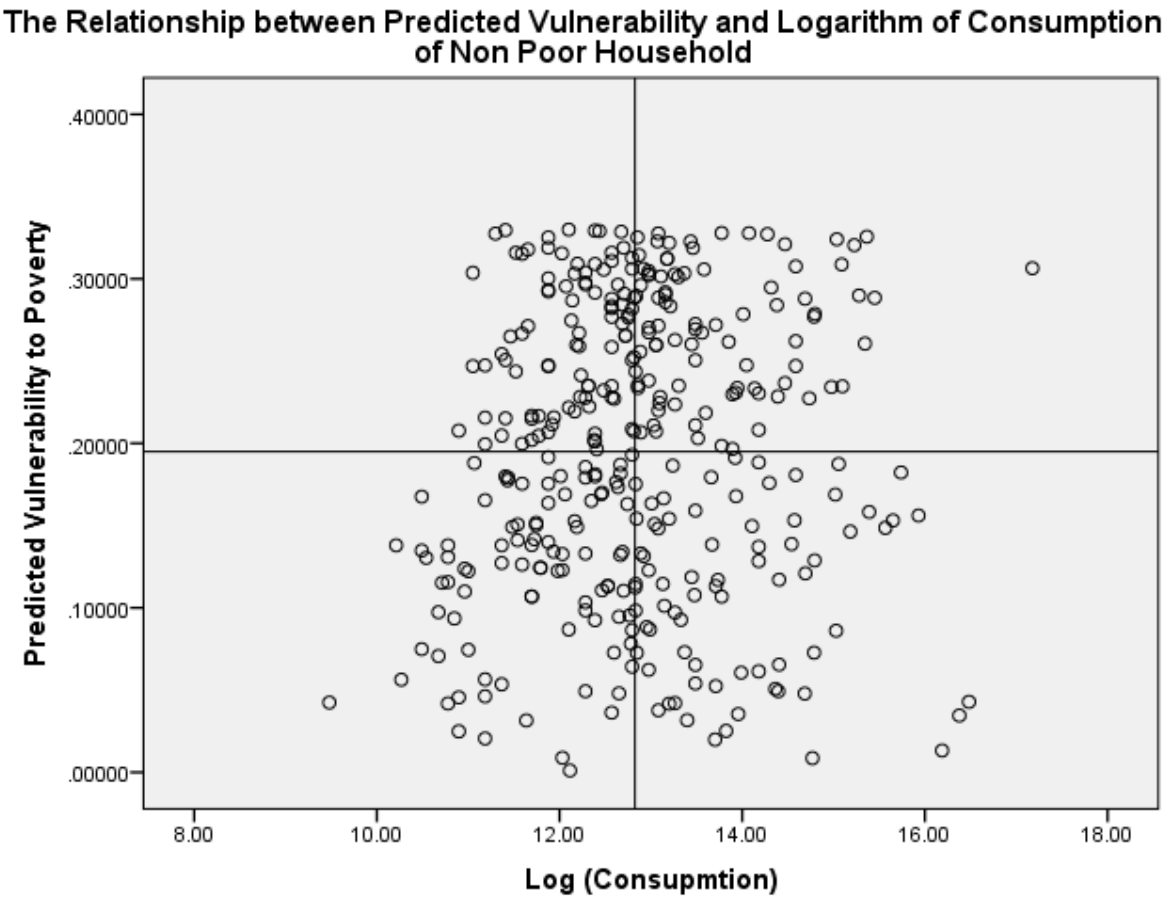


Source: Own calculation.

Note: Mean of predicted vulnerability to poverty of very poor household is at 0.37468.

The last figure 4.17 presents the relationship between predicted vulnerability and logarithm of consumption of non poor. The graph presents the joint distribution of vulnerability and current consumption for the non-poor. It is 25% of the non-poor are not vulnerable, and those who are vulnerable have consumption levels close to the poverty line. Another part of non-poor groups, account for 75%, are not poor at present but they are risk of being falling into the poor group in the next period.

Figure 4.17 The Relationship between Predicted Vulnerability and Logarithm of Consumption of Non Poor



Source: Own calculation.

Note: Mean of predicted vulnerability to poverty of non poor household is at 0.19497.

4.2.4 Discussion of the Vulnerability to Poverty Group

The concept of Thailand to calculate the poverty group is most frequently use of poverty line as the cut off households, which stay below poverty line, are poor and the households, which stay upper poverty line, are not poor.

Therefore, poverty line measurement in Thailand based on the concept of physical subsistence is called the “absolute” approach. People are defined as poor if they do not have sufficient income to satisfy their basic needs. The poverty line defines the minimum basic needs of the people and is the threshold income below which one is considered to be poor (NSO, 1999).

Thailand poverty line in the year of 2014 was at 2,647 Baht per capita per month (Table 4.64). The rural headcount ratio in terms of household expected consumption less than poverty line is at 28.79%.

Table 4.64 Poverty Line (Expenditure) by Region

Unit: Baht per capita per month

Poverty line	**2014**	**2015**
Country poverty line in 2015	2,647	2,644
Northeastern poverty line in 2015	2,387	2,355
Northern poverty line in 2015	2,355	2,377
Bangkok	3,133	3,132
Central Region	2,832	2,827
Southern Region	2,735	2,724

Source: National Statistics of Thailand, 2017.

When comparing by using regional poverty line of the northeastern region of Thailand, which was at 2,387 Baht per capita per month. The percentage of expected consumption of household less than poverty line is at 28.86%.

Poverty line of Northern region of Thailand in 2014 equaled to 2,355 Baht per month per capita (Table 4.65).

Table 4.65 Comparison of Expected Consumption and Poverty Line

Expected consumption	**Frequency**	**Percentage**
Country poverty line in 2014 (2,647 Baht per capita per month)		
Expected consumption less than poverty line	403	28.79
Expected consumption more than poverty line	997	71.21
Total	1,400	100.00
Northeastern poverty line in 2014 (2,387 Baht per capita per month)	**Frequency**	**Percentage**
Expected consumption less than poverty line	202	28.86
Expected consumption more than poverty line	498	58.29
Total northeastern province	700	87.14
Northern poverty line in 2014 (2,355 Baht per capita per month)	**Frequency**	**Percentage**
Expected consumption less than poverty line	139	19.86
Expected consumption more than poverty line	561	80.14
Total northern province	700	100.00

Source: Own calculation.

Poverty and vulnerability in Thailand arises as a result of transient rather than chronic conditions. The main causes of poverty were the lack of land ownership, lack of capital, education and skills, debts, irregular employment, large families, aging and sickness and uncontrollable outside forces (Taneerananon, 2005). This could be a result of chronic condition (e.g. low level of assets and endowments) or a transient situation (e.g. a temporary setback due to shocks). In term of

vulnerability, the main causes are low expected consumption and high variance of consumption. In order to provide policy advice, the literature of (e.g. Bidani and Richter, 2001) should be followed: the pool of vulnerable households are divided in two mutually-exclusive groups namely (1) those who are vulnerable due to the high volatility of their consumption or the HV vulnerable, and (2) those who are vulnerable due to their low expected mean consumption or the LM vulnerable (Alayande, 2004).

The result of this study shows two groups of vulnerable households, which are, high and low vulnerable households. The estimates show that about 53.57% of households were vulnerable to poverty (Table 4.66).

Table 4.66 Vulnerability to Poverty Household

Vulnerability households	Frequency	Percentage
High vulnerability ≥ 0.5	750	53.57%
Low vulnerability < 0.5	650	46.43%
Total	1,400	100

Source: Own calculation.

The comparison of observed poverty status based on vulnerability index present that 75% of farm households are poor, whereas another 25% are non-poor (Table 4.67).

Table 4.68 show the classification of poverty status based on observed poverty status and vulnerability index. Poverty status can be classified into four groups. The first severe group is the poor household with high vulnerability to poverty. This group can be counted only 9.64%. The second group is the household that is currently not poor but has high vulnerability to be poor in the future, amount for 43.93%. The third group is the poor household but has low vulnerability to poverty, account for 19.14%. The last group is safe group that is not poor and low vulnerability to poverty. This group has 27.29%.

Table 4.67 Comparison of Observed Poverty Status based on Vulnerability Index

Poverty status	Frequency	Percentage
Poor	1,050	75
Non-Poor	350	25
Total	1,400	100

Source: Own calculation.

Note: Poor = Chronic poor + frequently poor + infrequently poor.

Chronic poor = Chronic poor.

Transient poor = Frequently poor + infrequently poor.

Table 4.68 Classification of Poverty Status based on Observed Poverty Status and Vulnerability Index

Poverty status	Frequency	Percentage
1.Poor and high vulnerability	135	9.64
2.Not poor but high vulnerability	615	43.93
3.Poor but low vulnerability	268	19.14
4.Not poor and low vulnerability	382	27.29
Total	1,400	100.00

Source: Own calculation.

Note: Poor is household, which has consumption below poverty line.

High vulnerability household is household, which is 50% probability to be below the poverty line.

Low vulnerability household is household, which has vulnerability index less than 0.5.

4.25 Comparison of Vulnerability to Poverty and Household Characteristics classified by Non-vulnerable and Vulnerable Households in Frequency and Percentage of Population

A vulnerability profile by selected household characteristics is displayed in Table 4.69. When concentrating to the non vulnerable group, northeastern region contain the higher percentage (59.69%) than the northern region. When comparing between non vulnerable and vulnerable group, it indicates that northern households are vulnerable with 62.57%. The analysis of the province, it depicts that Chiangmai, Nan, and Kalasin province have high percentage of vulnerable households, while Burriram province has the high percentage of non vulnerable households.

Table 4.69 Comparison of Non-vulnerable and Vulnerable Households classified by Region and District

	Non-vulnerable			Vulnerable			Total
	Frequency	Percent (Column)	Percent (Row)	Frequency	Percent (Column)	Percent (Row)	(Row)
Region							
Northeast	388	**59.69**	**55.43**	312	41.6	44.57	700
North	262	40.31	37.43	438	**58.4**	**62.57**	700
Total	650	100.00	46.43	750	100.0	53.57	1,400
District							
Burriram	231	35.54	**66.00**	119	15.9	34.00	350
Kalasin	157	24.15	44.86	193	25.7	**55.14**	350
Nan	140	21.54	40.00	210	28.0	**60.00**	350
Chiangmai	122	18.77	34.86	228	30.4	**65.14**	350
Total	650	100.00	46.43	750	100.0	53.57	1,400

Source: Own calculation.

Table 4.70 is the comparison of vulnerability to poverty and household characteristics classified by non-vulnerable and vulnerable households. The calculation the percentage in column and row give them another view of the comparison.

In overall number of households, non vulnerable households account for 46.43%, the rest are vulnerable household account for 53.57%. The average household size in the research area is between 4 and 6 person.

The comparison of vulnerability to poverty and household size illustrate the interesting result that the larger of the household size has the tendency of having lower number of vulnerable group. For instance, household size between 1-3 people has high vulnerable households, amount for 71.89%. Household size between 4-6 people has lower vulnerable households with 42.95%. Household size between 7-9 people has lower percentage of vulnerable households with 32.99%. It is the opposite direction for household size more than 10 people, which contain the highest percentage of vulnerable households. This clearly indicates that larger household size has lower vulnerability to poverty.

The reason behind this may because the larger household size has the larger social network. Working family members who work in other area send money back to support family. The network tiles are very strong. Family members have very close relationship and frequently interaction. It is a great number of northeastern family members work aboard and married with foreigners. Therefore, the ability to support other family members is high. In Thai culture, parents invest on children education. After their children complete education, they support their parents. The goodness of large family is the sharing of cost of living in a household. Everyone does not need to buy all home appliances. So, everyone does not need to purchase everything. It causes the economy of scale. Therefore, they have saving. Saving is the engine for consumption smoothing as well.

Another reason may because the larger numbers of family members indicate the greater number of labors participating in labor force, which mean the opportunity of acquiring income is also high as well. Most of household in research area do farm work, which require a number of labor supply to help their own household farm to save farm investment cost. In the farm work, family members join

together to work on farm and also share the crop production. Rice and other crops produce for their own household consumption and the rest of production are sold. So, labor supplies are known to be the primary engines for the consumption smoothing of households.

Lastly, the life of rural farm households is simple, many households spend less on food because they plant crops and feed animals. Some households collect vegetable from own fence, so they do not necessary to spend a lot by cash. That's why their consumption expenditure is not high.

However, poverty incidence as well as vulnerability to poverty worsens as one moves from medium size to bigger family size households. The vulnerability to poverty increases shapely to 66.67% with the largest family size. The overcrowding household sizes of more than ten persons turn the poverty incidence. Farms in study area mostly are small farm size, which do not need a great number of labor participation. Some family members are distinguishing unemployment. Farm profit is not enough to support the household expenditure with a largest family size. Larger number of family members above ten persons causes a decline in household savings. Hence, in this case labor supplies and saving are not smooth consumption at all.

When compare the vulnerability to poverty with the gender of household head, it can be say that households head generally are male. The difference between vulnerability group classified by male and female household heads are not different.

Concerning to the relationship of vulnerability to poverty and the age of household head, the age of household head play an important role in separating households, which are nearly to fall into the vulnerable and non vulnerable households. The higher risk of vulnerability to poverty is for the age of household head below 30 years old. Cross-tabulation results show that young household head age less than 30 years old have pretty high percentage to lead the household to fall into the vulnerable group because their household head may have low experience to organize household income. These household become in vulnerable group for 52%.

An increased in the age of household head is found to decrease vulnerability to poverty. Older household head ages 31-50 years old are active labor

force, have high possibility to earn a lot of money and have high experience of livelihood. As a result, middle-age family boss frees family from vulnerability to poverty.

On the other hand, household head ages between 51-60 and 61-70 years old are mostly be in vulnerable group, account for 51.14% and 61.80%, respectively. It is recognized that Thailand becomes the aging society. Cross-tabulation results present that 22.36% of household head are retired age beyond 60 years old. The vulnerability to poverty declines for the household head age above 70 years. This may because the household head at this age may have a certain amount of saving. They have a lot of lesson from the past about how to improve their own income and expenditure flow. They can handle well on household consumption smoothing and have strategies to handle risks. Although the elder has lower opportunity to seek income, but they are non vulnerable because they have the other family member support them.

The last point is the relationship of the vulnerability to poverty and education of household heads, the results from table demonstrates that household heads education background below primary school are safe in non-vulnerable group, while household head who has taken primary and secondary education take a risk to fall into vulnerable group account for 60% and 55.52%, respectively.

The results are very interesting that higher education can lead household far from the opportunity to fall into the vulnerability to poverty group. Cross-tabulation results identify that household head who has taken bachelor education are stay in non vulnerable group, reach to 90.16%.

Table 4.70 Comparison of Vulnerability to Poverty and Household Characteristics classified by Non-vulnerable and Vulnerable Households

	Non-vulnerable			Vulnerable			Total
	Frequency	Percent (Column)	Percent (Row)	Frequency	Percent (Column)	Percent (Row)	(Row)
Household size							
1-3	149	22.92	28.11	381	50.8	**71.89**	530
4-6	429	66.00	**57.05**	323	43.1	42.95	752
7-9	65	10.00	**67.01**	32	4.3	32.99	97
> 10	7	1.08	33.33	14	1.9	**66.67**	21
Total	650	100.00	46.43	750	100.0	53.57	1,400
Gender of household head							
Male	500	76.92	46.82	568	75.7	**53.18**	1,068
Female	150	23.08	45.18	182	24.3	**54.82**	332
Total	650	100.00	46.43	750	100.0	53.57	1,400
Age of household head							
< 30 years	12	1.85	48.00	13	1.7	**52.00**	25
31-40	84	12.92	**53.16**	74	9.9	46.84	158
41-50	229	35.23	**50.22**	227	30.3	49.78	456
51-60	192	29.54	42.86	256	34.1	**57.14**	448
61-70	89	13.69	38.20	144	19.2	**61.80**	233
> 70 years	44	6.77	55.00	36	4.8	45.00	80
Total	650	100.00	46.43	750	100.0	53.57	1,400

Source: Own calculation.

Table 4.70 Comparison of Vulnerability to Poverty and Household Characteristics classified by Non-vulnerable and Vulnerable Households (Continue)

	Non-vulnerable			Vulnerable			Total
	Frequency	**Percent (Colum**	**Percent (Row)**	**Frequency**	**Percent (Column)**	**Percent (Row)**	**(Row)**
Education of household head							
1.Below primary school	80	12.31	**56.74**	61	8.10	43.26	141
2.Primary school	326	50.15	40.00	489	65.20	**60.00**	815
3.Secondary school	145	22.31	44.48	181	24.10	**55.52**	326
4.Vocational school	**44**	6.77	**77.19**	13	1.70	22.81	57
5.Bachelor degree and above	**55**	8.46	**90.16**	6	0.80	9.84	61
Total	650	100.00	46.43	750	100.00	53.57	1,400

Source: Own calculation.

The number of last year risks hit household classified by vulnerability household proposes that 61.49% of non vulnerability households do not encounter with any risk. On the contrary, vulnerability household face with one to two risks employs about 57.48% and 63.21%, respectively.

Table 4.71 Number of Last Year Risk Classified by Vulnerability Household

Number of risks	Non vulnerable	Percent (Row)	Vulnerable	Percent (Row)	Total
No risk	182	**61.49**	114	38.51	296
One risk	270	42.52	365	**57.48**	635
Two risks	117	36.79	201	**63.21**	318
Three risks	81	53.64	70	46.36	151
Total	650		750		1,400

Source: Own calculation.

In conclusion, poverty is manifested not only in hunger, but also in poor health, lack of education, poor settlement conditions, lack of access to clean water supply and sanitation and environment degradation. It is clear from the results and discussion above that there are several factors determine vulnerability to poverty, that are, household size, education of family member, education of household head, occupation of household head, disable person in household, unemployed person, own livestock, monetary asset, tangible asset, total borrowing, expenditure to cover risk, severity of risk, and risks. There are four natural, physical and financial risks and two human and social risks hit household. These four natural, physical and financial risks are theft of producer goods in 2014 and 2010-2013, theft of crops, 2010-2013, and crop loss by insect and plant disease in 2014. Another two human and social risks are unemployment in 2014 and working disability by accident of household head in 2010-2013. These factors influence on household poverty. Therefore, the setting of poverty attacking development policy should beware of the factors affecting household to be below the poverty household.

Chapter 5

Conclusion and Policy Recommendation

The last chapter ends up with the summary of descriptive data analysis, follows with the qualitative and quantitative assessment of vulnerability to poverty and discusses about the suggestion and policy recommendation.

5.1 Descriptive Analysis of Household

This research describes about the livelihoods of farm household in the northern and northeastern region of Thailand. According to the household status, the respondents mostly estimate their wealth in the moderate level (70%). About 23 percent of total households are poor status. Zooming into the household data, household size between 4-6 persons account for a little bit more than a half of overall households. About the disable in household, almost the entire household member has a small number of the disable person.

According to the **household head information**, it has been shown that most of the household head's genders are male, accounting for 76%. The percentage of total age of household head is greatest in the range between 41 and 60 years. The finding indicates that household head age is in the labor force, which can sustain the income flow of household. It is interesting that the aging household head age between 61-70 years is 16.6% and age more than 70 years old is 5.7%, totally 22.3%. The education of household head plays an important role on the internal household management. The result presents that household head on the average graduate primary school at 58%, secondary school at 23% and below primary school at 10%. Main occupation of household head is agricultural work account for 66.6%. The next main occupation is hiring work, which can be count for 19.6%. The third main occupation is selling, amounting for 6.3%. Concerning to the unemployed household

head, about 3.9% of household heads are under unemployment position. Northern household head are more unemployed than household head of the northeast region.

About **education of household member**, each household have at least 1-2 students, which family must support school cost, amount for 44%. About 6% of households with student have 3-4 students in household. Families in the northeast have high number of students. School cost per year that family must support is about less than 10,000 Baht, account for 58.7%, and following with the rank of 100,001-200,000 Baht with 22.3%. Among the household that have children, there are a very small number of children not go to school.

According to **the number of absent member** in household, around 17% of households have 1-2 absent members. Nearly a half of absent members contribute money to support their family. Their contribution is less than 10,000 Baht per year.

Note to **employment and family income**, most of household occupations are farm related. As is observed, agricultural work of households are classified into: 1) doing full time farm on family farm, 2) doing full time farm work on other farm, 3) doing part time farm work on family farm, and 4) doing part time farm work on other farm. It is 46% of total household work is doing full time farm on family farm. The next biggest categories are doing part time farm work on family farm (42%), doing part time farm work on other farm (10%) and doing full time farm work on other farm (2%), respectively. It is quite clear that household income is average less than 50,000 Baht per month account for over 80%. Household expenditure is also less than 50,000 Baht per month. It is 63% of total household have family member spend time on their part time self employment. However, there are 11% of family members, who have part time self employment, contribute money to family. About the unemployed family members, nearly 73% of total household are employed.

Livelihood assets compose of natural assets, physical assets, and financial assets. In this part concentrate on **livelihood assets: natural assets**, which discuss about total area of land, area owned by household member, rented or leased land, cost of rent or lease, land buying and land selling. The farm land in the north and northeast region are different depend on the kind of plant. However, the same kind of plant in both regions is paddy fields. About the land uses, one-tenth of total area is

resident area. Nine-tenths of total area is agricultural land, which consist of paddy fields, agricultural land, fruit tree, home garden, ponds, forest, pastures, fallow, etc. According to the resident area, which classify into rented land, leased land, and own land. About one percent of the total households in the sample rent land, whereas leased land is on an account of one tenth of total land. The rented land cover one third of total land. On the one hand, leased land is only one tenth of total land. It expresses that many households have a fix land renting cost. Note to the percentage of land buying and land selling of household, it represents that the purchasing and selling of land account for about 3%.

Physical assets classify into productive assets or crop production, livestock, agricultural tools, housing and basic household equipment. Refer to physical assets: crop production, firstly, main crop productions in research area are paddy rice, sticky rice, sweet corn, para rubber, sugarcane, garlic, cassava, mango, tobacco, litchi, chrysanthemum, chayote, cabbage, sweet pepper, Chinese white cabbage, etc. Rice is the most important crop; follow by corn or maize, pararubber and sugarcane, respectively. The average area of rice planting per household is 6.5 rai, which are classified into the small size plot. Some farmers change the type of crop planting to cash crop such as pararubber. Some farmers diversify crop planting because of market opportunity. Secondly, livestock feeding in research area is growing very quickly and plays an important role not only for internal household consumption but also for commercial. It has changed from backyard animals and integrated crop-livestock farming systems to industrial livestock farming system. Household in research area feed many kind of animals or poultry such as buffalos, cows, cattle, goats, sows, piglets (less than 12 kilograms), fattening pigs (more than 25 kilograms), chicken, ducks, other poultry, fish, etc. A great number of livestock feeding in research area are chickens and ducks. The high values of livestock feeding are pigs, buffalos and cows. Chickens are predominantly raised by communities, representing the greatest number of livestock. The average number of chickens per household is 7 head. Ducks are also feeding widely. The average number of ducks per household is 5 head. In the northern region, most farm household feed local livestock like native pigs. Native pigs are raised by people in many villages. They can stand for disease. In contrast to the pig feeding, the importance of beef cattle and buffaloes is still low in spite of the fact that they are mostly raised by smallholders in rural areas rather than by companies. Thirdly,

agricultural tools play an important role as productive assets. For example, special building (stable, storage), processing (rice mill, food processing tools), agricultural machinery or equipment (ploughs, seeding machine, sprayer, threshing machine, water pump), means of transport (pickup car, tractor, trailer, cart, motorbike, bicycle), others (loom, generator, water tank, fishpond). Finally, physical assets, which represent the wealth of household, are the following consumer goods: car, motorbike, bicycle, television, mobile phone, jewels, refrigerator, electric or gas cooker, housing, furniture, etc.

A financial asset is a non-physical asset whose value is derived from a contractual claim, such as bank deposits, bonds, and stocks. Financial assets outline into credit and saving. In this first part, the study starts firstly with the access to financial services and credit. Credits are important to farmers. It can be said that credits are coupled with agricultural occupation. Farmers in the north and northeast region have problem with lack of water resource, dry and cold weather, soil fertility, and logistic. Thereafter, farmers face the problem of production loss, deficit and finance. The credit problems of farmers are exacerbated by the bad weather. According to credit, household's debt is average 45% of total household. Many farmers have difficulty paying off loan. The research result illustrates the purpose of loan is mostly for agriculture work, stand at 74%. Most household in the northern region borrow for agricultural work (65%), while the northeastern household borrow for non agricultural work (88%). Non agricultural loan, for example, some household ask for loan to relief household spending such as car loan, housing loan, education loan, etc.

Formal financial institutions are known well by household. The Bank for Agricultural and Agricultural Cooperatives (BAAC) is the only government agricultural bank to provide loans for small scale farmers with low interest rate. That is why there are a numerous famers apply loan from BAAC reach to the highest percentage at 79%. Within this survey group, a little bit more than a half of farm households have no debt. Debt is all liabilities that require payment or payments of interest to the creditor at a date in the future. The lowest range of debt is the range below 50,000 Baht, account for 51.4%. The highest range of debt is the range above 500,001 Baht, amount for 0.6%. The debt in the range of 50,001-100,000 Baht is quite high at 36.4%.

In lending agreement, collateral is a borrower's pledge of things (property, land, consumer goods, etc) to lender, to secure repayment of loan. The most favorite collateral uses are land and property at 42%, and guarantee person at 39%. A 17.5% of total respondents access credit without collateral.

Debt is a common feature of farm works. Yet, the timing of debt payoff date is the critical and pressure time. The debtor feels pressure to pay off in finite time. Luckily, nearly 50% of the borrowers are able to pay back the credit in time. Only 3% of them are already paid. On the other hand, about 27.5% of total borrowers fail to pay back the credit in time. Lastly, the other borrowers feel uncertainly to repay debt in time, providing for 20.3%. Being in debt isn't great. Being unable to pay debt is even worse. There are many reasons why some respondents may not be able to pay their debts. Looking at the information in more detail, we can see that the most unable to pay debt reason is no cash available, amounting for 53.5%. The next hardship reason is they must pay back to another moneylender since they may apply for more than one source of credit, account for 14%. Some of the other hardships are: must pay for social cost, too high expenses for education, must pay for factor of production, failed business or can not sell harvest, high diary expenses, must give money to family, bad harvest, property damage and must pay for construction work, unexpected medical bills, unexpected animal loss and died and high Interest rate. The consequences if they do not pay back the credit in time, their security rather be seized, or do not get new credit.

This second part of financial assets is the accessing to financial services and savings. Saving is the difference between a disposable income (wages, income of the self employed and net property income) and its consumption (expenditure on goods and services). The family with the greater savings is in a much better financial situation. The approximately half of the survey people have saving at the moment. The amount of cash savings is mostly in the range below 50,000 Baht, about 77.5%. The next second range is 50,001-100,000 Baht with 13.7%. There is a smaller percentage of respondents who have saving in the higher saving range. Saving and insurance are related. At present, there are many different insurance plans. Some special type of insurance plan such as insurance savings plans offer both protection and are a disciplined way to save regularly. Generally, insurance is a pattern of risk management

primarily used to hedge against the risk or uncertain loss. Therefore, it is a means of protection from financial loss. However, according to the insurance member, it is realized that the insurer is the smaller group than the non insurer, providing for 41% of total respondents.

Concerning to **group membership and social networks**, the most popular social group is agricultural group, which reveal 55% of total respondents since main occupation of them is agricultural work. The second popular group is housewife group, counting for 21%. For the reason that in many local villages, there are the housewife group joining together to produce local product such as basket, dried fruit, silk cloth, etc. The third group is village committee group, which is about 19%. The rest groups are Tambon administration group, elderly group, bank credit group, village head group, one Tambon one product group (OTOP), informal credit group, village agricultural product storage group. Human beings may sometimes enter very difficult times. The group can help them to solve the difficulties. That is why people come together to join the group. Nearly a half of sample joins the group because his neighbors or friends are members. About 31% of survey people participates the group since they want to get the information. It is 11% of them give the reason that advantage of group is giving them the opportunity to meet other people. Besides, there is 5% of interviewee's answer that they can exchange product when they join the group. Around 2% of overall group members think that group can help if problem occurs. The others 1% of members gain benefits from the group due to group can help to access credit. The other respondents think that they join the group since family or relatives are members and they can access inputs. Among the persons who are joining the group, they have no contribution for joining the group, account for 21.5%. On the contrary, there are a lot of group members contribute for joining the group by spending time for group (35.3%), being the committee (31.5%), paying membership fee (8%), and helping in other ways (3.7%).

The next part describes about **individual risks, shocks and emerging costs** occurred to household and the reaction of household on selecting the adaptive and coping strategies to manage risks. Furthermore, the severity of risks and the number of risk attack households are also discussed. The discussion classified by time line, beginning with the experienced asset, risks or shocks and emerging costs of household during last year, last five years, and expected risk occurred in the future.

There were more than one risk hit households in each period. The analysis of risks show only the first risk refers most by households. The most occurred risks experienced by households during the last year are natural, physical and financial risks. Human and social risks are also rank in top ten risks as well. The top ten risks hit household of four provinces namely Burriram, Kalasin, Nan and Chiangmai for the year 2013. First, concentrating to the risk which happened to household in last year classified by province, it presented the ranking of main experienced risks of farm household in last year (2013). Sudden moving away of working family member and breaking ties (no money flow) is the top household concern, with 23% saying that this is what they worry about most. Crop loss from insect and plant diseases is next, with 20%. Theft of crops (12%), Land slide (9%), loss of house from flood (6%), fire (5%), crop loss from weather (4%), damage of house from weather (4%), flood (4%), and low crop production (2%) complete the top ten local concerns. The other important risks, which are also important but those are not range in top ten risks hit household, are damage of storage, theft of goods, local heavy wind, hailstone, theft of livestock, local heavy rainfall, drought, costs for other ceremonies, prolonged sickness of household head, self-financed for death of pig (disease), credit-financed for death of duck, birth of son, divorce costs and funeral costs. Next, main risks hit farm households in last five year during 2009 to 2013 were crop loss due to insect and plant diseases, drought, low agricultural productivity, flood, theft of producer goods, high input price, low price of production, crop loss from weather, theft of crop and working disability (accident) of household head. Last, the expected asset, risks and ranking of risks/shocks are discussed. The result shows that crop loss from insect and plant diseases is ranked in the first place. The others risks that farm household forecast may encounter in the future are drought, unemployment, old age, low agricultural productivity, high input price, low price of production, crop loss from weather, theft of producer goods, and flood. It identifies that the risks that attack households in the past affect on the decision of households on their future livelihood. According to top ten risks forecast to face in the future, there are two of human and social risks expect to occur to households, which are, unemployment, and old age situation.

According to human and social risk, unemployment is ranked first. A lot of households concern about the unemployment situation in local area perhaps a

reflection of changing economic and social structure following the financial crisis. Unemployment in rural farm household occurs from many cases such as technological unemployment, casual unemployment, seasonal unemployment, graduate unemployment and voluntary unemployment from failure of farms. At present, widespread advances in technology and smart machine on farm work may displace certain types of work. The losses of works that are caused by technological change call technological unemployment. New technologies can lead to a lasting decline in the total number of workers in employment.

In addition, catering or agriculture work that workers are employed on a day-to-day basis, there are chances of casual unemployment occurring due to short term contracts, which are terminable any time. Therefore, when a worker's contract ends after the completion of some farm work, he has to find a job elsewhere. Likewise, seasonal unemployment in farm work, which farmers work for only a certain period of time in a year. They work at the time of ploughing and then engage in unemployment. The problem of seasonal unemployment of farmers can be solved by making agriculture a full-time work through irrigation, fertilizers and mechanization. Another way to solve this problem, for example, doubles cropping, mixed farming, dry farming, intensive cultivation, etc. For students, graduate employment is a major trigger of mental distress. They are worrying about getting a job but it is less opportunity to get work in rural area. The young generation selects to work on off farm occupation because their knowledge is not matching on their parent farm work. Most of them emigrate to urban or to the cities. Young people who intend to abandon farming do not help their family farm. That is why there is the decreasing in agricultural output, farm income and the number of farmers. Furthermore, since the nature of farm work is hard, complicate, costly, and uncertainty. Farmers must to bare a catastrophic event, steady erosion or a slow coming to erosion. Farmers spend years crunching numbers, tweaking production methods, and trying to stay ahead of market trends. Despite their exhaustive efforts, the farm business is not making money. Farmers stand on the finances stabilizing in ten years. They feel that is a long time to sit in the hold and work to get out of the red. Most farmers do not decide to step away from their farm lightly but sometimes it is the only economic choice that makes sense. Thereafter, the unemployed farmers seek out off farm occupation.

Concerning to human and social risk, the research finds that the number of elder in household is in the second rank of overall top ten future risks. Many household worries about old age situation for the reason that the changing in working-age household has a significant impact on agricultural output. Additionally, the rising numbers of elder in household impose a heavy burden of old age supported by household. The more old age wave household income lower and pose challenges to the vulnerable rural household. The interviewed farm households express the opinion that it is a great challenge of government to reform the old age security system because we are going into the aging society. The rapid aging at a low-income level effects household finance shapely. Most of those old people are at the age of dis-saving.

All in all, to solve a risk we must understand what the risk is, including its severity. According to research result, crop loss from insect and plant diseases, drought, low agricultural productivity, crop loss from weather, theft of crops, and flood are also raised as the most significance risks during last year, last five year as same as future. Therefore, the policy maker can design the policy to help households to outreach from these problems. To start with crop losses caused by pests affecting major crops grown in research area. Pests are any kind of insect, plant disease, or weed that hurt farmer's profits. Almost all of farmers spray to mitigate crop damage caused by pests. The use of toxic pesticides to manage pest problems has become a common. Nonetheless, pesticides are not only harmful and poison for human but also environment. Many farmers find out the solution by planning crop planting. Some crops can naturally withstand pest damage and grow well. Another way is crop rotation. Some farmers grow different crops and wait for a few years before growing the same crop on the same field. Currently, organic farm is popular in Thailand. Some organic farmers also tend to spray less pesticide on their field than other farmers. It is the best way to protect crops by using a natural method. For instance, farmers keep pests away from field. Some farmers grow the plants that naturally keep the pest out, surrounding their main crops. Another way is they use a natural enemy or insects that eat that pests but do not hurt their crop. Some farmers burn diseased crops in order to stop the pest spreading to healthy crops. The next example is a lot of farmers use plastic bag to wrap mango to protect the mango skin, or to bump against the branches and also to protect disease and insect.

Then, the important risk rank is drought. Agriculture in Thailand is rain-dependent agriculture. The frequency and severity of such droughts occurs certainty. Drought problems in areas of low rainfall or planted area in northeastern region of Thailand are very seriously. Agricultural drought begins when the lack of water starts killing crops and livestock. One of the major tests of a government has been how it deals with water uncertainty. From the past, farmers use groundwater, pond. For the government sides, the irrigation project is applied to decrease drought risk. Dam project will be advantaged to keep a great amount of water during raining season. However, weather-driven production shocks or crop loss from uncertain climate or weather is really difficult to find out the solving solution. Thus, the alternative way is farmers should plan drought-tolerant plant; protect landscape during time of drought, efficient watering practices to conserve water.

Next, the third significance risk is low agricultural productivity. Quality of soil is a cause of this problem. Many farmers select the way of shifting cultivation. Shifting cultivation is the way to cultivate crop temporarily, then abandoned and revert to natural vegetation whereas the cultivator moves on to another plot. Some farmers slash and burn straw and grass but some farmers clear land without burning. After producing vegetable and grain crops on cleared land for a few years, farmers abandon it for another plot. They slash trees, bushes and forests, and burn the remaining vegetation. The ashes increase potash to soil. The seeds are sown when it rains. However, there are other causes of low agricultural productivity. Farmers input high factor of production but they get low production. The understanding of the influence of agricultural productivity is significant, which lead to the way to solve low agricultural productivity problem. Patmasiriwat and Suewattana (2010) found there are seven factors relative to the growth of the agricultural productivity which are education, agricultural capital stock, cultivated land, price of fertilizer, expected crop price, irrigation and agricultural research expenditure, and crop location. Therefore, these factors would be the major focus for the policy makers and development workers in improving the total factor productivity. For this reason, the suggestion policy for improving agricultural productivity should firstly concentrate on farmer’s education, knowledge and skill on their specific farm. Besides, government can help to support the price of fertilizer.

Afterward is crop loss from weather. Climate and weather influence their crop production year to year. The empirical research work is also finding that many farm households have problem with crop loss, which is directly related to unfavorable weather such as drought, floods, heavy rain, hail storms, too cold and too hot weather. In the north Thailand, farmers face with cold and dry weather but it is not so much problem because they substitute to plant crop that can stand on cold weather already. However, problem of variation of monsoonal rainfall and rainfall accumulation rate in June to July, typically peak in Northeast Thailand, effects on the planting in rainfed lowland rice cropping. It is far beyond the ability of general households to deal with it. In contrast, some farmers attempt to reduce the uncertainty of future climate change impacts on crop production by improving knowledge of climate influences on and management contributions to cropping area and intensity. They use climate adaptation strategies through work calendar and field workability. Additionally, some farmers improve the ability to operate farm machinery. Therefore, farmers should learn together how to response with these problems.

Lastly, theft of crops, livestock, consumer goods and producer goods are incremental important. Thieves are in barns, sheds and outbuildings. They often stole crops, cattle, tools, generators and welders. In small village, everyone knows each other. Farmers can join with community and rural neighbors to switch farm watch. For large village, each farmer has to rely on himself. As a matter of fact, farmers raise their dog to guard their field and property. The elderly parents are essentially to help to survey and secure farm. Interestingly, modern farm apply using technology network like a video camera or smart phone to catch the theft. To sum up, the best way to prevent theft are taking stock of stuffs, locking storage, placing bright lights or motion sensor lighting around outside the house, and securing gates with chains and locks.

It was about 80% of total household encounter with risks in last year. Half of them experienced risk during last five year. Nearly half of them expect to face future risk. The ranking of the risks in general have analyzed. After that, the calculation of the number of months that households take to recover from the above risks is discussed. The provided table 4.48 reveals most households spend short time (below one year) to recover from those risks, amount for 91.2%. The rest of them, 8.8%

spend more than one year to recover from risks. It is 5.4% infer the severed risks, which will take most time to recover. Each households face different risks. After ranking the experienced risks, households are further indicating the cost of risk. High cost of risk management implies high severity of the risks. Cost of risks are separated into last year risk cost, last five year risk cost and future risk cost. Most households express the opinion that they do not spend money on managing that all risks, occurring in different time period. For the last year risk cost, 602 out of 1,400 households spent money to manage risks. Most of them spent around 1-10,000 Baht, at 32.5%. For the last five year risk cost, about 70% of households did not spend budget to manage risk. About 22% paid 1-10,000 Baht on those risks. For the future time, it's hard to expect for the future. The costs of the expected risk are zero at 77% because households can not prepare or provide budget to safe themselves for the future risk.

The livelihood strategies are classified in adaptive strategies and coping strategies. The adaptive strategies, which household implemented to cope with risk. The highest adaptive strategy in last year was diversification of income source. The other strategies were hygiene and disease prevention, less risky production system, saving in cash and diversification of crops. The top five of adaptive strategies in last five years were hygiene and disease prevention, less risky production system, diversification of income source, diversification of crops and saving in cash, respectively. The top three strategies expect to face in the future are quite similar to the strategies that respondents were selected in last five years.

Adaptive strategies that household use in different time period classified by province. According to last year strategies, there were 380 out of 1,104 households that use strategies, not preparing any strategies to manage risk. The reason may because they do not have the ability to ask for the credit from any financial institution or no collateral assets. Moreover, some of them fail on managing those risks again and again. Therefore, some households select no risks response. The most popular adaptive strategy that household used in last year was diversification of income source, about 31%. There is nothing more dangerous than relying upon one or two employers to support household's income needs. Diversifying income, or adding multiple income streams, is a great way to secure them from the volatility of cash

flows. Diversifying income streams reduces risk and positions farmers against the unknowns, for example, unemployment, a downturn in the market, farm business failure, and more. It also gives them the chance to take advantage of new opportunities and explore their interests. After that, hygiene and disease prevention is the second order, account for 18.6%. If household are successfully in disease prevention, it can decrease many human and social risks, which are, death of other working family member, working disability caused by disease of family member, chronic disease and prolong disease of other family member. Next, less risky production system strategy is applied for 9%. In research area, farmers make decision rather on crop planting or livestock feeding to reduce production risk. In the northeast, farmers grow fast-growing crops such as cassava, pineapple, and sugar cane and grow crops that are resistant to drought and disease. In addition, it follows that saving in cash strategy is used with 8%. When households have saving, it is a guarantee for their wealth stability and they can run any activities related on their farm work or for any other purposes. Many households expect to save more in order to compensate for the different types of risk which they are exposing to themselves and their family. On the one hand, saving in cash alone is not enough, the survey household select saving in variety kind like livestock, crop and consumer goods. Lastly, diversification of crops is in the fifth ranked, amount for 6.6%. This strategy can minimize low production price risk before it cause loss to farmers. Farmers shift from the regional dominance of one crop to regional production of a number of crops. The changing from cultivating low value crop to high value crop mix cause the economic returns from different value-added crops and better marketing opportunities. Main adaptive strategies, which households applied in last five years, were ranked in orderly, which were hygiene and disease prevention, less risky production system, diversification of income sources and diversification of crops. Finally, there are 748 of total household expect no risk happen in the future. About 217 households are not preparing any strategies to manage risk. The adaptive strategies that household expect to use are hygiene and disease prevention (24%), less risky production system (11%), diversification of crops (10%), diversification of income sources (9%), Saving in cash (8%), diversification of livestock (8%), membership in groups or networks (6%) and use of extension service (6%).

The coping strategies that household mostly select to handle risks. Household member is facilitating risk-coping in the aftermath or shocks and crisis. The

first and second strategies, which are reduce food consumption and dis-saving, are the same in every time period. The other important strategies are credit from bank and credit from family and relatives. The coping strategies for last year risk. Risk coping strategies are implemented after a shock to deal with the impacts. Food consumption reducing is the single most important component, accounting for 46% of total households' strategies. Households report a variety of coping strategies over the last twelve months preceding the interview. There are 947 out of 1,400 household or 68% of household reporting using these strategies. Households report most frequently used strategy is related to reduction in food consumption, followed by dis-saving, with 23%. A substantial proportion of households also report permanent migrating to manage unemployment risk. Credit from bank, credit from family/relatives, take children out of school, pawned good, new/additional work of household head, sale of assets, and ask for charity are the coping strategy household use.

The coping strategies used by household in last 5 years. The risks, which households experienced during the last five years cause them looked for the strategies to manage on them. The strategies they prepare for risks and react to risks are advantaged to learn. The lesson of the past strategies that household has applied until present indicated that strategies is successful and best uses. Half of household report no risks in last 5 years. The most frequently used strategy is reduction in food consumption: one third of households (32%) report spending less food consumption. The second most commonly used strategy is dis-saving: more than a quarter of households (28%) report not saving presently. So, they may hard to deal with risk. Loan from bank, family and relatives, friends, money lender and other sources are used by about 15.8% of the households that using strategies. Also 8.8% of households report using sale of assets in kind of livestock, crops, standing crop, consumer goods and others. It is only 3% of household report removing children from school to manage risk. Some households think that school cost is so high and they want to cut the expenditure. The average education of family member is at primary school. Higher education study must spend a higher budget. So, it is higher probabilities to reduce school cost burden. Most of them expect their children helping farm work. On the other hand, 8% of the households report using no coping strategy in the five years prior to the survey. The use of coping strategy in the future, in future, households think that they will have to solve many risks. Households will prepare the

strategies to manage and cope with risks. The coping strategies, which most households select to manage risks in the future are reduced food consumption (32%), dis-saving (23%), ask loan from all sources (14.9%), sale all kind of assets (11.8%), and additional work of household head and other adult family members (6.2%) respectively**.** Reduced food consumption is the primary strategies. Household deals with the consequences ex post of income risk by self enforcing consuming reduction. In the future, household expect to face the fluctuation in consumption. Consumption reduction will affect on nutrition, health and education. The next interesting category is dis-saving. Each household choose the way to adjust themselves firstly by losing saving opportunities. Loss of precautionary savings and insurance arrangements will cause the fail of coping strategy when common shocks occur. As a result, these households may loss their self protection. Asking loan is the next choice, especially, Bank of Agriculture and Cooperatives (BAAC), ranks first with 79%. Ex-post risk coping strategies include formal credit, which appear to contribute to reduce income risk and its consequences. The fourth of future coping strategy rank is sale all kind of assets. Assets are easier to be sold in the case of valuable assets, not only consumer goods but also crop or livestock. For instance, sales of productive assets are usually in the form of livestock sales, which have high demand. This is the possibility way to allocate income easily to compensate the loss. Finally, the future coping strategy that household prepare to cope with risk is the promoting the labor force participation of household head and other adult family members.

The last descriptive part describes about **demand on government assistance.** Household has high demand level on all policy that will be advantaged to farm household. Firstly, the highest demand from the ranking show that farm household wants government to help about the price guarantee on agricultural product. In fact, agricultural products are pretty low every year and it causes of low incentive to invest on the next crop production. Problem of agricultural works are mostly come from the natural disaster like heavy rainfall in rainy season and drought during summer. Another important problem is the insect attack on farm. Farmers are relying on the use of insecticide, which are very costly. Another reason come from the unplanned production system, some season farm households are promoted to produce the same kind of crop, after the harvest season there are a plenty of production lead the price decline and the farm households are completing to each other to sell the production.

Therefore, there is no any guarantee for the production price. The uncertainty of the production price from many factors causes the farm households loss all the time. Furthermore, there is no anyone looks at the overall picture of the country's crop production. There is no system to calculate the demand matching to supply of production. So, the farm households have low opportunity to gain from farm occupation.

Secondly, the next aiding policy that farm household need is helping to guarantee fertilizer and factor price. It is certainly that fertilizer price play a substantial role on agricultural work. Production function is determined by the factor demand. That is the input. By the way, the input supply and input price are fluctuating. Farmers take a very high risk of scaring or lacking input supply to the farm and the risk of increasing input price. It is as the domino effects. When farm households have a high cost of factor of production, households must supply the production with the increasing cost as well.

Thirdly, drug and gambler reduction and control policy rank next biggest category. Households show the severity of drug and gamble problems, which people receive the effect of them. Many governments in the past used to promote this policy but it is hard to continue this policy because the drugs sellers have a great power and large network. However, people still want some aids from government to help the drug addicted persons. When a family member is addicted drug, it means a household must loss a labor to do farm occupation and household must spend time and a lot of money to cure the sickness family member.

Fourthly, the next demand is the demand on funding circulates in village. To do farm work is taking a high risk. A lot of farm households loss continuity in many season but they must continue working on their farm to outreach the debt. Hence, they need the fund for new investment for the new cropping season. In some area, farmers work in group and join together. So, they need the village fund to help and share their risk on agricultural work.

Fifthly, the next category is demand on land allocation. Land allocation problem in Thailand have been raised and included in the policy in many governments. A lot of farmers in research area have no their own land. Farmers need

their own farm land because some farmers must pay for the high rent cost in order to do their farm. Some must do the farm on other farm land and get only the hiring wage. It is uncertainly for the cash flow to sustain their living.

Sixthly, farmers want government to help solving agriculture work problem. Agriculture is hard work but income flow from the production sale is quite uncertainty. It seems a thousand problems hit farm household a year. For example, a numerous of farm household face the production loss, low production price, whereas cost of production increase since factor price increase. The agricultural work has high competition due to it change the pattern to agricultural business. Small farmers can not complete with the global competition. Hence, farmers become poorer every year.

Seventhly, many households want governments to solve unemployment problem. In rural area, income is mainly come from farm work, hiring work, constructing work and trading. It needs only a certain skilled labor more than high educated labor. There are a great number of unemployment and the employment problem of hiring the labor under their knowledge or under skilled employment. For example, the engineers and scientists have high skill and knowledge background, but they can not find work position in local area. Most of them must turn their aim in working in the factory to do their private occupation like fixing computer or migrate to work in other region. Consequently, people need the policy to promote and create work in rural area. In addition, at present there are already a great number of legal and illegal migrants working in agriculture. Their wages are generally much lower than those of Thai workers. Hence, Thai farmers, who are the hire labor in farm, are unemployment.

Eighthly, it is the demand for water supply arrangement. Water is needed for all types of agricultural production. However, the specific quantities required differ among agricultural subsectors. Apart from the natural water requirement of “fisheries,” the crop sector is the most water intensive. Water supply for agriculture is very important because lack of water, it is hardly to plant any crop. At the research area in northeast region encounter of the frequency of the drought every year. Local state try to solve this problem but it is not long run successful. Government paid a great amount of budget on irrigation system but it can not cover all the extensive arable

land. It helps the farm, which locates close to the irrigation area only. Likewise, this problem still happens and it will be the eternity problem.

Ninthly, farmer has demand on funding for their farm work. The result of low production price, low production cause low total revenue, while the cost of farm investment is so high, it leads farmer deficit. Thus, farmers need funding aid to support their farm work.

Finally, households in many areas face the difficulties to access the outsides because of the poor construction of the road. Therefore, many households show their demand on road construction. Good road can reduce travelling cost, transportation cost and it is easy to access to the market. Crop production is easy to rot. After harvesting, it needs to supply to the market fast. In the reality, farm households encounter the high competition of selling product with the crop from other region. Moreover, it is not easy to deliver production farther from the planted area because of high fuel cost. Some households' loss half of their production due to the delivery process spends many days to customer. Therefore, the construction of road is very important aid policy to help

5.2 Vulnerability to Poverty of Rural Farm Household in Northern and Northeastern Region of Thailand

Result of estimating vulnerability to poverty with OLS and FGLS, the results of the model for the log consumption equation and variance of the log consumption (OLS) reveals that 48% of the variation in log consumption (a measure of well-being) can be explained by the following factor: household size square**,** family members: below primary education, family members: primary education, family members: secondary education, family members: vocational education, family members: bachelor education, education of household head: below primary education, level of education of household head level, literacy of household head: can not reads or write, non-farm occupation of household head, disable person, number of unemployed family member, non-farm full-time employees adult, the belonging of

livestock, monetary asset, tangible asset value, total borrowing in last 12 months, expenditure on last five year risks, severity of risk, unemployment in 2014, theft of producer goods in 2014, theft of producer goods during 2010-2013, crop loss due to insect and plant disease in 2014, working disability by accident of household head during 2010-2013, theft of crops during 2010-2013. The rest, 52%, can be attributed to the disturbance term. The low R^2 value is not uncommon, and is due to the measurement error (from unobserved and omitted variables) associated with the use of cross-sectional data in consumption studies. However, this measurement error indirectly accounts for the importance of the disturbance term, a variable capturing idiosyncratic factors (which includes risk associated with income) (Oluwatayo, 2004). All the variables included in the analysis have some influence on household well-being. For example, education of family members, non-farm occupation of household head, disabled person, number of unemployed, animals belonging and unemployment in 2014, have a negative influence on the consumption expenditure of households in the study area.

Generally, most of the model's coefficients (log consumption and variance of log consumption) come up with expected signs. In all samples, household size square, education of household head: below primary education, education level of household head, literacy of household head, non-farm full-time employees, monetary asset, other asset value, total borrowing in last twelve months, expenditure on last five year risks, severity of risk, theft of producer goods in 2014, theft of producer goods during 2010-2013, crop loss due to insect and plant disease in 2014, working disability of household head because of accident during 2010-2013, theft of crops during 2010-2013, are positively significant in explaining welfare in the research area.

For instance, a strong relationship is apparent between log consumption and theft of crops during 2010-2013, where by the household which has theft of crop has a positive effect on log consumption. An increase in theft of crop leads to an increase in log consumption of 1.178 Baht. In recent years, theft from farms has become more of a common occurrence. Access to high value agricultural equipment, crops (paddy, fruit, vegetable) and cattle that can easily be turned into cash has sparked new interest from thieves. In particular, crop theft is increasing and leading to thousands of baht in uninsured losses by unsuspecting farmers. In several cases the

thefts occur months before discovery of the loss and recovery almost impossible. For instance, in research area of Kalasin, the surging rice prices cause a widespread paddy theft of premium quality fragrant rice from farmer's granary. Therefore, households with high number times of being stolen have higher consumption expenditure than households without being stolen.

This example is as same as the relationship between log consumption and working disability of household head by accident and crop loss by insect and plant disease. In the uncertainly case of household head that face the accident and then being disability, he or she cannot work. As a result, it affects to household income directly. An increase in the number of working disability of household head by accident leads to an increase in the log consumption of 0.890 Baht. Their family member must pay for the hospital and other health cost to cure their household head. The next important risk hit household is crop loss by insect and plant disease. An increase in crop loss by insect and plant disease leads to an increase in the log consumption of 0.867 Baht. In the area of study, farmer loses their high-value crops particularly rice, maize, vegetables and fruit to insect, pests and diseases every year. The damage and production loss lead to monetary losses. Inspire of increasing in pesticide use, the losses in all major crops still increased in relative term. Farmers take a risk of toxic contamination. Therefore, their consumption expenditure is also higher for the higher pesticide cost, the spending to compensate yield loss and the spending for taking care of their health.

On the other hand, unemployment in 2014 also has a strong relationship with log consumption, but in the negative direction. An increase of unemployment leads to a decrease in log consumption of 0.61 Baht. Households, which encounter high unemployment, have less consumption than households, which not encounter unemployment. In research area, households are hit by unemployment risk. Households, which expect that their family member may be lay off from factory in the future, have low present consumption, secure their income and plan to save for future.

In the same direction, household that has disabled family member has a strong relationship with log consumption in the opposite direction. An increase of the inability person leads to a decrease in log consumption of 0.435 Baht. Vulnerability is most often associated with poverty, but it can also arise when people are isolated,

insecure and defenseless in the face of risk, shock or stress. In the case of disable persons in local area, all of them stay alone when family members go to work on farm. They eat less and must help themselves in all dairy activities. The disabled people do not work and can not earn own income. They are potentially vulnerable groups.

The results of the regression model by FGLS presents the determinants of vulnerability to poverty by FGLS and variance of consumption. The signs of the coefficients found that education of household head below primary school, theft of producer goods in 2014, and crop loss from insect and plant disease in 2014, have a positive impact on log consumption but a negative impact on variance of consumption. Household size square has a negative impact on log consumption, as well as on variance of consumption. Family with large number of family member, the consumption expenditure is also high. When households pay a high expenditure, it causes them have less of money left for the other consumption items. If the households are attacked by natural risks, like drought or flood, it will as the result of crop loss, which is probably difficult for them to smooth consumption. Family members education below primary education, primary education, secondary education, and vocational education, education level of household head, illiteracy of household head, non-farm occupation of household head, inability person, non-farm full-time employees (adult), monetary asset, tangible asset value, total borrowing in last twelve months, expenditure on last five year risks, severity of risk, unemployment in 2014, Theft of producer goods during 2010-2013, working disability by accident of household head during 2010-2013, theft of crops during 2010-2013, have a tendency to increase log consumption and also to increase consumption variance. For example, if households have more monetary assets, they will have more ability to consume and have enough assets to smooth their consumption during the difficult time. Therefore, households may either sell the assets or rent them out. Moreover, the accident incidence of household head as a kind of risk that hit households lead them to expense more to manage risks, which effected household consumption and its variance.

Relationship between vulnerability to poverty and observed consumption, it reveals that the relationship between vulnerability and current consumption is positive, different from the expected. The expect direction of vulnerability and current consumption is positive because household, which has high

current consumption indicates low vulnerability. This is because household has high power of purchasing. However, the results of the study consist to the real situation of household livelihood. It means the more consumption the more vulnerability because the source of money spending on consumption is come from loan. On the background of farm households are vulnerable. Farm occupation take a high risks from unexpected weather, production price and other factors, while the returns are quite low. Doing farm is costly with the continuing increasing of input factor. It is not consist of the theory that high risk and high return. Although farm households take a high risk from this variation, they must continue on their farm working and find out some part time job or secondary occupation to seek money to support family consumption. A lot of farm households change main occupation from farm working to do other kind of job like the hired construction worker, trading and so on. Moreover, there are a great number of farm households are in debt. The more consumption means the more vulnerability. Households must save a part of income for debt repaying, then the less left for consumption. Some households repay debt and borrow again because income is not matching or balancing with the expenditure. In other words, this may because the vulnerable households have limit income for spending. With the large household size and the small number of employees in a household, money receive must share for all family member for consumption. Hence, the increase in consumption causes the increase in vulnerability to poverty.

The relationship between predicted vulnerability and logarithm of consumption of extreme poor, as expected, almost all of the extremely poor are among the highly vulnerable. Mean of predicted vulnerability to poverty of extreme poor household is at 0.89882. The marginal box plot of the graph signals that almost all households have a vulnerability index in excess of 0.76, with 25.06%. The rate of exit from the extreme poverty pool is extremely low. This means that the majority of the extremely poor in 2014 were also poor in 2015. This segment of the population should be supported through the social programs that increase their human capital and their other assets.

The relationship between predicted vulnerability and logarithm of consumption of very poor household presents the joint distribution of vulnerability and current consumption among the very poor group. From the marginal box plot, it

can be seen that the very poor household have a vulnerability index in excess of 0.33 but less than 0.75. Mean of predicted vulnerability to poverty of very poor household is at 0.63782. This means that the currently poor households will still be poor in the next period.

The relationship between predicted vulnerability and logarithm of consumption of poor household presents the joint distribution of vulnerability and current consumption among the poor household. From the marginal box plot, it can be seen that the poor household have a vulnerability index in excess of 0.33 but below 0.528. These poor households have 14.29% be vulnerability to be poorer in the future.

The relationship between predicted vulnerability and logarithm of consumption of non poor household presents the joint distribution of vulnerability and current consumption for the non-poor. It is 25% of the non-poor are not vulnerable, and those who are vulnerable have consumption levels close to the poverty line. Another part of non-poor groups, account for 75%, are not poor at present but they are risk of being falling into the poor group in the next period.

The concept of Thailand to calculate the poverty group is most frequently use of **poverty line** as the cut off households, which stay below poverty line, are poor and the households, which stay upper poverty line, are not poor. Thailand poverty line in the year of 2014 was at 2,647 Baht per capita per month. The rural headcount ratio in terms of household expected consumption less than poverty line is at 28.79%. When comparing by using regional poverty line of the northeastern region of Thailand, which was at 2,387 Baht per capita per month. The percentage of expected consumption of household less than poverty line is at 28.86%. Poverty line of Northern region of Thailand in 2014 equaled to 2,355 Baht per month per capita. The result shows two groups of vulnerable households, which are, high and low vulnerable households. The estimates show that about 53.57% of households were vulnerable to poverty. The comparison of observed poverty status based on vulnerability index present that 75% of farm households are poor, whereas another 25% are non-poor.

The classification of poverty status based on observed poverty status and vulnerability index. Poverty status can be classified into four groups. The first severe group is the poor household with high vulnerability to poverty. This group can

be counted only 9.64%. The second group is the household that is currently not poor but has high vulnerability to be poor in the future, amount for 43.93%. The third group is the poor household but has low vulnerability to poverty, account for 19.14%. The last group is safe group that is not poor and low vulnerability to poverty. This group has 27.29%.

Comparison of Vulnerability to Poverty and Household Characteristics classified by Non-vulnerable and Vulnerable Households in Frequency and Percentage of Population are discussed. A vulnerability profile by selected household characteristics is displayed. When concentrating to the non vulnerable group, northeastern region contain the higher percentage (59.69%) than the northern region. When comparing between non vulnerable and vulnerable group, it indicates that northern households are vulnerable with 62.57%. The analysis of the province, it depicts that Chiangmai, Nan, and Kalasin province have high percentage of vulnerable households, while Burriram province has the high percentage of non vulnerable households. In overall number of households, non vulnerable households account for 46.43%, the rest are vulnerable household account for 53.57%. The average household size in the research area is between 4 and 6 person. In addition, the comparison of vulnerability to poverty and household size illustrate the interesting result that the larger of the household size has the tendency of having lower number of vulnerable group. For instance, household size between 1-3 people has high vulnerable households, amount for 71.89%. Household size between 4-6 people has lower vulnerable households with 42.95%. Household size between 7-9 people has lower percentage of vulnerable households with 32.99%. It is the opposite direction for household size more than 10 people, which contain the highest percentage of vulnerable households. This clearly indicates that larger household size has lower vulnerability to poverty. However, poverty incidence as well as vulnerability to poverty worsens as one moves from medium size to bigger family size households. The vulnerability to poverty increases shapely to 66.67% with the largest family size. The overcrowding household sizes of more than ten persons turn the poverty incidence. Farms in study area mostly are small farm size, which do not need a great number of labor participation. Some family members are distinguishing unemployment. Farm profit is not enough to support the household expenditure with a largest family size. Larger number of family members above ten persons causes a decline in household

savings. Hence, in this case labor supplies and saving are not smooth consumption at all.

When compare the vulnerability to poverty with the gender of household head, it can be say that households head generally are male. The difference between vulnerability group classified by male and female household heads are not different.

Concerning to the relationship of vulnerability to poverty and the age of household head, the age of household head play an important role in separating households, which are nearly to fall into the vulnerable and non vulnerable households. The higher risk of vulnerability to poverty is for the age of household head below 30 years old. Cross-tabulation results show that young household head age less than 30 years old have pretty high percentage to lead the household to fall into the vulnerable group because their household head may have low experience to organize household income. These household become in vulnerable group for 52%. An increased in the age of household head is found to decrease vulnerability to poverty. Older household head ages 31-50 years old are active labor force, have high possibility to earn a lot of money and have high experience of livelihood. As a result, middle-age family boss frees family from vulnerability to poverty. On the other hand, household head ages between 51-60 and 61-70 years old are mostly be in vulnerable group, account for 51.14% and 61.80%, respectively. It is recognized that Thailand becomes the aging society. Cross-tabulation results present that 22.36% of household head are retired age beyond 60 years old. The vulnerability to poverty declines for the household head age above 70 years. This may because the household head at this age may have a certain amount of saving. They have a lot of lesson from the past about how to improve their own income and expenditure flow. They can handle well on household consumption smoothing and have strategies to handle risks. Although the elder has lower opportunity to seek income, but they are non vulnerable because they have the other family member support them.

The last point is the relationship of the vulnerability to poverty and education of household heads, the results from table demonstrates that household heads education background below primary school are safe in non-vulnerable group, while household head who has taken primary and secondary education take a risk to fall into vulnerable group account for 60% and 55.52%, respectively. The results are

very interesting that higher education can lead household far from the opportunity to fall into the vulnerability to poverty group. Cross-tabulation results identify that household head who has taken bachelor education are stay in non vulnerable group, reach to 90.16%.

In conclusion, poverty is manifested not only in hunger, but also in poor health, lack of education, poor settlement conditions, lack of access to clean water supply and sanitation and environment degradation. It is clear from the results and discussion above that there are several factors determine vulnerability to poverty, that are, household size, education of family member, education of household head, occupation of household head, disable person in household, unemployed person, own livestock, monetary asset, tangible asset, total borrowing, expenditure to cover risk, severity of risk, and risks. There are four natural, physical and financial risks and two human and social risks hit household. These four natural, physical and financial risks are theft of producer goods in 2014 and 2010-2013, theft of crops, 2010-2013, and crop loss by insect and plant disease in 2014. Another two human and social risks are unemployment in 2014 and working disability by accident of household head in 2010-2013. These factors influence on household poverty. Therefore, the setting of poverty attacking development policy should beware of the factors affecting household to be below the poverty household.

5.3 Policy Recommendation

From the past to present, the government has drafted several policies for poverty reduction, which include national and local policies. As a consequence, Thailand have been successful in lowering the national incidence of poverty, nonetheless, the poverty remain, especially in the northeast and north region. Thailand income inequality is highest in Southeast Asia. This research recommends the government review of poverty reduction programs that can reduce income gap and inequality among the region of Thailand.. The numerous programs that have high impacts on poverty reduction should be reconsideration.

At macroeconomics level, the country **GDP growth rate** is as the key indicator of poverty reduction. Government should fasten growth by expanding trade through enhanced integration with the global economy, improving business regulatory environment, bolstering growth by implementing transformative public investments to crowd-in private capital, stimulate domestic consumption, and improving quality of public services across the entire country.

At microeconomics level, first of all, this paper recommends government increase the **community and social development project** in the target area to increase opportunities for social and livelihood activities for poor and vulnerable households. Government should implement national strategy for a community driven development approach. Besides, national growth can be driven from the local area. So, government should **promote local trade and production**.

Secondly, this research also recommends the government includes the **improvement of infrastructure services** in a sustainable manner throughout remote area. Crop production is easily to rot. After harvesting, the production needs to be distributed as fast as they can to the market. However, households in many areas face the difficulties to access the outsides because of the poor road construction, which increase transportation cost and obstruct to the market assessment.

Thirdly, it is recommended the government **assistance on farm work** such as agricultural price guarantee, support fertilizer and factor price, land allocation. Farmers want government to help for the **agricultural price guarantee** on main agricultural product. It is not as expect that more production will get the high return. It is under the constraint of production price as well. So, government should find out the procedure to help about the slow down price of agricultural product. Next, farmers want government to **support fertilizer and factor price.** Doing farm is hard to gain profit. Farm cost saving can safe household to outreach poverty. In addition, it recommends government to help about **land allocation**. A lot of farmers do not have own land. They do farm under high rent cost. A lot of them get hiring wage from working on other farm. It is uncertainly for the cash flow to sustain living. Besides, **water supply arrangement policy** is recommended. Water is needed for all types of agricultural production. However, the specific quantities required differ among agricultural

subsectors. Apart from the natural water requirement of “fisheries,” the crop sector is the most water intensive. Water supply for agriculture is very important because lack of water, it is hardly to plant any crop. At the research area in northeast region encounter of the frequency of the drought every year. Local state try to solve this problem but it is not long run successful. Government paid a great amount of budget on irrigation system but it can not cover all the extensive arable land. It helps the farm, which locates close to the irrigation area only. Likewise, this problem still happens and it will be the eternity problem. Lastly, it is recommended government to help the **agricultural trading** to help domestic agriculture. The agricultural work has high competition due to it change the pattern to agricultural business. Small farmers can not complete with the global competition.

Fourthly, it provides recommendations on a **social protection** framework. Government should establish a national social protection council to review poverty reduction program and provide recommendations to the government**.** According to the human and social risks**,** the result indicates that rural employment needs more a certain skilled labor than high educated labor. The employment problem is the hiring the under skilled employee. There are a lot of youth unemployment in the northeast region. Additionally, there are already a number of legal and illegal migrants working in agriculture. Their wages are generally much lower than those of Thai workers. Hence, Thai farmers, who are the hire labor in farm, are unemployment. Government should reconsider about labor market policies to protect workers and issue **job creation policy and migrants working policy.** Another demand on government assistance is drug and gambler reduction and control policy, which rank next biggest category. Government should trigger new safeguards policies. Households show the severity of drug and gamble problems, which people receive the effect of them. Many governments in the past used to promote this policy but it is hard to continue this policy because the drugs sellers have a great power and large network. However, people still want some aids from government to help the drug addicted persons. When a family member is addicted drug, it means a household must loss a labor to do farm occupation and household must spend time and a lot of money to cure the sickness family member. It will be important for the strategy to **reduce and control drug and gambler**.

Fifthly, government should propose **microfinance policy** for the low income households**.** The research finding that farm households have high demand on funding for farm work. To do farm work is taking a high risk. A lot of farm households loss continuity in many season but they must continue working on their farm to escape the debt. Hence, they need the fund for new investment for the new cropping season.

Sixthly, this paper recommends a government **examine the poor and vulnerable person** such as disable person, elder, vagrant, in order to provide assistance and to ensure vulnerable groups have increased access to social support services. Moreover, local government can help to strengthen the local level mechanism of supporting the poor.

Finally, it recommends local authorities **carry out the training program** to reduce farm loss. On the farmer side, farmers should adjust the practice on farm. The main risk effect on household is crop loss from insect and pest. Farmers are depending on the costly insecticide uses. The insect resist to the insecticide, then farmers spray more and more, which lead them, have poor health. Health cost increase household expenditure. Farmers should reduce insecticide uses and then find out the alternative way such as organic farm, rotate the crop plating, plant the crop that resist on the disease. In addition, farm households face the risks from the unplanned production system. Some season farm households are promoted to produce the same kind of crop. After the harvest season there are a plenty of production lead the price decline and the farm households are completing to each other to sell the production. Therefore, farmers can think different to speculate and forecast the tendency of production quantity and price at the beginning of the cropping season.

In conclusion, this research recommends a government review poverty reduction programs. There are several recommendations, which are, stimulate country growth rate, increase the community and social development project, promote local trade and production, **improve infrastructure services,** help for the **agricultural price guarantee, support fertilizer and factor price,** help about **land allocation, water supply arrangement policy,** help the **agricultural trading, social protection,** issue **job creation policy and migrants working policy, reduce and control drug and gambler,** propose **microfinance policy** for the low income households**, register poor**

and vulnerable person and **provide the training** to reduce farm loss. All sectors should cooperate to eliminate poverty and boosts shared prosperity for all citizens.

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