

A man in a checkered shirt and dark pants is walking across a dry, dusty field, carrying a large log on a shoulder pole. In the background, there is a lush green rice paddy field under a clear sky. The text is overlaid on the top half of the image.

Case Studies in Insurance Effectiveness: Some Insights into Costs and Benefits

2017

**South East Asia Disaster Prevention
Research Institute (SEADPRI)**

Case studies in Insurance Effectiveness: Some Insights into Costs and Benefits

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Foreword

Risk insurance has been advocated as a practice that has high potential to provide climate change adaptation and disaster risk reduction benefits. However, there is very limited evidence to support the argument that insurance can be an effective tool. A variety of factors may have contributed to the lack of such evidence, which include factors that are embedded in the traditional notions of risk spreading, institutional imperfections, and lack of innovation. As a result, the reported insurance benefits are largely hypothetical and there is a dearth of evidence for insurance benefits from actual community-based insurance initiatives. Measuring the DRR and CCA costs and benefits of various forms of insurance can help in identifying the most effective insurance approach and help put insurance among the basket of risk mitigation options suitable to the most vulnerable and ultra-poor people.

Recognizing the above need, the Asia-Pacific Network for Global Change Research (APN) has funded the project ‘Assessing Community Risk Insurance Initiatives and Identifying Enabling Policy and Institutional Factors for Maximizing Climate Change Adaptation and Disaster Risk Reduction Benefits of Risk Insurance.’ The project has objectives of identifying technical, socio-economic, institutional and policy barriers limiting the penetration of risk insurance, to assess CCA and DRR benefits and costs accrued through risk insurance initiatives and to identify an enabling environment to scale up risk insurance. This report presents a series of cases where the costs and benefits of variety of insurance products available in the case study countries are quantified and presented using survey approaches. Wherever such quantification was not possible, the benefits were presented either qualitatively or from the literature review. I believe that this report will raise awareness of the need to evaluate insurance interventions in terms of CCA and DRR outcomes and stimulate discussion and research to address insurance effectiveness and outreach to the most vulnerable groups.

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Head, Communication and Scientific Affairs Division
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Preface

The assumed benefits provided by insurance to the management of both climatic and non-climatic risks have attracted climate change adaptation (CCA) and disaster risk reduction (DRR) practitioners to consider it as an important risk management tool. Despite the efforts by various stakeholders, the communities whose livelihoods are most vulnerable to climatic vagaries have often not been reached by insurance. Several bottlenecks remain unaddressed, such as the high cost of insurance relative to ability to pay, poor overall progress on risk mitigation, lack of awareness among the communities of risk insurance, and lack of an enabling policy environment, etc. From a deeper perspective, there is a lack of robust evidence as to what CCA and DRR benefits accrue from risk insurance and how they compare with other risk management opportunities that exist or can be developed as an alternative to risk insurance.

With this background, the research team comprising of the Institute for Global Environmental Strategies (IGES), Hayama, Japan; Southeast Asia Disaster Prevention Research Initiative (SEADPRI) of Universiti Kebangsaan Malaysia (UKM), Bangi, Malaysia; eeMausam, Weather Risk Management Solutions, Hyderabad, India; International Agriculture for Development (IAFD), Brighton, Adelaide, Australia and University of Philippines at Los Baños (UPLB), Laguna, Philippines embarked upon the project ‘Assessing Community Risk Insurance Initiatives and Identifying Enabling Policy and Institutional Factors for Maximizing CCA and DRR Benefits of Risk Insurance’ with the objectives of identifying technical, socio-economic, institutional and policy barriers limiting the penetration of risk insurance, to assess CCA and DRR benefits and costs accrued through risk insurance initiatives and to identify an enabling environment to scale up risk insurance. Funded by the Asia-Pacific Network for Global Change Research (APN), the team has conducted country-specific survey-based studies to understand various costs and benefits accrued to the risk insurance. In most of these cases, the agriculture insurance was evaluated wherever available. When agriculture insurance was not available, as in the case of Malaysia, home insurance for floods was evaluated. All the insurance products studied are pertinent to reducing risks associated with climatic and weather vagaries in the study countries. This research report was developed as an outcome of the household surveys conducted in the case study countries and provides an opportunity to gain deeper understanding on various costs and benefits accrued to risk insurance. We are hoping that this report sets stage for further discussion on objective evaluation of insurance approaches so that the most vulnerable are benefited through long-term risk reduction. This work is in no way conclusive in nature and several improvements are possible in areas of quantifying certain benefits that couldn’t be quantified and in including insurance products that have triggered and have existed for considerable period so that the benefits can be easily visible. The authors thankfully acknowledge the helpful inputs received from the research and development experts representing government and non-governmental organizations during the consultation meetings and to the community members for participating in the surveys and for providing useful insights. This work wouldn’t have been possible without financial support from the Asia-Pacific Network for Global Change Research (APN), support from the institutions from where participating researchers represent and support of numerous researchers, community members and insurance professionals who contributed to the study in numerous ways.

S.V.R.K. Prabhakar

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Acronyms

ABARES	Australian Bureau of Agricultural and Resource Economics
ADCL	Agriculture Disaster Compensation Law (Japan)
AMR	Agriculture mutual relief association (Japan)
APN	Asia-Pacific Network for Global Change Research
BCR	Benefit-cost ratio
BMP	Best management practice
CCA	Climate change adaptation
DRR	Disaster risk reduction
FGD	Focus group discussion
GST	Goods and Services Tax
INR	Indian Rupees
IPCC	Intergovernmental Panel on Climate Change
IPFARI	Impact Pathway Framework for Assessing Risk Insurance
JMA	Japan Meteorological Agency
MAFF	Ministry of Agriculture, Forestry and Fisheries (Japan)
MARIM	Malaysian Association of Risk and Insurance Management
MNAIS	Modified National Agricultural Insurance Scheme (India)
MPCI	Multi-peril crop insurance
NADMA	National Disaster Management Agency
NAIS	National Agricultural Insurance Scheme
NIAM	National Insurance Association of Malaysia
NOSAI	Nogyo Kyosai Seido (Agricultural Insurance Scheme)
NPV	Net Present Value
PCIC	Philippine Crop Insurance Corporation
PhP	Philippine Peso
PMFBY	Pradhan Mantri Faisal Bhiman Yojna
RM	Malaysian Ringgit
SWOT	Strengths, Weaknesses Opportunities, Threats analysis
WBCIS	Weather-based Crop Insurance Scheme

Executive Summary

Several risk insurance initiatives have been implemented at grassroots level over the years for reducing the vulnerability of communities to natural disasters. Despite these efforts, the penetration of risk insurance in the developing Asia Pacific is poor compared to many developed countries in the region due to several barriers that this sector is facing. Issues such as high basis risk, lack of qualified historical data for designing and pricing risk insurance, limited knowledge and awareness in designing and utility of insurance, high premium prices, limited reinsurance availability, and lack of enabling policies are the key bottlenecks that limit the spread of risk insurance in the region. Keeping this in view, this project aimed to assess the benefits accrued through community level risk insurance experiences in the region, evaluate barriers limiting its penetration, and identify interventions for greater risk insurance penetration leading to climate change adaptation (CCA) and disaster risk reduction (DRR).

In order to assess the insurance effectiveness, the project team has devised a multi-country case studies-based methodology that looks into country-specific circumstances of risk insurance, assess benefits and costs of risk insurance and stakeholder perspectives. This methodology helped the team to assess the barriers to insurance, mainly through stakeholder perception surveys and consultations and assess the costs and benefits of risk insurance mainly through the household surveys of the insured and uninsured for comparison purposes. The research has revealed that the traditional criteria employed to assess the insurance effectiveness often doesn't consider issues such as long-term risk reduction but rather are centered around administrative and operational aspects of the insurance delivery.

The project has quantified the benefit-cost ratio (BCR) of risk insurance. High BCR results suggest that insurance can be beneficial to farmers in all the countries presented in this report. The highest BCR was found in Malaysia where the flood insurance can have as much as 14 BCR based on a single year flood loss and insurance premium paid. In case of Japan, the BCR of being insured can range between 1.3 to 2.1 depending on the area insured and the number of years of premium paid before loss was incurred due to natural disasters. In India, a similar BCR of 2.1 was found across most farmers even though the BCR values varied across farmers with different landholding sizes. However, the data was not sufficient to draw conclusions if the landholding size had any influence on BCR values.

It was observed that in the case where catastrophic events occurred annually, crop production with insurance is financially profitable as can be seen from high NPV and BCR values in the Philippines. Availing of crop insurance will increase the financial profitability since farmers with insurance have higher NPV and BCR compared with farmers without insurance. With catastrophic events occurring at a 60% probability (6 out of 10 years), the NPV and BCR of insured farms have reduced. Nonetheless, these are still higher than uninsured farms. Overall, it is still financially attractive to avail of crop insurance since premium paid in present value terms is also relatively smaller than the payout received by the farmers. These results prove that the risk insurance has a potential to provide a cost-effective means of covering financial shocks to the insured.

The most important factor that has contributed to high BCR values is the considerable premium subsidy given to farmers. Even though subsidy rates varied across the case study countries, except Australia where the premium subsidies are not encouraged, subsidies proved to be an effective strategy to make insurance affordable. However, it was beyond the scope of this study to prove if removing subsidies would be effective at the policy level, which needs macro-economic analysis. There could be a very limited scope for insurance to result in long-term risk reduction while still not conveying the price signal of the risk and without it being combined with risk mitigation measures, which is the case in most examples presented in this report.

There could be net fewer benefits of insurance based on the balance between number of accounted benefits and costs depending on how the insurance effectiveness is assessed for DRR, CCA and development. This study only relied upon those benefits and costs that could be reported and

quantified by the participants of the survey. Since most benefits of CCA and DRR were not quantified, the qualitative assessment proved to be insufficient to draw any meaningful conclusions in terms of long-term efficacy of insurance in risk reduction.

A comprehensive insurance effectiveness assessment framework is required to differentiate various forms of insurance products. Such a framework should look beyond the immediate 'insurance payoffs' but identify long-term and sustainable risk reduction benefits that insurance can provide. The investigation on insurance effectiveness indicated that the notion of insurance effectiveness in terms of CCA and DRR are largely speculative than evidence-based partly due to the complexity of connections between CCA, DRR and sustainable development but also due to the complex ways in which insurance can impact the wellbeing of the insured and those engaged in the insurance delivery. There is a need to segregate the insurance products more clearly than a one-fits-all way of defining the insurance effectiveness.

1. Costs and Benefits of Insurance: Setting the Stage for Case Studies

S.V.R.K. Prabhakar and D. S. Solomon

The agricultural sector in most developing countries is highly vulnerable to natural disasters due to reasons that include limited spread of best management practices, limited investments in rural infrastructure including assured irrigation facilities and largely subsistence farming. Reports from the IPCC suggest that droughts, heavy precipitation, increased temperatures as well as increase in the frequency of extreme events will have significant impact on agriculture sector. The agriculture sector in developing countries could be disproportionately affected by climate change due to the capacity constraints that these countries are facing. Developing countries have already started implementing various disaster risk reduction (DRR) and climate change adaptation (CCA) interventions wherein the promotion of agriculture insurance as a means to address weather and climate-related risks has gained specific attention. Considering the importance given to promote risk insurance in general and agricultural insurance in specific, one important question arises is to what extent the insurance can provide DRR and CCA benefits to the communities who subscribe to such insurance services.

Insurance has been proposed as a cost-effective way of coping with financial shocks. The published literature suggests that there could be many advantages of insurance. Depending on the way the insurance is designed, it has been claimed that the insurance mechanism can address a wide variety of risks emanating from climatic and non-climatic sources. Insurance can emphasize risk mitigation over response, can help cover residual risks uncovered by the other risk mitigation mechanisms and stabilize rural incomes by reducing the adverse effects of income fluctuation. Insurance also provides opportunities for public-private partnerships and reduces burden on government resources for post-disaster relief and reconstruction. Communities and individuals can also quickly renew and restore livelihood activities through the use of insurance.

Despite the 'known' benefits of insurance, the evidence of how insurance is proving effective on the ground and benefiting communities for a long-term risk reduction outcome for DRR and CCA is limited. Furthermore, the potential of insurance to benefit the most vulnerable has not been adequately explored. To address this gap, the Asia Pacific Network for Global Change Research (APN) has funded a project entitled "Assessing community risk insurance initiatives and identifying enabling policy and institutional factors for maximizing CCA and DRR benefits of risk insurance" led by the Institute for Global Environmental Strategies (IGES), Japan. The objectives of the project are to identify technical, socio-economic, institutional and policy barriers limiting penetration of risk insurance; assess CCA and DRR benefits and costs accrued through risk insurance initiatives; identify enabling environment to scale up risk insurance; and sensitize policy makers and other stakeholders about scaling up the risk insurance.

1.1. Methodology for Case Studies

The country-case studies presented in this report were developed using the methodology shown in Figure 1. In order to identify costs and benefits associated with the risk insurance, the study team has reviewed the literature, identified the relevant indicators including based on the discussions carried out during the regional expert meeting¹ and converted these indicators into structured questionnaires that are to be implemented in various case study countries. This report provides deeper insights into the results from the country case studies in terms of costs and benefits associated with insurance and if insurance is an effective risk reduction investment for communities.

¹ Workshop on "Evidence for Disaster Risk Reduction and Climate Change Adaptation Effectiveness of Insurance: Challenges and Opportunities" held in Bangi, Malaysia on 4-5 July 2014. More details on the workshop can be found at <http://www.iges.or.jp/en/natural-resource/ad/riskspreading.html>.

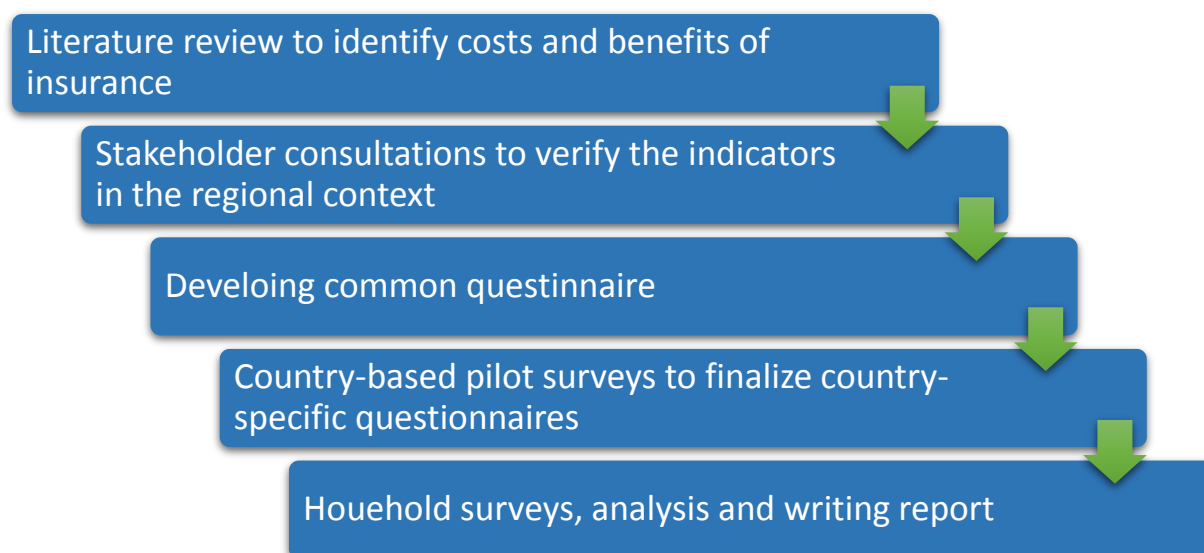


Figure 1. Methodology followed in developing the country case studies on costs and benefits of insurance

1.2. Insurance Effectiveness

The notion of insurance effectiveness was discussed in detail in the report entitled *Effectiveness of Insurance for Disaster Risk Reduction and Climate Change Adaptation: Challenges and Opportunities* (Prabhakar et al., 2015). Traditional understanding of insurance effectiveness revolves around delivery of the contractual obligations i.e. payoffs as agreed in the contract. Insurance effectiveness could also be assessed based on the number of people insured, avoidance of moral hazards and adverse selection as well as minimization of basis risk (Figure 2). However, in the context of CCA and DRR, the insurance effectiveness goes beyond these factors (Prabhakar et al., 2015). The assessment of insurance effectiveness in the context of DRR and CCA requires more features for consideration. Payoffs from insurance have to result in long-term reduction of threat to provide DRR and CCA benefits (Prabhakar et al., 2015). Insurance pay offs should be channelled for risk mitigation rather than business as usual practices, resulting in net risk reduction. Payoffs should not result in promoting high risk and profit seeking behaviour. However, the current scenario may not lead to such long-term risk reduction. For example, subsidized premiums will not convey the real price signal of the risk leading to continuation of practices with no net reduction in cost of risk. Most of these features are linked to the insurance design and support services (e.g. education on risk management) for insurance buyers (Prabhakar et al., 2015).

1.3. Indicators for Cost-Benefit Analysis

The study team has reviewed the literature published on insurance effectiveness in terms of costs and benefits of insurance. Insurance effectiveness indicators are difficult to identify largely due to the complex ways in which insurance can affect the wellbeing of the insured, insurance agencies and even the governments at the macro level and the lack of literature that dwells into deeper insurance impacts. Hence, most indicators reflect theorized impacts within the purview of CCA and DRR. These indicators were further scrutinized and developed for employing in quantifying the overall benefits and costs of insurance instruments. Any indicator framework used for assessing the costs and benefits of insurance need to consider the entire ecosystem of insurance design and delivery from the policy level to the community level for the reason that the insurance products are often implemented as a part of government policy with various outcomes for both the government as well as the insured.

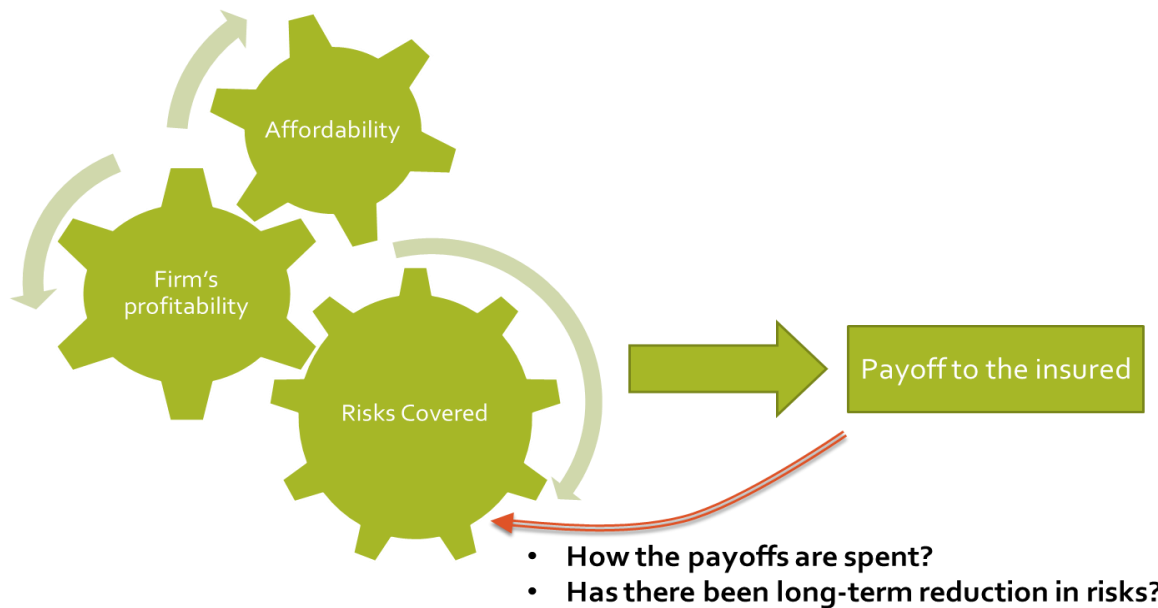


Figure 2. Closing the loop: Moving away from the traditional notion of insurance effectiveness (Prabhakar et al., 2015)

An effort has been made to identify key indicators from the published literature that describe the effectiveness of insurance in terms of the costs and benefits. The key purpose is to identify the role of insurance in CCA and DRR in developing countries. Although agricultural insurance is being pioneered in many countries in Asia, there is a dearth of work regarding quantification of effects using on-the-ground data. The studies included within this review mainly consists of studies where attempts have been made to analyze the costs and benefits of agricultural insurance with importance given to its effectiveness in disaster risk management and climate change risk reduction.

Studies have shown that there is a gap in the long-term effects of insurance especially in agriculture (Cole et al., 2012). The review also revealed dearth of studies with respect to the long term benefits of insurance, most of the studies do not focus on the specific benefits of index-based agricultural insurance or focus only upon the factors concerning the take up. In addition, most of the documents and works done on agricultural insurance were theoretical. A large number of studies deal with hypothetical insurance take up (Cole et al., 2012).

Table 1 shows the nature of costs and benefits reported in the insurance literature. In a study funded by the World Bank to explore the experiences and lessons learnt from previous microinsurance programs (Patoja, 2002), the disaster risk management framework was used on household and institutional level as the conceptual framework. The DRM process focuses upon four key concepts: preparedness, response, recovery and prevention. Secondary data collection through literature reviews and interviews with pertinent stakeholders and experts was used to bring out effectiveness of insurance-based studies in various countries. The study was qualitative and no attempts were made for quantification of benefits or costs. The primary focus of the study was the benefits of microinsurance programs for DRR. The linkages of financial benefits and social with CCA have been largely omitted within this study.

Another study was conducted by the World Bank to assess the performance of crop insurance in Karnataka, a southern state in India which has had a variety of index insurance programs (Kalavakonda and Mahul, 2005), the study was based on a complete overview of the agricultural risk insurance sector in Karnataka. The effectiveness study was focused primarily upon the coverage, operational efficacy and the financial effectiveness of the product. This study is more relevant towards the financial institutions and government implementing the program. Technical issues and product design are given more importance in this study.

In the paper ‘Disaster Microinsurance for Pro-Poor Risk Management: Evidence from South Asia,’ a large scale cross-country examination of disaster microinsurance offered by multiple organizations in India was conducted in order to assess the effectiveness of disaster microinsurance in helping households coping with disasters (Stigler et al., 2012). Primary data on perception of clients towards the benefits was collected based on stratified sampling with a control group. Socio economic variables were used as a proxy indicator for effectiveness of the program. This was a perception-based study of the clients of microinsurance and other stakeholders were not involved within this evaluation. The long term transformational effects were not taken into consideration.

A recent study by the EPPI center in London seeks to measure the effectiveness of index-based microinsurance in helping stakeholders manage weather related risks (Cole et al., 2012). This study was a metanalysis of previous studies regarding the effects of Index insurance. String search was conducted on published and unpublished data which was used to shortlist case studies that dealt exclusively with the take up and impact of index insurance. A realistic synthesis-based approach was used with a causal framework for the production channel and the consumption channel related to insurance take up. This was used to collect evidence regarding the effectiveness of Index Insurance in helping farmers cope with weather-related risks. This study helps to bring out notable patterns within insurance case studies.

There are shortcomings in the work that has been conducted in assessing the insurance effectiveness. The main identified shortfall is lack of standardized indicators to measure the outcomes. There is a noticeable lack of work done on theoretical framework on effects of risk insurance leading to different understandings and frameworks. This makes cross comparison between different studies nearly impossible. It would be useful to have a clearly defined conceptual framework to enable a common base for cross comparison of different studies. The inferences obtained from most of the studies are at best fuzzy and fail to give an accurate quantitative on the ground effectiveness of risk insurance within the purview of CCA and DRR. The studies fail to show conditions that ensure positive outcomes with risk insurance, when studies did not show expected outcomes it was usually attributed to a failure of the methodology to give significant results. None of the studies reviewed identify specific indicators to assess the impact upon adaptation, with no efforts to quantify the benefits within the CCA arena. In the current context where microinsurance products are being developed especially for developing countries. There is an urgent requirement to effectively measure the long term as well as short term benefits of insurance programs to understand the relevance and design products beneficial in terms of comprehensive risk reduction.

1.4. The impact Pathway Framework

Traditional impact assessment studies of insurance simply try to find the direct impacts that the programs have upon the stakeholders that they target. The causal relationships, long term transformational effects and secondary impacts on other areas, is often not taken into account. By developing an Impact Pathway Framework, we seek to address certain fundamental questions regarding the impact of risk insurance for agriculture within the frameworks of CCA, DRR and SD. The following questions are pertinent for developing an Impact Pathway Framework: 1) Do the targeted clients use the financial service to reduce vulnerability to future disasters? 2) Does the product provide sufficient cushioning to the shock of disasters in the community? 3) Can the financial products assist in the long term adaptive capacity of farmers to climate change? 4) What are the unaccounted impacts of risk insurance on other stakeholders² with respect to DRR and CCA? and 5) How these can contribute to the overall goal of sustainable development?

² Here governments and insurance institutions

Table 1. Compilation of costs and benefits of selected insurance cases

Insurance case	Benefits of insurance	Costs of insurance
Patterns of rainfall insurance participation in rural India (Gine et al., 2007)	Not specified	Undermine existing indigenous risk sharing mechanisms. Rainfall insurance being purchased exclusively by the wealthy could result in increased prices of locally traded goods during periods of low rainfall.
Disaster Micro insurance for Pro Poor risk management : Evidence from South Asia (Stigler et al., 2012)	Helped to reduce the shocks of disaster on farmers. Helped in alleviation of post disaster poverty by reducing post disaster borrowing patterns. Uptake of insurance has made farmers more open to proactive measures of reducing risk.	Poorly designed subsidized by the government lead to additional financial burden on consumers, micro insurance does contribute to cover losses in case of disaster events; however, it is usually not sufficient to cover all losses and can lead to an increase in indebtedness. The long and tedious claims process does not provide financial liquidity immediately in case of an emergency.
The effectiveness of index-based micro-insurance in helping small holders manage weather related risks (Cole et al., 2012)	Increased take up of index insurance has resulted in reduced income variability and improved consumption smoothing. Helped in building of assets basis of households that protects the household from shocks to investment. Improvement in the education and health outcome, which serves as an adaptation for the long-term effects of climate change.	Large evidence gap regarding the impacts of index insurance. The product itself is seen to be risky due to the basis risk and lack of sufficient knowledge regarding the product leading to low uptake.
Crop Insurance in Karnataka (Kalavakonda and Mahul, 2005)	The insurance works along with national and state disaster relief programs to provide post disaster relief, restores the credit reliability of farmers for future credit, stabilizes farm income and helps adopt more advanced farming methods, which also helps in future adaptation against climate change. Schemes are being proposed by the Karnataka government, which will work in tandem with disaster mitigation plans.	Reaches a small percentage of poor farmers. Does not target the most vulnerable. Catastrophic losses are the norm rather than the exception in Karnataka and as premiums are not priced as per the risks it results in losses for insurers. The operational effectiveness of the project is quite low.
Index Insurance and Climate Risk Prospects for development and disaster management. (IRI, 2009)	Index insurance was seen to be most effective when integrated within the disaster management framework. Insurance addresses the unresolved risk from disaster management programs. Improved accessibility to resources. Index insurance behaves as a mechanism to incentivize risk reduction behavior among farmers.	The exact impacts of index insurance are not known. Index insurance alone cannot be used as an effective disaster management device, it is imperative that it is used in conjunction with other disaster management programs as well.

Compiled by authors from: Gine et al., 2007; Stigler et al., 2012; Cole et al., 2013; Kalavakonda and Mahul, 2005; IRI, 2009

In order to obtain suitable answers to the above questions, the causal chain of insurance is explored to identify the socio-economic as well as financial influence of risk insurance upon farmers and other stakeholders involved in the chain of insurance delivery and policy setting. An Impact Pathway Framework to assess impacts of insurance was developed based upon existing literature and studies. The flow chart given below shows a graphical representation of the causal model with respect to risk insurance in agriculture. The arrows represent the flow of effect of the product. This model aims to show links to the immediate, intermediary as well as final impacts of agriculture insurance and how this will play into the benefits and costs of CCA and DRR under the overall framework of sustainable development.

A process-based approach was selected to identify indicators. Key impacts upon stakeholders were identified. Using the causal model developed, secondary and tertiary impacts were identified (Please refer to Figures 3 and 4). This approach could help in identifying a range of effects and outcomes of insurance which can be tested based upon selected indicators for this study. In the causal model for risk insurance on agriculture, we explore the impacts of agriculture insurance on three primary stakeholders i.e. farmers, insurance delivery agencies and the government. However, for the actual case studies, only impacts on farmers were evaluated while the impacts on insurance delivery agencies and government couldn't be assessed due to lack of reach and lack of information from these stakeholders. As a result, the description in this section is entirely focused on impacts on farmers. For discussion on other stakeholders, readers are advised to refer to the Prabhakar et al., 2015.

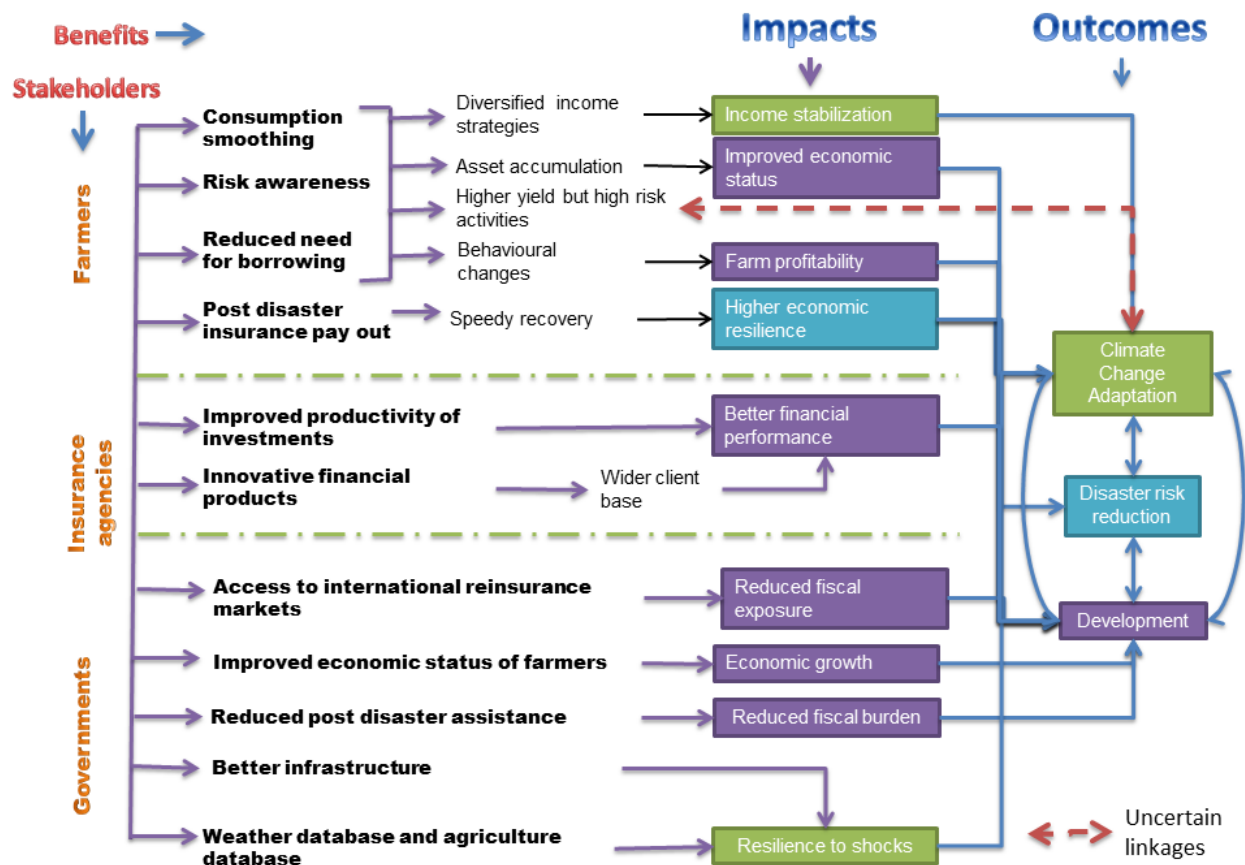


Figure 3 Impact Pathway Framework for Assessing Risk Insurance – Benefits

Source: Authors

Agricultural insurance targets farmers, it seeks to reduce the risks and vulnerabilities of farmers through a formal risk sharing mechanism (Barnett and Mahul, 2007). Rural farming communities around the world face fluctuating livelihoods and often engage in costly and inefficient risk coping strategies. By providing timely financial input, risk insurance services can serve as an effective

cushioning for farmers to deal with post disaster effects allowing farmers to better allocate their resources (Bock and Ontiveros, 2013). If well designed, risk insurance can lead to prevention of the long term effects of disaster on households; acting as a formal and dependable coping mechanism for rural households against the effects of disasters.

The effect of insurance works primarily through four causal channels: consumption smoothing, building risk awareness, reduced need for borrowing (IRI, 2009) and post disaster payout (Linnerooth-Bayer et al., 2007; Warner, et al., 2009). Agriculture communities often engage in several self insurances against weather risks; through supplying of labour, planting of low yield but highly resistant varieties of crops, delayed planting until complete seasonal weather information arrives (Murdoch, 1995) and sometimes even decrease input provisions to minimize losses (Cole et al., 2012). These costly strategies often lead to persistent poverty. Agricultural risk insurance leads to greater risk awareness and provides a secure livelihood causing behavioral changes within farmers, they are more confident in taking larger risks within farming operations which could result in enhanced income. Farmers are less restricted by their crop choices and may even recognize economies of scale while purchasing seed and fertilizer resulting in enhanced productivity (Bock and Ontiveros, 2013). With development focused agricultural insurance schemes, households can safeguard their assets while indulging in more riskier activities which could potentially be more profitable, these profits may still only be marginal and may not be sufficient to pay unsubsidized premiums (Hazell, et al., 2010). Insurance can help to bring about a shift in the composition of investments within agriculture, with higher investments in high yield and high risk cash crops.

Insurance also serves to reduce 'Risk rationing', this is a situation where farmers can qualify for loans but they prefer not to take them because of fear of losing the collateral i.e usually fixed assets. Agricultural insurance has been shown to increase the rate of take up of formal credit by farmers to enhance their agricultural operations and maximize profits. By providing a consistent and secured income, insurance could lead to increased intensity of input and investment into crop lands. Availability of post-disaster liquid capital also reduces the need for households to sell assets and reduce credit constraints, this help farmers escape from a poverty vulnerability cycle (Aggarwal, 2010). The availability of liquid capital allows farmers to invest in other livelihood options such as aquaculture, animal husbandry, small scale agriculture industries etc. This reduces dependance upon agriculture alone indirectly reducing vulnerability of farmers towards weather-related hazards. Income generation is supported, smooth and consistent income allows farmers to save surplus income in savings accounts which allows for positive returns through savings. Insurance can also help build social capital and improve self confidence and empower the rural poor. It helps in the availability, flow and dissemination of information regarding weather risk and variability (Patoja, 2002).

In terms of costs, some of the major shortcomings of agriculture risk insurance are basis risk and moral hazard. Basis risk refers to the risk that the policy holder will not receive a payout in case of a disaster or will receive payout even if his crops have not failed which is especially applicable in the case of index insurance. Improper design of the insurance product and insufficient and unreliable weather data can serve to exacerbate basis risk resulting in an increase in vulnerability of the farmer. Diversity in microclimate and insufficient weather monitoring data makes basis risk an intrinsic and widespread problem (Hazell, et al., 2010). Moral hazard is one of the primary risks of agriculture insurance, due to the existence of insurance the farmer may tend to create perverse incentives to make spurious claims and behave carelessly ultimately increasing risks which could wipeout the benefits of insurance.

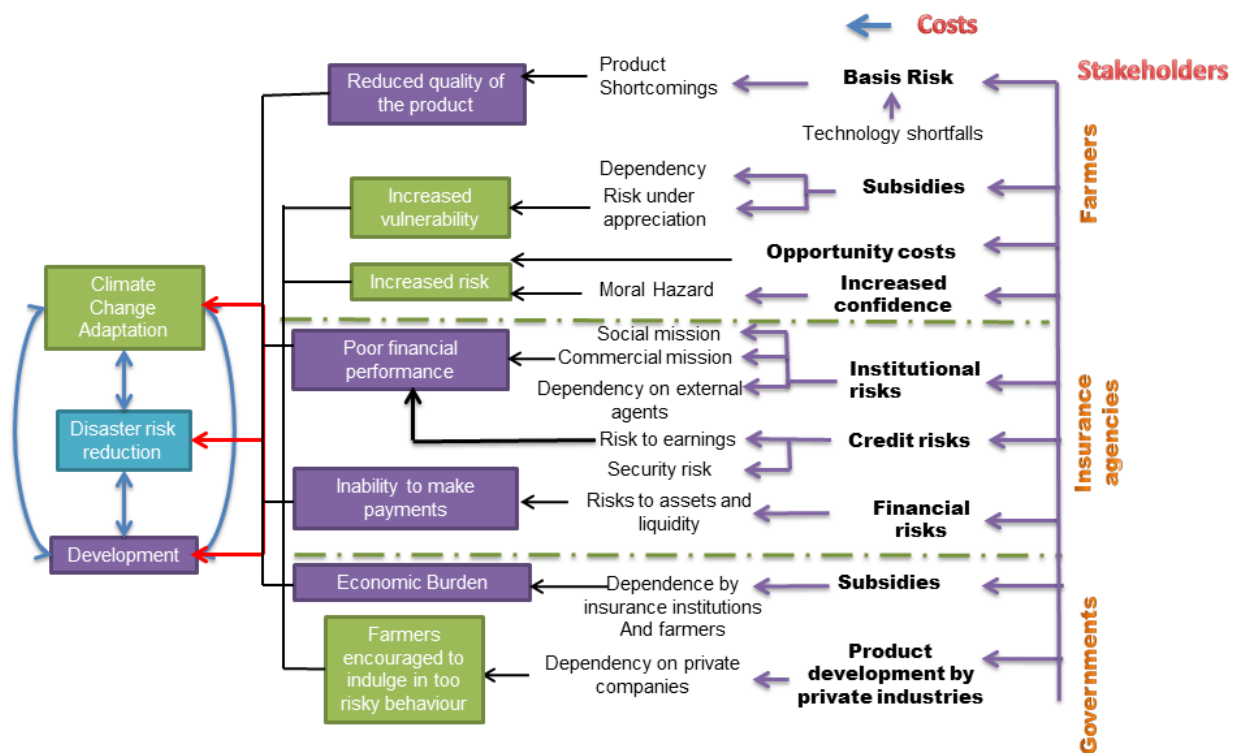


Figure 4. Impact Pathway Framework for Assessing Risk Insurance – Costs

Source: Authors

The appropriate target market for agriculture risk insurance may not be individual households but rather organizations that work with households on a community basis. However, these organizations are highly vulnerable to co-variate risks (Barnett and Mahul, 2000). Few co-variate risks are often managed quite cost effectively and easily by farmers and financiers investing in agricultural insurance to deal with covariate risk may often be an opportunity cost for farmers (Hazell, et al., 2010). The money spent on the premium could be more usefully engaged for better mitigation and coping strategies.

Although awareness about agricultural insurance is increasing, it is still low within developing countries resulting in the poorest sections being ignored. Lack of knowledge regarding the product can result in clients being dissatisfied in the product leading to low take up. In countries where the premiums are not sufficiently subsidized, agricultural insurance may still remain below the purchasing power of the most marginalized farmers. Index insurance targeting farmers usually needs to be subsidized especially for the initial years or until the farmers have achieved a significant amount of economic growth where they can pay the complete premium themselves (Hazell, et al., 2010). However, if the premium is consistently subsidized by the government, poor could become dependant on the subsidies, they tend to adapt their livelihoods around these subsidies resulting in poverty perpetuation (IRI, 2009). Moreover, since the premiums do not fully reflect the level of risk, the farmer may unnecessarily indulge in risky behaviour further increasing his vulnerabilities.

1.5. Conclusion

In order to maximize the beneficial effects of financial products, it is essential to quantify its benefits and costs upon stakeholders. From the review of literature regarding the costs and benefits of agricultural risk insurance, it can be said that the existing knowledge regarding agricultural insurance is very incomplete and systematic studies need to be carried out using a common indicator framework in order to identify impacts of agricultural insurance which can be compared along different studies.

This is of prime importance considering the scope for growth and future expansion of this field especially within developing countries. In this study, an effort has been made to address this gap through quantifying costs and benefits wherever possible in the case studies presented in this report.

The aim of this report was to identify and refine the causal pathway of the effects of agricultural risk insurance in order to identify indicators to quantify its costs and benefits towards DRR and CCA. In order to do this, an Impact Pathway Framework for Assessing Risk Insurance (IPFARI framework) was developed using existing literature for the various stakeholders of agricultural risk insurance. However, in this report, only communities were targeted for assessing the costs and benefits associated with insurance for the team had relatively good access to communities. Using the Framework, different indicators were identified under various levels from a macro scale to a micro level scale. The IPFARI serves to bridge the gap of a common framework for identifying indicators within agricultural risk insurance; it is especially applicable in the case of developing countries where there is a dearth of studies quantifying the effectiveness of risk insurance. It is necessary to identify precise conditions under which agricultural risk insurance programs are most beneficial to its primary targeted stakeholders by evaluating benefits and costs, the insurance product can be tailor made to maximize benefits towards the targeted stakeholders.

Many of the impacts regarding the effects of agricultural insurance are theoretical, it has been agreed upon that insurance can help reduce poverty and provide secure livelihoods. However, the exact micro impacts are to be fully defined and more specific research is required in this area. Most of the agricultural risk insurance programs have not existed long enough to fully understand the long-term effects.

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2. Promoting Risk Insurance and other Risk Management Approaches in Australia: Evaluating Farmer Perceptions and Costs and Benefits

Jay Cummins

Abstract

This paper presents the findings of a questionnaire survey of farmers on their perceptions about the crop insurance in Australia and reviews the literature related to challenges and opportunities of crop insurance and provides policy suggestions for promoting crop insurance in Australia. Based on the discussion presented, the paper recommends to develop and deliver on-farm risk management training to farmers as part of an awareness raising and educational process. It recommends to encourage farmers to utilize improved decision support tools relating to seasonal crop forecasting, climatic risk management, rainfall distribution and decile tools (to aid decision making in relation to crop inputs and their management), gross margin profitability analysis, and a range of scientifically developed decision support tools for farmers. There is a need to either reduce or withdraw completely Government stamp duty and such fees payable by farmers who take out crop insurance policies as an incentive to encourage wider uptake by farmers. It also finds that there is the need to explore and quantify the benefits associated with the Government providing MPCCI premium support and/or underwriting specific event occurrence (such as the incidence of severe drought). This would require advanced modeling and analysis of the relative costs and benefits in introducing such government policies in this regard. To this effect there would need to be a demonstrated 'market failure' in the market place that would need to be demonstrated in order to justify such intervention.

2.1. Introduction

Farming in Australian agriculture is often described as a risky business largely the result of climate variability, adverse weather events, and principally less than average rainfall occurrence. The primary means of providing on-farm crop related insurance in Australia is by way of Multi-Peril Crop Insurance (MPCI). In Australia MPCI is a relatively new facility that has been provided to Australian farmers by a small number of insurance company providers. The introduction of MPCI is in its' relatively early stages in Australia, with only a small number of companies offering this service to farmers on a commercial basis. The range of MPCI policies provided to farmers to date in Australia have mainly been promoted to those farmers involved in larger scale broad acre grain production. The basis of MPCI works on the assumption that there is an agreed expected yield for a particular cropping enterprise (agreed to by the insurance company offering the service and the farmer who takes out the policy). The actual coverage of the insurance policy may range from 40 to 70% of the total expected value of the crop against economic loss that is incurred as a direct result of the poor seasonal conditions.

Farmers in Australia producing grain crops have for many years in fact been undertaking event-specific MPCI products. These have related to insurance policies taken out for crops to insure them against the risk of hail and fire in the lead up to (and during) the harvest period. This has

obviously only been for selected events, and has not included the incidence of drought (which is one of the key attractive points to offering farmers a broader MPCCI product). MPCCI in Australia faces several challenges while providing several benefits to farmers and the agriculture sector as a whole and resolving these challenges for maximizing the benefits offered by crop insurance. Keeping in view the relative importance of MPCCI to farmers, this paper explores the costs and benefits of MPCCI service in Australia and discusses means of promoting insurance in Australia through specific policy interventions.

2.2. Challenges and Opportunities of Crop Insurance

Challenges of crop insurance

There are a range of challenges that are associated with offering a MPCCI service to farmers in Australia.

Relative risk of farming in Australia: Farming in Australia is a very risky business, this is driven primarily as the direct result of the relative high incidence of drought in Australia and variability in rainfall incidence (including relative intensity and distribution of rainfall).

Availability of accurate localized data: As Australia is a very large country, and indeed many farmers undertake their operations in very remote locations, the availability of reliable historical rainfall and climatic data in some instances is limiting. Where records are available the length of time that such data has been collected may be less than 100 years. Further complications occur in relation to the impact of climate change, whereby changes in seasonal conditions (including rainfall distribution, intensity, the timing of ‘opening seasonal rains’ in some instances are rapidly changing). This provides further challenges since it is sometimes difficult to predict the precise risk and potential exposure that the insurance companies are exposed to when they are establishing the cost structure for the MPCCI policies.

Farmer awareness and understanding of MPCCI as a risk management tool: Since MPCCI is a relatively new insurance product and tool that is available to Australian farmers, there is in many instances a low level of awareness of how such MPCCI insurance products work, and the nature of the specific benefits in better managing risk available to farmers. As a result there is a market development issue here, whereby the insurance companies need to invest considerable sums of money to market and promote the MPCCI products to farmers (requiring more of significant upfront investment). In addition, Australian farmers also differ significantly in their level of attitude to risk, and indeed how they manage risk on-farm. Farmer attitude to risk is influenced by their past experiences, their relative debt levels, the incidence (and risk) of production failures, drought, hail, flood and fire, and also their own level of technical and production efficiencies.

Opportunities

The insurance industry considers that in general the growth of popularity in MPCCI in Australia will be limited without government intervention. The main stumbling block is the fact that the premiums (cost of the product) offered to farmers tends to be relatively expensive (compared with the particular benefits and the management of risk by farmers).

A study was conducted in the Australian State of New South Wales, to determine if the Government should intervene in the MPCCI market. It was considered that investment by Government in supporting MPCCI may be a valid form of assistance for farmers.

MPCCI may lead to increased adoption of Best Management Practice BMP: With farmers adopting MPCCI, this may provide an incentive for farmers to adopt best management practice

(BMP) agronomic practices, since the risks associated with adopting technologies (and investing a larger amount of money into the production and agronomic aspects) may be off set through the ‘flexibility’ offered in the MPCCI product. The net exposure of farmers to risk is in fact reduced, so there is likely to be a lowered impact on the farmer’s overall exposure to risk.

Financiers to farmers will be more secure: Many farmers in Australia often have large financial debts, be it for purchase of land and machinery, or for financing the cost of sowing and producing the crops or livestock enterprises. Managing risk, be it climatic or financial induced, requires careful management. Those banking institutions that finance farmers are often exposed to elements of risk, in terms of the farmer’s ability to repay specific financial commitments associated with the funds that they borrow for their farming operations. Through taking out MPCCI policies, both the farmer and financier have less exposure to the risks facing production and subsequent cash flow.

Structural reform may be accelerated: It was considered that the wider adoption of MPCCI may lead to increased structural reform in Australian agriculture. Structural reform refers to an adjustment that takes place in the number of farmers farming, and actual farm size. So in effect making MPCCI more widely available would result in farmers being able to better manage risks. The production risks associated with much larger farming operations often results in farming businesses being exposed to higher elements of risk. If farmers can manage this risk through a MPCCI product, then they will possibly be more likely to expand their operations, increase farm area and subsequent land areas sown to crops. This would result in larger farmers buying out their smaller (land area size) neighbouring farmers; resulting in increased ‘economies of scale’, more efficient farming operations and increased productivity and profitability. At the same time the particular management of risk is also improved through farmers taking out MPCCI. Farmer attitudes to risks are not only limited to seasonal crop production decisions but also their decisions relating to larger farm business management decisions such as the expansion of farm size and overall increase in crop production activities. Once gained such decisions are largely driven through the management and exposure to risks, triggered through the farmer’s desire to manage climatic and seasonal risks. Hence the wider availability of suitable MPCCI would play a potential benefit that may encourage farmers to increase overall farm sizes. As previously indicated, this is a form of industry readjustment and rationalisation, which in turn offers the opportunity to further increase the overall productivity and efficiencies of agricultural industries.

2.3. Farmer Attitudes to Crop Insurance

Research Methodology

Two farmer focus group studies were conducted to help identify farmer understanding and attitudes towards MPCCI, in the Mallee region of South Australia at two locations called Wunkar and Geranium. These farming regions are primarily involved in cereal, oilseed and grain legume production in a mixed farming system that also includes livestock (primarily sheep). The annual rainfall ranges from 300 mm in Wunkar to 350 mm in Geranium, reflecting a relatively low rainfall winter dominant environment. The risk of drought tends to be greater in Wunkar than in Geranium.

The adoption of new conservation agriculture-based technologies has in recent years resulted in farmers being able to improve their crop water use efficiencies, sow crops earlier in the season upon the opening seasonal rains and in general reduce the variability of crop yields between growing seasons, despite the variability in rainfall distribution and incidence. Both of the districts are entirely rain fed, there is no supplementary irrigation.

A survey questionnaire was completed by participating farmers. The questionnaire is provided in Annexure 1, and comprised a range of closed and open questions that collected both quantitative and qualitative data. The questionnaire was provided to the farmers to complete following a general introductory session provided by the researchers. There were 10 farmers from Geranium and 13 farmers from Wunkar who attended the workshops and completed the questionnaire. Following the completion of the questionnaire (which generally took between 30 to 45 minutes to complete), a general question and answer session took place in relation to the management of risk on-farm and the attributes and characteristics of MPCl. Analysis of the information provided was limited to summarizing the responses to the various questions on a group by group basis. Due to the relatively low sample size, descriptive summaries of the quantitative and qualitative data were provided.

Results

Demographic background: Most of the participants operated as the owner-farmer of the farm businesses and were in partnership with other family members. All participants attending the workshops were male, however many farmers also worked in partnership with their wives, who often provided labour and managerial input into the family-based farming operations. Annual rainfall received on average ranged from 250 to 400 mm, with majority of participants farming in the 250 to 300 mm annual rainfall range. The average farm size varied between the two groups, with Geranium having an average farm size of 2,328 hectares, and Wunkar 5,466 hectares. Wunkar is a lower rainfall size than Geranium, and generally having lower crop yields, hence farm size is reflective of the economic returns and viability associated with maintaining and economic threshold. Most of the crop types grown comprised cereal crops (mainly wheat and barley), some grain legumes, canola and hay (fodder) crops. Livestock were also an integral part of the farming systems, with all farmers also having sheep operations. This was in fact an important part of managing risk in the farm business, since the livestock would provide reliable income even in the poorer seasons when droughts occurred.

Risks and their management: The main risks identified by farmers that affected their farm business operations were: a. drought, characterized by low rainfall, poor rainfall distribution; b. hailstorms, damage to crops during late maturity prior to harvest operations caused by hail; c. fire, risk of fire damage to crop, the result of a number of factors such as lightening strikes, and harvesting machinery; d. frost damage to crop. Higher risk of frost damage will be evident where the crop is water stressed during the Spring flowering period, and the landscape is frost susceptible; such a slow lying land with little air movement and extremely low overnight air temperatures are experienced, and e. climate risk, related to drought, hail and frost risks. Some concern expressed by participants in relation to the impact of climate variability and climate change.

Risk insurance: Farmers were quite intuitive when it came to managing such risks that they were exposed to. Whilst there was some opportunity to take out risk insurance policies (relating to insuring for hail and fire damage to crops leading up to the harvest period), the other risks were managed by careful management. Such management practices included adjusting their agronomic management of crops such as sowing less frost susceptible crops, sowing crops on frost prone landscapes last (so that they would flower after the high frost risk periods), minimizing expenditure on non-essential items during periods of drought, as well as keeping on hand fodder and grain reserves to feed livestock during dry periods in droughts (since all livestock generally graze in open pasture land fields). Good financial management was also required to minimize the impact of financial and business risks. Such risks included interest rate rises, varying commodity prices at harvest and high crop input costs.

It was common practice for all but one of the farmer participants take out crop insurance for hail and fire damage, and insurance of the grain during transportation. The majority of participants have made a claim and received financial compensation under their insurance policies over the past 20 years. Only 2 participants had never suffered an event that required them to make a claim. In terms of the particular price premium that participants would be prepared to pay for insurance products, 50% indicated a value of less than 5% of total insured crop value, and approximately 50% would be prepared to pay an insured value of 6 to 10% of total crop value.

General attitudes to crop insurance, risk and outlook on farming: There was a strong level of agreement to the following statements: a. Having my crop insured for hail and fire puts my mind at rest; b. I consider that I am an innovative farmer; c. I still hope to be farming in 10 years time; d. The adoption of new technologies (such as no-till) has allowed me to grow crops having consistent yields, even in years of below average rainfall; and e. Australian farmers are the most efficient farmers in the world.

There was a lower level of agreement to the following statements: a. The Government should subsidize drought and frost insurance premiums; b. It doesn't matter how good you are as a farmer, it is always the weather that has the greatest impact on crop yield; and c. Farming is becoming more of a risky business because of the impact of climate change on my farming operations. Farmers generally neither agreed or disagree to the following statements: When I make a claim on crop insurance, I never get back the full amount I think that I am entitled to. Farmers disagreed to the following statement: Farming in my district is not as risky as what it was 20 years ago. It was evident that farmers value the benefits associated with hail and fire insurance. The adoption of new technologies has allowed farmers to better manage risk (primarily through the reduction in crop yield variability) allowing them to produce consistent crop yields, even during seasons of lower rainfall. Farming is now riskier than what it was 20 years ago, largely the result of the impact of climate change.

In summary, there is a high level of awareness amongst the farmer participants in relation to the specific production, management and climate related risks that they are faced with in their farming operations. Farmers respond to the risks associated with the range of influencing factors by trying to manage such risks within their own sphere of control. Managing risk is important to them so that they can remain as productive and viable farmers. There has been no reliance on government subsidies and hand-outs. Farmers have had favorable experiences in relation to taking out risk policies relating primarily to hail and fire damage to their crops. This has been a common practice for them with the majority having made a claim against their policies in recent years. The farmers involved in the focus groups were genuinely interested in the range of other MPCl related insurance products. The uptake of such MPCl products will be largely driven by the cost of such policies, the perceived risks of such an event occurring (from the farmer's perspective) and the particular level of benefit and ease of making a particular insurance claim for such an event occurring against the specific policy.

The focus group discussions and survey questionnaire proved to be a useful exercise in establishing a level of understanding in relation to MPCl and other crop insurance experiences of a selected group of farmers in South Australia. This exercise serves as a useful 'snapshot' amongst a selected group of farmers. It is recommended however that a much larger survey of farmers across the different production regions of Australia would be warranted before drawing more general conclusions. This would be in the interests of either the Government or the commercially driven insurance companies themselves to investigate further.

2.4. Costs and Benefits of MPCl

Despite the challenges involved in developing and delivering an insurance product, the MPCl policies in general provide several benefits, these being to provide acceptable benefits that are affordable to farmers, provide farmers with the opportunity to manage risk in their farming enterprises and provide some guarantee of farm income and cash flow in seasons where crops otherwise would be affected by drought, flood or fire. For the insurance companies themselves, there have been a range of criteria in order for them to provide the incentives to offer the specific products. Firstly, being commercial businesses, there needs to be financial incentives for the companies to offer the services (profitable activities) and secondly the exposure of the companies to risk needs to be managed.

The Australian Bureau of Agriculture and Resource Economics (ABARES) have calculated the cost of insurance premium products, which was presented in a National Rural Advisory Council Report (2012). The ABARES estimated the cost of providing viable MPCl premiums. Table 2 provides a summary of the results for the region of South Australia, for a range of different crop types (wheat, canola and lupins) based on the insurer (farmers) contributing a 30% excess of the value of the claim. A range of percentage level coverage scenarios are provided: 25, 40 and 60% of agreed crop value loss. To provide an example, in the Eyre Peninsula region, insuring 60% of the agreed value of a wheat crop, the cost to the farmer will be 5.5% of total crop value. Such a premium is higher (at 14.4%) in the North pastoral region, where the risk of drought is far greater.

There are also additional costs associated with MPCl that are not always reflected in the cost of the premiums. These include the cost of on-farm auditing (production, climatic and other data cantered recording to verify yield and productivity associated with some products that have an upfront assessment fee at the time that the policy is taken out by the farmer), stamp duty and Goods and Services Tax (GST) payable on the cost of the premiums. In addition to the direct monetary benefits associated with taking out MPCl, there are additional benefits that cannot always be financially verified (in terms of the specific benefits arising) as suggested by Horton (2015). These include the following:

1. Reduce the risk of the farm business having to raise expensive additional finance to fund the farming operations during times of prolonged seasonal drought.
2. Provide continuity in farm cash flow from one season to another,
3. A higher degree of confidence for the management practices undertaken by the farmer is generated.
4. Opportunity to negotiate with the main financier (bank) to secure lower interest rates given the fact that MPCl is assisting in managing production and subsequent financial risks.

Table 2. Premium rates for wheat, canola and lupins in Southern Australia

	Wheat (%)			Canola (%)			Lupins (%)		
	25	40	60	25	40	60	25	40	60
North pastoral	3.5	6.8	14.4	na	na	na	na	na	na
Eyre Peninsula	0.7	2.0	5.6	3.3	7.4	14.4	1.9	4.3	10.4
Murray Lands and Yorke Peninsula	0.8	1.9	5.6	0.9	3.5	9.1	3.0	5.5	12.0
South East	1.1	2.7	7.0	1.5	4.2	8.2	2.5	4.9	10.4

Note: na = not available. The premium rates are based on ABARES estimates for pure risk multiplied by 1/(loss ratio), and then by (1–excess). Data source: Adapted from Hatt et al., 2012.

A study conducted by the Independent Pricing and Regulatory Tribunal of the New South Wales Government (State Government in Australia) exemplified the cost-benefit of MPCCI Center for International Economics, 2016). This was primarily conducted from the perspective of whether or not the Government (at the State or Federal level) should intervene in the MPCCI and provide support or subsidies to farmers taking out MPCCI products. The results of the cost benefit analysis in terms of government subsidies examined three different scenarios, namely (1) no productivity gains, (2) productivity gains accelerated by 5 years, (3) productivity gains achieved as a direct result of MPI (Table 3).

Table 3. Benefit-cost ratio of government intervention for a range of scenarios

Price scenario	MPCI benefits (\$)	MPCI Costs	Benefit cost ratio
Scenario 1: No productivity gains			
Subsidy of \$14 per ha	19.1 M	40.0 M	0.5
Subsidy of \$22 per ha	21.0 M	46.7 M	0.5
Subsidy of \$30 per ha	15.3 M	32.9 M	0.5
Scenario 2: Productivity gains brought forward by 5 years (faster rate of adoption by farmers of Best Management Practice)			
Subsidy of \$14 per ha	105.0 M	40.0 M	2.6
Subsidy of \$22 per ha	53.6 M	46.7 M	1.1
Subsidy of \$30 per ha	16.8 M	16.8 M	0.5
Scenario 3: Productivity gains achieved through MPCCI			
Subsidy of \$14 per ha	220.1 M	40.0 M	5.5
Subsidy of \$22 per ha	97.5 M	46.7 M	2.1
Subsidy of \$30 per ha	18.9 M	16.8 M	0.6

Source: Center for International Economics (2016)

The analysis concluded that if the MPCCI does not influence any productivity gains through the adoption of best management practice then there is a poor rate of return, primarily a benefit cost ratio of 0.5 (for every \$1.0 of government investment, then only \$0.50 is returned as a benefit attributed to the MPCCI investment by Government).

However, if the rate of adoption of best management practice is accelerated by 5 years (farmers would have over time adopted the practices, however through MPCCI the rate of adoption was speeded up), then the benefit cost ratio ranged from a return of 2.6 down to 0.5. This indicates that the highest rate of return is greatest when there is a lower rate of subsidy (at \$14 per hectare). The third scenario provided the greatest return. Under this scenario it was assumed that all of the uptake and adoption of best management practices was directly attributed to the farmers taking up MPCCI. The benefit cost ratio in this instance was 5.5 (at \$14 per ha subsidy), whilst dropping to 2.1 (subsidy of \$22 per ha) and then only providing a ratio of 0.6 where a higher subsidy of \$30 per ha was provided.

In terms of the recommendations and conclusions coming out of this study, it is unrealistic to anticipate that MPCCI would be the only influencing factor to increase farmer adoption of best management practice. A more likely scenario would be the second scenario, whereby MPCCI results in a more rapid uptake of best management practice; providing a 5-year faster adoption rate than otherwise would be the case where farmers did not have a MPCCI uptake.

In terms of achieving the greatest returns on the subsidy/government investment, the greatest benefit cost ratio is achieved where the level of subsidy is lowest. This assumes that the level of impact (accelerated adoption of best management practice) would be the same regardless of the level of cross-subsidization. Nonetheless, scenario 2, with a subsidy of \$14 per hectare provided a

benefit cost ratio of 2.6, which is still quite a significant return on investment for the government. The study also examined what the benefit cost ratio would be if a training and educational program were to be provided to farmers in order to enhance their skills in managing risk on farm. The rate of return was calculated to be 1.5, which is a valuable return and value-add to the overall program.

In concluding, it is recommended that a) a modest level of subsidy of \$14.00 per hectare be considered by the government, and be introduced for a trial period of perhaps 5 years. There needs to be a particular 'ceiling' on the level of subsidy in order to ensure that such funding is managed in a responsible manner with total costs of the program kept within a budgeted amount. This ceiling would be based on the total amount of subsidy allocated per farm business (perhaps limited to 1000 ha per area of crop, or a total value of crop specifically insured). b) Accompanying the MPCCI program there should be a training program that farmers would need to complete, in order to allow them to qualify for the subsidy program. This would relate to on-farm risk management training for farm managers, so that they have the opportunity to increase their skills and capabilities to become better managers of risk in the farm business, production risk and marketing risk aspects. This approach to providing an incentive to receive a subsidy would allow the opportunity for the skills and capabilities of farmers to improve. The training would improve their decision making allowing them to manage their operations in an improved manner.

2.5. The Need for Government Intervention

The need for Government intervention is an interesting consideration given the commercial business and nature of the business of farm and crop insurance. Given that there are already commercially viable models of crop hail and fire related insurance that has been in operation for decades in Australia, the need for Government intervention can be questionable purely from the perspective of being able to demonstrate 'market failure' in the first instance and an assessment of the particular beneficiaries from such a market intervention by government. In this instance the beneficiaries are the farmers themselves, they are commercial business people involved in agriculture, and like any other commercial business need to manage all of the risks that they are faced with. Similarly, other elements in the broader community may argue that subsidizing MPCCI products only adds to the 'bottom line' profitability of insurance companies, so why should the government subsidize such commercially driven insurance products? The cost of subsidization by governments can be significant. In the USA for example, the level of government subsidy is 59%, in Japan 51% and only 6% in India (Mahul and Stutley, 2010).

According to the National Rural Advisory Council (2012), international experience has overwhelmingly concluded that MPCCI is not commercially viable unless government intervention largely through subsidization of such insurance products is provided. Experience has indicated that the commercial cost of such MPCCI products exceeds what farmers are willing to pay for such facilities and risk management outcomes.

On the other hand, without having commercially viable farmers operating in the rural areas of Australia, the nation's economy, export earning capabilities, food security and broader rural economies would suffer considerably. The need for government intervention could therefore be argued on the basis of these latter characteristics that have been described, however there is a degree of caution warranted, in terms of the likely cost and impact of offering some level of government financial support and intervention.

There is also the need to ensure that such MPCCI products are viable in the longer term. There is the need for a 'critical mass' to be achieved in the market place, and this only develops over a period of time. Farmer awareness of MPCCI as a tool to manage financial risk needs to build. Farmers need to be educated about the benefits and opportunities associated with such insurance

products. The net impact and benefits available to farmers through utilizing MPCCI is quite significant, and in time offers the potential to lessen government support to be provided to farmers and farming communities during periods of drought. This would offer a particular financial advantage (saving) to government, hence some investment into promoting an awareness about MPCCI could easily be justified. ‘Good farmer managers managing better through MPCCI’ could be a particular outcome that would occur as the direct result of MPCCI being adopted by a greater number of farmers in Australia.

There is past evidence where there has been ‘market failure’ demonstrated in the market place that has warranted governments in Australia at the State and Federal level in establishing commercially orientated businesses in the community in order to provide the specific product or service. This has largely applied to the utilities sector (such as water, electricity, communications and some forms of motor vehicle and worker’s compensation insurance products). This has proven to be beneficial, in terms of addressing market failure issues, provided some incentive for other commercial companies to enter the market (over an extended period of time). In the longer term, governments have hence sold their interest in the companies that they have established to the private sector. Whether or not this particular model is warranted in the case of MPCCI is questionable however it needs to be considered along with the other possible models of operation and government intervention.

2.6. Policy Recommendations

Based on the discussion presented above, a number of interventions could be identified whereby the Government could play a more positive role in the promotion of MPCCI in Australia.

Reduction in Government Taxes (stamp-duty) on MPCCI policies: Cost of insurance is a major factor for farmers and reducing financial the burden on farmers could go a long way in promoting the crop insurance. All insurance policies that are purchased by farmers, the general public and businesses in Australia attract a government tax called stamp duty. It is considered that through the government charging ‘stamp duty’ fees to farmers for taking out MPCCI it is counterproductive. Whilst the government may receive increased revenue, it is a tax raising activity and only adds to the overall cost of the MPCCI product – making it less affordable to farmers.

Farmers adopting MPCCI can lead to increased productivity: Due to the conservatism of farmers (management of on-farm production risk), often farmers will tend to use less crop inputs (fertilizers, pesticides for weed, insect and disease control) and other beneficiary technologies. With farmers taking up MPCCI, much of this risk can be covered through the insurance policy, hence there will be more motivation for farmers to adopt many of the new technologies and increase their level of crop inputs. Farmers being able to better manage risk and apply crop inputs to maximize economic yield would be positive outcomes that are a ‘win-win’ situation.

MPCCI is a planned approach to managing the risks associated with farming: There have been several arguments expressed which consider that traditional government support in terms of ‘drought assistance’ is a far better model of supporting farmers during adverse events such as drought in seasons of very low rainfall. Under such situations farmers are often faced with little prospect of receiving income for a 12 to 18-month period or longer (particularly if extended drought conditions are experienced). The government usually releases support packages that may include reduced interest rate subsidies, farm household financial support, counseling and other social support services.

Whilst such facilities are well received, often farmers need to qualify for these. If farmers have other forms of support (off-farm income, diversified assets, off-farm employment) then they have

difficulty in qualifying for such drought assistance. Therefore, such assistance tends to favour those farmers who do not plan ahead, who do not diversify their business income streams or who manage cash flow to cope with years of limited income. MPCCI needs to be considered as a better model to support farmers in years of reduced rainfall, so that the farmers who are good managers are able to increase their insurance and manage risk through MPCCI. Therefore, government intervention may be valid, in that this approach is being pro-active (planning ahead) rather than being reactive (responding to an emergency that is triggered by drought). Further work in the development of suitable MPCCI products are warranted to factor in greater flexibility and use under situations where drought conditions may be more prevalent. Due consideration to some limited underwriting by government may be warranted through the establishment of an independent fund.

Raising the skills and awareness of managing risk on-farm: There is the opportunity to raise the awareness of how best to manage risk on-farm through providing education and training support to farmers. This approach has been successfully used in the past, through such national programs as Property Management Planning, farm business management training, crop monitoring and production benchmarking initiatives. Many of these programs have introduced farmers to the principles of risk management, in terms of identifying the ranges of risks that they are exposed to (climatic, natural disaster, commodity market, production and environmental related risks). Such programs can be adapted and developed to assist farmers in managing their risks and in turn learning how best to utilize MPCCI products in their particular farming environments and business situations.

Government direct subsidy is not a viable option: Direct government subsidy in relation to MPCCI premiums is not a viable option for Australian agriculture. This conclusion is largely reached on the following basis: a) Australia has a low population of 25 million people. Therefore, it has limited capacity to support a generous MPCCI subsidization scheme than compared with other highly populous nations such as USA. b) There are significant 'data gaps' in available production and rainfall data in Australia making it difficult to calculate the specific risks and premiums. c) Government intervention would far be better focused on creating awareness of MPCCI tools and opportunities available to farmers, provided by the private sector. Farmer education and training, building of business and risk management skills are in fact key areas of opportunity for government intervention.

2.7. Conclusion

It is evident that MPCCI has the potential to be a very useful risk management tool in Australia, however an element of government support is required. Whilst the direct subsidy of premiums is to be avoided, there is a justifiable case for specific reductions in Government taxes associated with farmers taking out MPCCI premiums. MPCCI and other related insurance products offer farmers in Australia significant benefits in terms of the opportunity to better manage financial risk as a result of poor seasonal conditions brought about by climate variability. There are wide ranging benefits that extend beyond the specific financial benefits associated with the insurance products. These include the ability to make more confident decisions in relation to the management of the cropping enterprises (since there is a higher likelihood of gaining a financial return, even if the level of coverage benefit relates to recouping the operating costs to produce the crop).

Whilst MPCCI policies require a relatively large upfront payment, there is a guarantee of achieving a modest level of income that covers much of the risks associated with producing the specific crops. This is appealing not only to farmers themselves, but also the banks (financiers) of the farmers cropping operations. Even though MPCCI has only been offered in Australia for a small

number of years, the uptake of MPCCI has been relatively a slow event largely due to the conservatism of Australian farmers. Hopefully this will be overcome in future years as farmers become more aware of the benefits of MPCCI in being an extremely valuable tool to better manage the risks associated with farming and agricultural production in Australia.

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3. Agriculture insurance in India: stakeholder perspectives on associated costs and benefits

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Abstract

Agricultural insurance in India has expanded in terms of coverage, scope and products offered over the past several years. The benefits of insurance as a risk management strategy are well discussed in the literature but the efficacy of these products to efficiently manage agrarian risk in comparison with other risk management strategies in India's diverse agrarian landscape is lacking. This study presents the benefits and costs of agricultural insurance as a means of understanding the effectiveness of insurance to address the financial risks faced by farmers. The results indicate a positive impact of insurance on the financial conditions of farmers. However, there remains tremendous potential for development and delivery of insurance products and engagement for greater customer confidence and satisfaction. It may be concluded that the insurance remains most effective for short term coping and the long term impacts of insurance was not clear in terms of risk management, investment behaviour and adaptation of farmers. The study recommends temporal long term monitoring studies to trace these long-term impacts.

3.1. Introduction

India is an agrarian economy, with a significant proportion of its population dependent on agriculture for their livelihoods (Gupta, 1998). Indian agriculture is prone to weather related vagaries, because of which the country's agriculture production fluctuates with the performance of the monsoonal rainfall (Dandekar, 1976). Recognizing the vulnerability of Indian agriculture to weather vagaries, the Government of India has been implementing several programs to smooth fluctuations in agricultural production including the introduction of improved crop varieties and expansion of agricultural areas under irrigation. In addition, the government has also invested in buffering the financial shocks to farming community through the implementation of agricultural insurance programs.

India has one of the longest standing agriculture insurance programs in the world, with the first insurance scheme launched by the government of India in 1976. Since its initial introduction various forms of agricultural insurance schemes continues to receive government support (Dandekar, 1985; Mosley and Krishnamurthy, 1995; Glauber, 2004; Greatrex et al., 2015). In addition to government supported crop insurance, India has also emerged as a rich ground for experimenting various insurance products on a pilot basis over the years. This has provided a useful case study for stakeholders studying the use of insurance as a risk reduction tool. There are however very limited efforts to study the costs and benefits associated with the use of crop insurance, particularly in terms of disaster risk reduction (DRR) and climate change adaptation (CCA). This case study as presented here analyses the costs and benefits of agricultural insurance for mitigating the impacts of weather uncertainty in the Telangana state of India. This study explores the role of insurance as a means of serving as a buffer against risk in comparison with other alternate strategies for risk mitigation. In this case study, we examine the effectiveness and opportunity costs associated with weather and index-based insurance in dry land cropping systems in regions particularly susceptible to weather vagaries. While the case study has a

relatively narrow focus it has important implications for the design and implementation of agricultural insurance schemes in India, particularly in response to an increased threat from the impacts of climate change.

3.2. Crop Insurance as a Risk Management Strategy

Agriculture is inherently fraught with risks for farmers; this is more so in the case of developing countries, with smaller land holding sizes and fewer buffering mechanisms available from the state. Agriculture in tropical countries such as India where 60% of agriculture is rainfed is further susceptible to the vagaries of the monsoons. The prevalence of risk in agriculture is not new and farmers over the decades have adapted methods to cope with losses and reduce risk. However, these traditional methods often undermine agricultural potential, reducing profits and maintaining a lower status quo. Further, under the looming threat of climate change and additional stressors, these traditional methods are insufficient to address highly covariate risks, interventions such as crop insurance can provide a more efficient alternative to manage risks and augment farm livelihood (Collier et al., 2009).

Farmers in developing countries such as India often survive on season to season profits. This means that the profits from the last season are circulated back into the farm to pay for overhead cost (farm inputs etc.) pay debts and meet the essential living costs of families. Crop loss can result in a serious disruption to this system often embedding families in a poverty debt cycle. In order to minimize risks, farms adopt various risk reduction strategies; such as intercropping, crop diversification and non-farm livelihood diversification (Hazell, 1992). These strategies are useful to manage market and production risks but unfortunately are costly particularly to the small farmers.

The risks associated with agriculture in arid regions are extensive; the risk of drought and variable rainfall is forever present, often compounded by complex socio-economic and environmental factors. Price fluctuations affecting the larger political economy of agricultural growth in India pose a significant risk to farmers. In the case of unirrigated agriculture, the relatively low rainfall has restricted cropping patterns to the options of only a few dry land food crops that include sorghum, millet and beans and unirrigated cash crops primarily comprising cotton and groundnut. Ground water irrigation has grown significantly over the last two decades allowing farmers to grow more vegetable and plantation crops, with lower production risks associated with a guaranteed supply of water.

Farmers in India's Semi-Arid Tropics (SAT's) have diversified their livelihoods from a primary dependency on agriculture to adopting a range of diversified livelihood options. This was mainly the result of the impact of climatic risks experienced from the prolonged droughts during 1980's. Households in the SAT's depend on a host of methods to cope with agrarian stresses, which include informal borrowing, liquidation of assets, migration and increase in labour market participation. As an additional coping mechanism to responding to agricultural risks, farmers have also been included to reduce investments into crops and diversify (Bantilan and Aupama, 2006). In addition to the above risk management strategies, crop insurance has emerged as an important risk management tool in India. Crop insurance was introduced in India as a contingency contract, whereby farmers pay premiums and collect indemnities when crop yields fall below a particular threshold level. Presently, crop insurance is commonly administered as crop credit insurance, where the insurer pays a part of the loans for cultivation in case of losses. Crop insurance is widely cited as a direct policy response to address agricultural risk. In order to safeguard farmers against non-preventable natural risks like natural disasters/calamity, insects, pests and diseases and adverse weather conditions, the government of India has introduced a variety of crop insurance programs. Presently four insurance programs are being implemented

which include (1) National Agricultural Insurance Scheme (NAIS) (25 States/2UT's) (2) Modified National Agricultural Insurance Scheme (MNAIS) (50 districts in 21 states) (3) Weather-Based Crop Insurance Scheme (WBCIS) (21 states) and (4) Coconut Palm Insurance Scheme (8 states) (See Table 4).

Table 4. Insurance schemes in India cumulative (from 2009-10 to 2014-15)

	No. of farmers covered	Area Insured (Ha)	Sum Insured (Rs)	Gross Premium (Rs)	Claims reported (Rs)	Claims Paid (Rs)
NAIS	240214730	357551702	38628437	1156322	3843195	3679818
WBCIS	63411135	82763233	10907273	1055327	821352	738537
MNAIS	19037142	20844176	4206307	362182	342753	330862
Coconut insurance	72612	0	44567	265	0	337

Source: Department of Agriculture, Cooperation and Farmers Welfare (Credit Division), 2017

Under the NAIS/MNAIS/WBCIS, insurance is mandatory that where farmers take out borrowings insurance is mandatory; in the case for farmers not having any borrowings, insurance is voluntary. The insurance is distributed through banks, empaneled general insurance companies, credit and cooperative societies and district agricultural offices. The NAIS is run exclusively by the Agricultural Insurance Corporation (AIC) and is spread across 450 districts in the country. Private insurance companies through a competitive tender process provide the MNAIS and WBCIS. Prior to the commencement of the cropping seasons (March for Kharif and early September for Rabi) a meeting of the state level Coordination Committee is convened during which crops, areas to be covered and companies to be selected are decided. MNAIS and WBCIS insurance providers are selected based on agricultural insurance experience, premium, infrastructure of the company, quality of services offered and the payout offered to farmers. All farmers growing notified crops in a notified area during the season who have insurable crops are eligible to take crop insurance (Interviews by authors). Table 5 lists the responsibilities of various agencies in implementing crop insurance in India.

A new crop insurance scheme, Pradhan Mantri Faisal Bhiman Yojna (PMFBY) was launched by the government, aiming to replace the NAIS and MNAIS, in June 2016 (Damodaran, 2016). The PMFBY is implemented through a multi-agency framework by selected insurance agencies under the supervision and control of the Department of Agriculture, Cooperation and Farmers Welfare (DAC and FW), Ministry of Agriculture and Farmers Welfare (MoA and FW), Government of India (GOI) and the concerned State (in co-ordination with financial and other concerned institutions). Currently, only about 33% of agricultural land in India has access to insurance and the PMFBY aims to increase it to 50%. Under this scheme, premiums are further subsidized and there is no cap on sum insured, the scheme provides for the coverage of post-harvest losses and localized crop losses (Agriculture Insurance Cooperation of India, 2016; Government of India Planning Commission, 2016).

Table 5. Roles of various agencies involved in agricultural insurance in India

Agency	Roles
National government	<ul style="list-style-type: none"> • Provide congenial policy environment for the healthy growth of agricultural insurance in the country. • Issues Administrative Instructions which states the terms and conditions of insurance coverage which are communicated to the state government
State governments	<ul style="list-style-type: none"> • Notify crop wise notified areas and premium rates as applicable in advance of each season. • Provide Unit area wise data on crop yield of notified crops for the past 10 years. • Communicate to all the FI's regarding notified areas and crops, premium rates and subsidies, and cut off dates for collection of proposals and remittance of premium. • Provide yield data to the insurance agencies.
Financial Institutes	<p>Institutes that disburse Seasonal Agricultural Operation (SAO) loans as per Reserve Bank of India (RBI) guidelines and conduct direct transactions with farmers.</p> <ul style="list-style-type: none"> • Provide additional loans to loanee farmers to pay crop insurance premiums. • The nodal offices communicate crop -wise, defined area-wise, monthly crop insurance information including premiums paid by all loanee farmers to the Insurance Agencies. • Disburse information to farmers and problem redressal regarding the insurance scheme. • Provide technical assistance and support to farmers in the insurance application process. • Maintain all the records and documentation of farmers.
Implementing agencies	<ul style="list-style-type: none"> • Build up crop yield database and prepare actuarial premium rates. • Implement and finalize claims, responsible for the claims for the amount mentioned in the schemes. • Negotiating of re-insurance arrangements in the international market. • Coordination in organizing, training awareness and publicity programs.

Source: (Singh, 2010; Agricultural Insurance Cooperation of India, 2016)

3.3. Costs and Benefits of Agricultural Insurance

The Table 6 lists several costs and benefits associated with insurance as reported in the literature and effort is made to elaborate on some of the costs and benefits associated with agriculture insurance in this section. Agricultural insurance can provide an opportunity to provide farmers with an alternative and potentially more effective risk reduction and buffering mechanism, which can reduce income fluctuations and build farmer's confidence to maximize investment for more profitable farming activities. Insurance provides immediate post-disaster liquidity, which allows for rebuilding and coping while preventing the forced sale of assets. At the same time farmers can pay back debts, increase credit worthiness and access capital to invest in high-returns agriculture (Mechler et al., 2008; Hazell, 1992).

Theoretical work on potential costs and benefits is ubiquitous; however, case studies analysing the effectiveness of crop insurance in India using a cost benefit analysis (apart from conceptual analysis) remain scarce. A notable exception however is the study by Mechler et al. (2008) which looked at drought risk management strategies in Uttar Pradesh including crop insurance. A plethora of studies addressing the issues regarding to crop insurance uptake exist (Mahul et al., 2012; Cole et al., 2013). These studies suggest that lack of liquidity; trust and knowledge are the main impediments to the growth of demand for agricultural insurance in India and conclude that the design and implementation of the product must be improved to increase uptake rates.

The subsidy of an insurance product can be considered a significant cost especially to the State. Despite the apparent benefits from agricultural insurance (particularly for high-risk farmers in developing countries), the uptake remains relatively low. Although often highly subsidized by the State, premiums remain relatively restrictive particularly to low income farmers with small land holdings. When premiums are not sufficiently subsidized, they can have an adverse impact on incomes and livelihoods due to high debt repayment obligations by the farmer. The varying correlation between actual loss and payout (Basis risk) is another recurring downside to crop insurance - particularly in the case of index insurance (Barnett and Mahul, 2007; Collier et al., 2009). Losses due to uncovered risks such as pests, disease, and market fluctuation is a recurring issue with crop insurance in India. Opportunity costs in crop insurance is represented by the income foregone by not utilizing the money spent on premium on the most effective and efficient risk management strategy. Opportunity costs could be significant particularly when the best alternates have to be forfeited due to the compulsory uptake of insurance mandated by the state or other authorities, often to access other facilities such as crop loans. Keeping this background in view, we analysed the costs and benefits of agricultural insurance at the farm household level for dryland agriculture in two villages in Telangana state in India.

3.4. Methodology

The Cost Benefit Analysis (CBA) method was used to compare the costs and benefits of crop insurance. It involves identifying the impacts of crop insurance on households, classifying these impacts into costs and benefits, and identifying and quantifying the economically relevant impacts. Table 6 provides an exhaustive list of costs and benefit indicators that formed basis for conducting CBA analysis in this study. The utility of using the CBA methodology goes beyond a comparison of costs and benefits, the CBA is instrumental in evaluating alternative risk management strategies. CBA is a major decision support tool that is used by governments to organize and understand the socio economic costs and benefits and inherent trade-offs of public policy programs and projects (Mechler, 2016). Recently CBA have come to the forefront notably for the appraisal of efficiency of disaster management projects, development projects and public interventions (Mechler, 2005; Kopp, 1997). Overall, CBA can provide valuable information that go beyond the rhetoric and help in selection of contextual and best-suited interventions.

CBA has limitations that have been recognized, some of the commonly recognized shortcomings in utilizing the CBA methodology are: 1) limitations of non-market goods including ecosystem services, 2) limited opportunity in valuation of intangible goods, 3) lack of incorporation of uncertainty and risks in valuation, and 4) spatial and temporal variability of risks. A study by Shreve and Kelman which compiled and compared CBA methods for evaluating DRR strategies detailed key shortcomings in using CBA to evaluate DRR impacts in studies including lack of sensitivity analysis, lack of consideration of future climate change impacts and temporal characteristics of benefits and non-benefits (Shreve and Kelman, 2014). Many of the costs and benefits from an intervention can be of intangible and indirect nature, which presents a challenge to monetize and attribute for the purpose of inclusion in CBA. While there are established techniques for valuation of certain intangible benefits such as labor benefits, social cohesion and other intangibles remain a challenge to evaluate and quantify. However, CBA still presents an efficient methodology to compare the net benefits of various approaches in risk management.

In order to systematically analyse costs and benefits of agricultural insurance, we followed the following procedure: 1) assess physical risks associated with cropping in the region and the resulting economic loss to farmers (reasons for crop loss, frequency of crop loss, crop loss amount), 2) evaluate costs associated with agricultural insurance as a risk management technique, and 3) evaluate benefits associated with crop insurance.

Table 6. Indicators to measure potential costs and benefits of agricultural insurance at household level

Category		Costs			Benefits			
Social	Justification	Costs		Source	Justification	Benefits		Source
Social	HH income stress due to high premium. Inability/difficulty in paying premium	Direct	Indirect	Mechler et al., 2008	Consumption smoothing No income fluctuation	Direct	Indirect	Rosenzweig, and Wolpin, 1993. Rosenzweig, and Stark, 1989 Townsend, 1994.
		Increased loans taken for premium payment	Reduced consumption			Steady income in loss month	Reduced Debts Preserved assets Increased Investment expenditure	
	Opportunity costs due to investment into insurance	Forfeited profits from alternated investments		Mechler et al., 2008	Improved credit worthiness Increased opportunity for increasing livelihood profitability	Increased bank loans taken for high yield crop/farm practices (machinery investments etc.)	Increased farm profits	Hazeller et al.,1986 Mechler et al., Mishra, 1994
Economic	Basis risk-Crop failure but no compensation Losses from prevalent risks (disease, pests, markets) which remain uncovered	Uncompensated crop losses Payout does not reflect losses		Clark et al., 2012 Merchler et al., 2008 Gosh and Yada, 1998	Increased confidence	Increased high risk high yield variety crops planted. Increased monoculture Increased investment in livelihood assets	Increased profits	Ahsan, Ali and Kuren, 1982 Hazell,1992 Venkatesh, 2008
					Post disaster liquidity Better ability to recover from disaster	Funds available for post disaster investments for livelihood and rebuilding	Preserved assets Reduced debts	

Source: Authors based on references cited in the table

The study identifies both qualitative and quantitative and primary and secondary impacts associated with the crop insurance. In the study, a 'comparative' approach was used, i.e. the study involves measuring the costs and benefits of agricultural insurance by comparing a group of insured farmers to a group of uninsured farmers with similar characteristics from the same village. The study focuses on the micro level impacts of agricultural insurance. The micro level impacts are defined as those that occur within households that have taken up insurance. The study was conducted at two levels, quantitative and qualitative. Variables that could be quantified were used to calculate the Benefit Cost Ratio (BCR) while unquantifiable variables were qualitatively compared either directly or by using proxy variables.

The study was conducted in the Khammam and Warangal districts in Telangana. 58 questionnaires were filled to assess the cost and benefits associated with agricultural insurance in two villages of Perumala Sankeesa and Rajolu. Random sampling was used to select farmer for the survey. The demographic and socio-economic background of respondents is presented in Table 7.

Table 7. Demographic characteristics of survey sample

Category	Gender		Education				Landholding size		
	Male	Female	Illiterate	Up to 10th	10+ 2	Degree	Small	Medium	large
Insured	14	13	3	23	5	2	8	4	15
Uninsured	15	15	6	23	-	-	10	7	12

Source: Authors

3.5. Results and Discussion

Risk analysis

All the survey respondents have agriculture as their primary source of livelihood. Secondary livelihood sources included driving tractors and working as farmer labourers, which contributed to less than 20% of their annual income and are seasonal in nature. Major crops insured are rice, cotton and chilli. The rice grown in the region is predominantly local varieties while hybrid high yielding varieties of cotton and chilli are produced. Agriculture is heavily dependent on chemical fertilizers and pesticides, cotton and chilli are primarily irrigated while rice is sometimes grown under rainfed conditions. Low and irregular rainfall was the primary reason for crop losses followed by crop disease and market fluctuations. Crop losses are frequent with a majority of farmers reporting consecutive loss years.

The survey indicates that the primary reason for crop failure is low and irregular rainfall followed by diseases and market fluctuations (See Table 8 and Table 9). Chilli (40% insured and 45% uninsured) has the highest reported loss followed by rice (33.46% insured and 38.91 uninsured).

Table 8. Risk analysis of insured farmers for the last three years (2013-2015)

Crops grown	Farmers growing the crop (%)	Rainfed (%)	Irrigated %	Average area (acres)	Crop loss reported (%)	Primary reason
Chilli	24	0	100	5.9	40	Disease
Cotton	35	7.6	92.3	4.9	30.2	Low rainfall
Rice	41	26.6	73.4	4.5	33.5	Low rainfall

Source: Authors

Table 9. Risk analysis of uninsured farmers for the last three years (2013-2015)

Crops Grown	Farmers growing the crop (%)	Rainfed %	Irrigated %	Average area (acres)	Crop loss reported (%)	Primary reason
Chilli	23	0	100	5.2	45	Low rainfall
Cotton	33	13.3	86.7	7	29.5	Irregular rainfall, low rainfall
Rice	33	84.2	15.7	7.00	38.9	Low rainfall
Mango	4	0	100	25.7	0	
Pigeon pea	7	50	50	5.8	20	Irregular rainfall, markets

Source: Authors

Crop insurance as a risk management strategy - Costs

Premiums

Presently crop insurance is mandatory for all farmers who borrowed/renewed crop loans for the notified crops during the stipulated cropping season. Non-borrowing farmers can voluntarily obtain insurance by paying the stipulated premium. Under the compulsory component for loanee farmers, the sum insured would be equal to the fixed Scale of Finance for the crop for which the crop loan was taken. The insurance premium payable by the loanee farmer is financed by the loan disbursing office of the bank, and treated as an additional component of the Scale of Finance of the loan. The maximum insurance charges payable by the farmer for food and oilseed crop is 1.5% and 2.0% of the sum insured in Kharif and Rabi season respectively; or the actuarial rate, whichever is less. In the case of commercial/annual crops, the maximum insurance charge payable by the farmer is 5% of the sum insured or the actuarial rate, whichever is less. The difference between the premium rate and insurance payable by the farmer is shared equally by the center and the state (Agricultural Insurance Cooperation of India).

There have been disputes between farmers and high premium costs experienced. Representing disgruntled farmers, the cooperative bank in Warangal went to court to obtain a stay order against the insurance company in response to excessive premium costs incurred by farmers (Interviews by authors). Some 39% of farmers affected experienced household income stress due to the high cost of premiums. The survey revealed that farmers preferred further subsidies of the insurance premiums by the State. None of the farmers in the survey had a clear understanding of the actual cost of the insurance premium and the high level of subsidy already paid by the State, with some farmers claiming that they received no subsidy (clearly a lack of awareness). Some 14% of the uninsured sample of farmers ranked the high cost of premium as the foremost reason they had not taken up insurance. The reason for lack of knowledge about the insurance premium being paid by farmers could be that the banks deduct the premium from the crop loan issued to the farmers. Even though the bank staff explain all the deductions, farmers often confuse the insurance premium deductions as 'bank charges for issuing the loan'. Limited education among the farmers and inability to refer to the loan book issued by the bank are some of the reasons leading to confusion among farmers, therefore clear communication and awareness raising by the bank will help to overcome these issues.

Opportunity costs

Opportunity costs refer to the income forgone by not investing resources in alternate opportunities that could be more lucrative. In crop insurance, they are the costs associated with

using resources to pay the premium for insurance and foregoing the other risk management strategies that could be more beneficial to the livelihood of the farmer. Net benefits of agricultural insurance between insured and uninsured farmers was compared in a study to help understand if the net benefits from opting for agricultural insurance is greater than other investment and risk management strategies. Of all the insured farmers that were interviewed, none felt that they could have invested the insurance premium in more profitable livelihood activities. Only 17% of insured farmers felt that they could have invested the premiums in other risk management strategies, particularly drilling of bore wells. However, as the cost of bore well digging is much higher (>10000 INR) insurance was the preferred risk management strategy. Lack of other options for investment seems to make agricultural insurance a more attractive option, with 39% of insured farmers in the region responded that they do not know where else to invest the insurance premium.

Opportunity costs for the crop insurance in the region appear to be low primarily because of the low insurance premiums paid by farmers, the premium is often not substantive enough to invest in alternate income generation and lack of knowledge on what else can be done with the money otherwise spent on insurance premium. The survey indicates that uninsured farmers prefer to invest money for the purchase of livestock (46% compared to 17% of insured farmers) and more insured farmers (28%) have made significant investments particularly in small business compared to uninsured farmers. Furthermore, only 10% of insured farmers felt that there was a moderate potential for implementing alternate strategies to insurance.

Uncompensated losses

A significant downside of crop insurance could be the potential lack of correlation between payment and actual losses. There was very low correlation between the percentage of crop loss and the percentage of crop loss that was compensated by the insurance ($r=0.1381$) indicating an inadequate compensation received by farmers (Figure 5). Similarly, the survey revealed a low correlation ($r=0.416$) between the insurance payout to the total premium paid during the 2012, 2013 and 2014 (Figure 6). However, it showed stronger correlation during 2013 ($r=0.67$) which was one of the most severe drought years in the region. The low level of correlation indicates that the premium does not reflect the payment for losses over the three years and but the insurance could be profitable during the severe drought years. It was found that in 2015 and 2016 14% and 11% of insured farmers respectively reported significant losses remained uncovered from the crop failure and no compensation was received.

Crop insurance as a risk management strategy - Benefits

Consumption smoothing and loss coping

Crop insurance can provide dual economic direct benefits for farmers; they can increase mean income and reduce income variability. The former is referred to as transfer benefit and the latter as risk benefit. Transfer benefit refers to riskier and profitable behaviour such as investment in machinery, growing of high-risk high yield crops etc.

Traditional risk coping strategies employed by farmers to cope during disaster years in the study region include the sale of assets; seek off-farm employment and borrowing loans from informal sources such as family members and village moneylenders. These traditional risk coping strategies could prove to be costly if it involves sale of productive assets that diminish current and future livelihood potential of farmers. Further to this, borrowing money from moneylenders at exorbitant interest rates poses the risk of entrapping farmers in vicious debt cycles. In addition, covariate risks can drive up interest rates charged by local moneylenders further pushing down prices of assets particularly cattle sold in distress sales. By providing immediate post disaster

liquidity, insurance has the potential to reduce the requirement for these costly risk coping strategies.

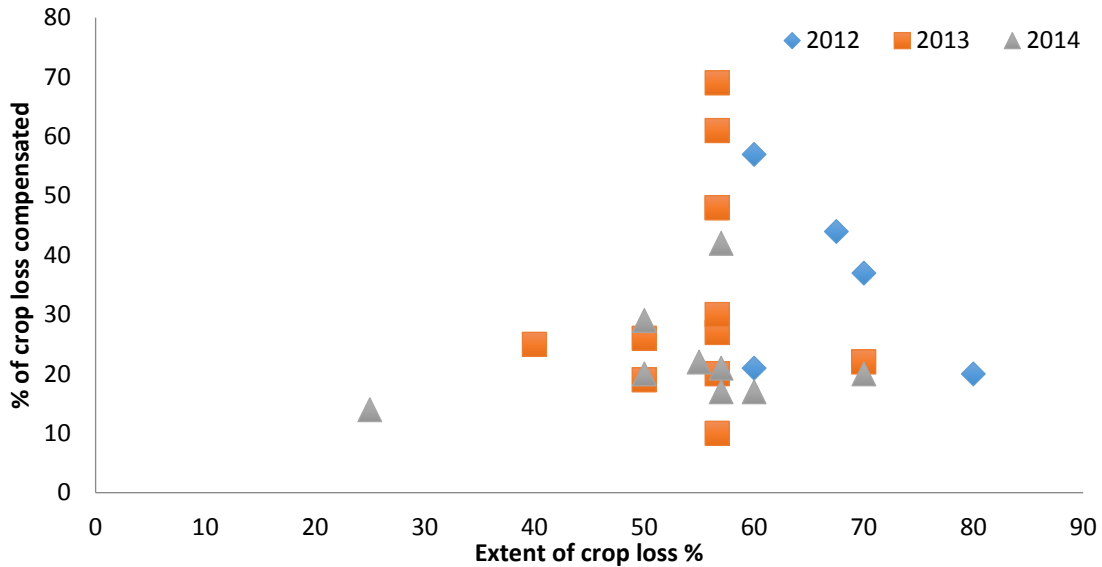
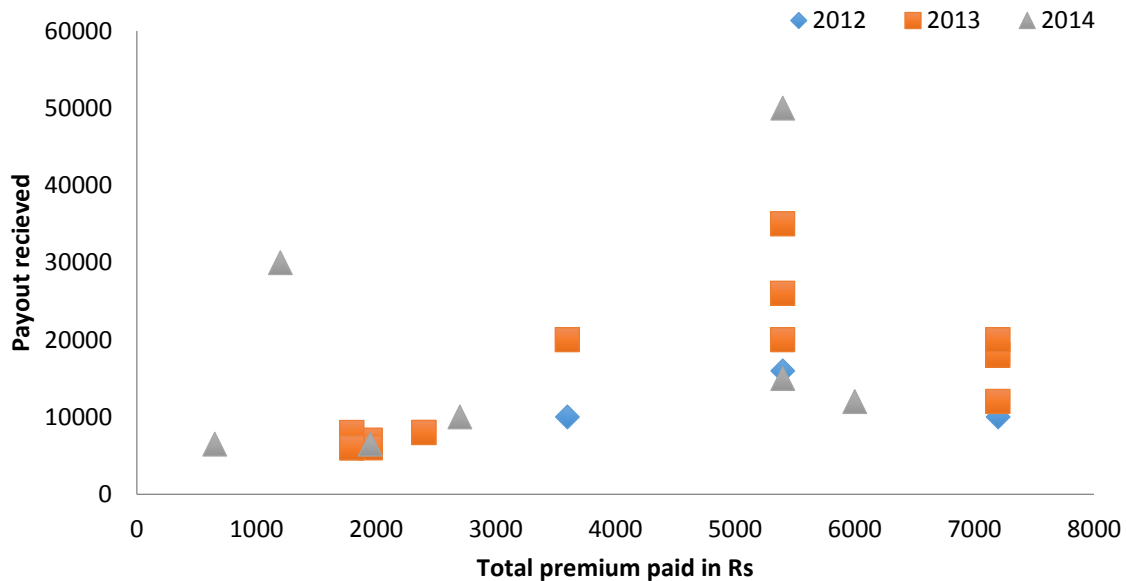


Figure 5. Correlation between the extent of crop loss and % of crop loss compensated by the insurance payout



Source: Authors

Figure 6. Correlation between the premium paid and the insurance payout

The survey indicated that the 33% of insured farmers sold their assets to cover losses compared to 43% of uninsured farmers during the crop loss years (Figures 7 and 8). Some 43% of uninsured farmers reported that they had sold livestock during the loss season and 50% of these farmers sold the cattle below the market price. This suggests that insurance has reduced the need for farmers to sell assets to cover losses. For the same loss year, 64% of uninsured farmers reported taking loans to cover crop losses, 39% of farmers reported taking loans from banks and moneylenders and 53% had partially repaid the loan. The prominent reason for taking the loan was unexpected

household expenses (46%). A large number of the insured farmers (82%) took loans during the season they suffered the crop loss, of which 74% borrowed money from moneylenders.

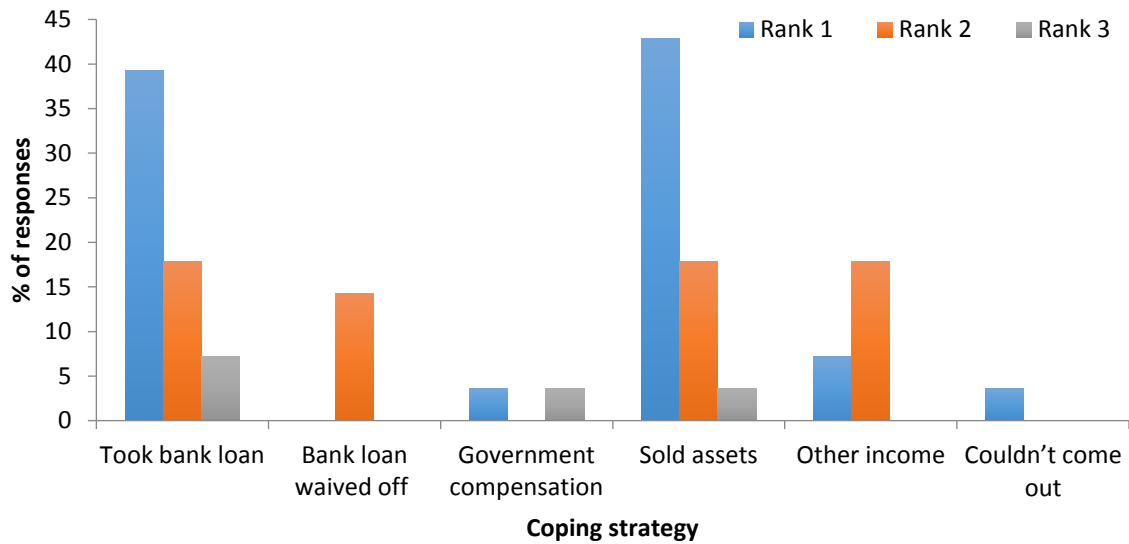
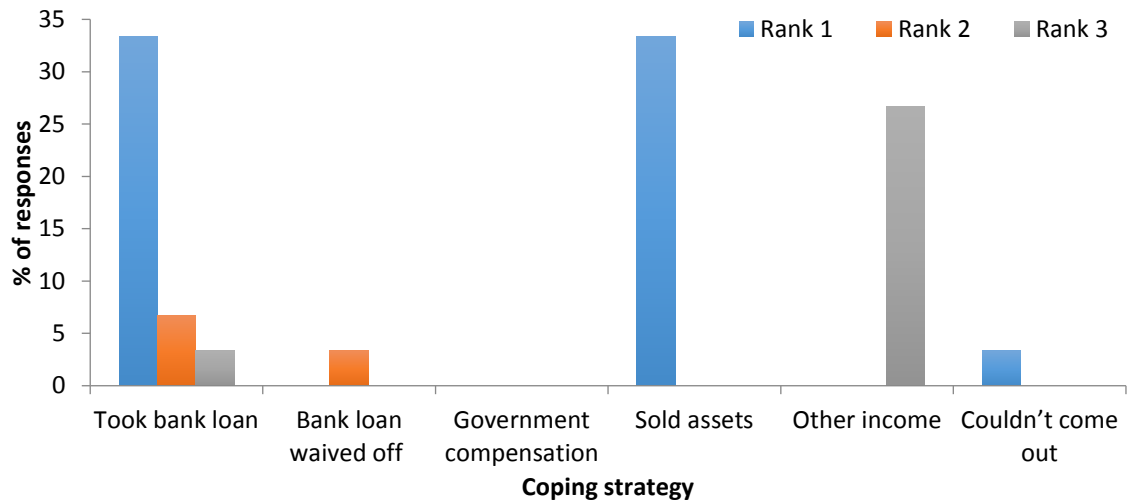


Figure 7. Loss coping strategies among the insured farmers



Source: Authors

Figure 8. Loss coping strategies among the uninsured farmers

In order to understand if the crop insurance had discernible impacts on the consumption patterns of farmers, the study compared consumption during loss years between insured and uninsured farmers. Some 53% of the uninsured farmers had to make consumption adjustments by reducing the expenditure on social events during the periods of crop loss, which was higher than the insured farmers (35%). Interestingly, 28% of the insured farmers reported as spent less on medical expenses than uninsured farmers. This indicates that insurance has a significant impact on the need for consumption adjustments during the periods of crop loss.

Crop management practices of insured and uninsured farmers

The survey indicated only 10.7% of insured felt more confident to invest in farming activities after obtaining insurance, while 17.8% did not thought it was the case. It was found that 17.8% of the insured farmers reported that they had spent more than they usually spend on farming activities due to receiving the insurance payout. The payout was predominantly spent on seeds (28.6%) and pesticides (21.4%). The primary expenditure of insurance payout was household expenses (46.4%) followed by inputs for farming and paying off debts.

Apart from the investment in better quality seeds (42.8%), which resulted in increased income (83.3%), the study indicated that there were no significant practices for augmenting the agriculture in the sample of the insured farmers compared to the uninsured farmers. It was identified that 64.2% of the uninsured farmers reported that they have invested in better quality seeds because of which 77.7% reported increased yields. Some 35% of the uninsured farmers reported investing in new irrigation technology (drip) and 39% of farmers have increased on farm mechanization with positive results on yield. The farmers were encouraged to make these investments due to increased profits from farming. Majority of the insured farmers (82%) have partially attributed insurance to their recovery from losses and 46% of farmers said they have increased insurance coverage after the initial beneficial experience from insurance. However, it was difficult to verify the veracity of this claim since the crop insurance is mandatory for all the borrowing farmers and very negligible number of farmers obtained the insurance voluntarily.

Farmer perceptions of insurance costs and benefits

Farmers perceived that the biggest cost of insurance was the income stress caused from paying premiums (42.8% insured farmers and 100% uninsured farmers). Uninsured farmers perceived that the inability/difficulty in paying interest (66.7%) was a significant cost of insurance (Table 10). This result was much lower among insured farmers (3.6%) indicating that the actual costs of insurance may not be exorbitant as perceived by the uninsured farmers. This can be attributed to a lack of knowledge and information among uninsured farmers regarding the cost of insurance premium. As a result, majority of the insured farmers thought that the premium should be completely subsidized by the government (67.8%). Unavailability of cash during crucial periods was also identified as a cost of insurance since the average time between claims and payout was 7 months. Consumption smoothing was perceived to be the biggest benefit of agricultural insurance among uninsured farmers (66.7%) and insured farmers (64.2%). A significant number of insured farmers (57.1%) felt that an increased confidence in farming was a benefit of insurance, this was not reflected in the perception of uninsured farmers, where only 16.7% of farmers felt that insurance could increase confidence in farmer. The perception of uninsured farmers that insurance benefits were primarily for loss coping was discernible (timely insurance payout 33.3%, no income fluctuation 66.7%, post-disaster liquidity 33.3%) from their responses, while insured farmers felt that insurance could also contribute to long term adaptation benefits (increased farm profits 14.3%, increased confidence 57.1%, reduced debt 32.1%).

Table 10. Uninsured and insured farmer perceptions on the costs and benefits of insurance

Costs			Benefits		
	Insured %	Uninsured %		Insured %	Uninsured %
Household income stress due to high premium	42.8	100	Consumption smoothing	64.2	66.7
Inability/difficulty in paying premium	3.6	66.7	No income fluctuation	10.7	66.7
Crop failure but no compensation	7.2	66.7	Improved credit worthiness	10.7	16.7
Unavailability of cash during crucial periods (Seed buying etc.)	17.9	33.3	Increased agriculture profitability	10.7	0.0
Can also lead to delayed recovery from disaster	3.6	0.0	Increased confidence	57.1	16.7
Losses from prevalent risks (disease, pests, markets) which remain uncovered	14.3	0.0	Increased high risk high yield crops planted	0	0.0
Reducing sustainable risk mitigation activities (e.g. soil conservation, irrigation technologies)	0	0.0	Increased investment in livelihood assets	0	16.7
Reduced consumption	3.6	16.7	Post disaster liquidity	10.7	33.3
Loans	14.3	16.7	Ability to recover from disaster	42.9	16.7
Uncompensated crop losses of insured crops	3.6	0.0	Timely insurance payout	10.7	33.3
Time taken to receive payout after loss	7.1	50.0	Increased bank loans taken for high yield crop/farm practices	7.1	0.0
Debts	32.1	16.7	Increased monoculture	3.6	16.7
Increased water usage	7.2	16.7	Timely insurance payout	28.6	0.0
Decreased soil fertility	0	0.0	Steady income in loss year	3.6	0.0
Reduced water availability	3.6	0.0	Reduced debts	32.1	33.3
			Preserved assets	3.6	0.0
			Increased Investment expenditure	3.6	0.0
			Increased farm profits	14.3	0.00

Source: Authors

Benefit Cost Ratio (BCR)

The benefit cost analysis was conducted using Benefit Cost Ratio (BCR) at household level. The total benefit at the household level is composed of the gross insurance payout paid per household per acre (P) plus the increase in the farm (I_f) profits owing to increased profits from on farm and agriculture associated livelihood activities. The increased in farm profit is calculated as the average increase in farm profits from additional farm investments. The per acre insurance payout for the last loss season averaged across insured sample farmers is considered. The components of BCR are shown in Table 11.

The costs considered for the calculation of the BCR include the insurance premium paid for the last year (IP) plus the perceived opportunity costs (O) and the uncompensated losses (L_u). Uncompensated losses are calculated as the total loss minus the insurance payout received.

$$L_u = L - P \quad (1)$$

$$BCR = \frac{P+I_f}{IP+O+L_u} \quad (2)$$

The calculated BCR for the agricultural insurance program averaged for the insured households was 2.14 indicating that the program had a positive impact, and the overall benefits outweigh the costs (Table 11). The variables use to calculate the BCR represent important monetarily quantifiable variables. The highest costs represented here are the premium costs and opportunity costs, which represent profits from alternate investments. Uncompensated losses have further contributed to the costs. Among the benefits, the insurance payout stands out to be the most significant benefit to farmers. The increase in farm profits from investments is though not significant its attribution to insurance alone could be contested.

Table 11. Benefits and costs of insurance at the HH level for the last loss year

n=27	
Rs per household	
Costs	
Insurance premium	3748
Opportunity costs	3244
Uncompensated losses	295
Total Costs	7288
Benefits	
Insurance payout	14519
Increase in farm profits	1076
Total benefits	15594
Benefits-Costs	8307
BCR	2.14

Source: Authors

3.6. Conclusion

This study compared the costs and benefits of agricultural insurance at the household level using a BCR approach. The greater part of the cost and benefit variables could not be monetarily quantified and hence were compared qualitatively, other variables that could be monetized were used to obtain a BCR. The BCR (2.14) indicated that overall the crop insurance provided more benefits than costs. Since a large proportion of the variables could not be quantified into monetary values due to lack of sufficient data, the BCR provides an incomplete picture of the overall costs and benefits associated with the crop insurance. However, the higher positive BCR ratio, indicates more benefits than costs and is a good starting point for the insurance to appear as a reasonable risk management choice to invest for the farmers. There is a significant variation in BCR between disaster years owing to the

variability in insurance payout and premium paid. Furthermore, the benefit to cost shows significant variation between farmer classes (classified based on land holding size) small and large farmers obtain larger benefits compared to medium farmers.

There are elements in the implementation of the crop insurance scheme that can render the crop insurance costly, particularly the delay between loss and payment of claims alluding to inefficiency in delivery service. Delayed payments are a significant cost that also has the potential to diminish the beneficial impacts of insurance particularly the loss coping benefits. In the absence of timely payout, farmers will turn to informal and unsustainable coping strategies such as loans from moneylenders and sale of productive assets (for which the study presented some evidence). This can be aggravated when farmers make decisions based on the security provided by the crop insurance; uncompensated and delayed payments can lead to an income shock to the household. Uncompensated losses due to basis risk in yield-based insurance or due to uncovered losses is also a significant impediment to farmers' confidence in insurance. Although the PMFBY attempted to address these issues by incorporating micro-level crop yield experiments, studies have shown that, due to lack of household-level yield data and high variability in physical conditions, the determination of accurate threshold-yield remains a challenging affair (Vyas and Singh, 2006). This issue was reflected in our study where the majority of farmers remain concerned about the uncompensated losses.

Benefits from change in the attitude and behaviour towards risk management in agriculture difficult to measure particularly because these changes are gradual and take a significant amount of time to manifest into tangible rewards in the form of increased farm profits. Temporal studies to understand the changing patterns of crop management due to agricultural insurance maybe useful in this regard. Furthermore, attributing changing practices and behaviour to a single variable given the dynamic nature of agriculture in India is a precarious task. The study has demonstrated that there has yet to be significant long-term impacts of insurance on farmer livelihoods in the region; changes in farmer behaviour relating to confidence building and associated positive impacts on farm management practices are yet to be realized, and significant impacts on profits and assets are only slowly emerging.

Overall, the study indicated the positive and beneficial impact of crop insurance on the livelihoods of farmers in the study location, this is echoed by a majority of farmers (85.7%) who found crop insurance beneficial and attribute it, at least partially, to their recovery from crop loss. The preference for insurance can also be attributed to the lack of availability and knowledge of other risk management practices. It turned out that the crop insurance is the most economically efficient risk management strategy available for farmers in the region. In the absence of better risk investment options for smaller amounts of money, crop insurance emerges as the preferred choice, 90% of farmers said that there was very low potential for implementing alternatives to crop insurance. Another primary driver for the uptake and preference for the crop insurance is its mandatory linkage to crop loans. Nearly all the insured farmers stated that accessing credit in banks was the primary reason they had taken crop insurance.

Crop insurance has existed in India in various forms for almost three decades. Although crop insurance is useful in managing farm risks, the benefits of crop insurance have not been completely realized. This study suggests that crop insurance in combination with other risk management methods are more useful way of managing agricultural risks. However the actual ability of insurance to manage crop risk still remains largely speculative. Lack of adequate impact evaluation and monitoring studies has led to a dearth of temporal and spatially explicit data on income and assets correlated to crop insurance and an inability to quantify qualitative and long-term benefits has limited the scope of the study to thoroughly understand the costs and benefits. In conclusion, although the benefits outweighed the costs of insurance. Further efforts are required to completely realize the potential of insurance, by looking at the complete spectrum of cost and benefits associated with the insurance that could not be included in the current study. Temporal and spatially and socio economically explicit long term data can help us decipher the intersectional benefits of crop insurance for DRR and risk management of farming households, thus contributing to the design of sound insurance programmes that can address risk management in India's widely varied agricultural landscape.

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4. Agricultural Insurance in Japan: Stakeholders' Opinions on its Effectiveness and Ways Forward

Nanako Nakamura, S.V.R.K. Prabhakar and Natsuko Ozawa

Abstract

Japan has a long and rich experience of promoting agriculture insurance for addressing the weather-related income shocks to farmers and the insurance in the country remained one of the most efficiently run insurance programs in the world. However, the agriculture insurance in the country is facing several challenges with changing demographics of farming communities, international trade related pressures and increasingly unpredictable climate and weather patterns. These changing environments within which the current insurance programs operate necessitate revisiting the insurance products and infuse flexibility that is required to accommodate emerging concerns. This paper based on literature review, interviews with insurance stakeholders in Japan including farmers and insurance companies and structured questionnaire surveys dwells into some of the issues that the agriculture insurance is facing in the country proposes that the insurance be designed based on location-specific conditions faced by farmers in order to remain relevant for farmers.

4.1. Introduction

Japan is located in the Asian monsoon zone, which is one of the most vulnerable regions to natural hazards such as typhoon, droughts, unusual low temperature, hailstorms. Agriculture in Japan is historically known to be affected by low-temperature related crop losses followed by typhoons, droughts, frost, hailstorm and snow (Ministry of Internal Affairs and Communication, 2005). Agricultural risks in Japan can be categorized into production, marketing, financial, institutional, and human risks. These risks can also be compounding risks that are the result of “interrelation of risks” (Kahan, 2013). It is important to either mitigate these risks by risk control or risk finance. Risk control can prevent risk occurrence while risk finance can help minimize the damage caused by disasters (Yokoyama, 2014).

Various stakeholders in Japan, including the Government of Japan, have recognized the risks faced by the agriculture sector in Japan and as a result have instituted measures to address the risks faced by Japanese farmers. The Article 22 of the Food, Agriculture and Rural Areas Basic Act enacted in 1999 clearly recognizes the need for the government to intervene and provide better conditions for farming in the country as reflected in the article. While some of the risks are managed by autonomous measures, others need to be covered by institutional instruments. Institutional measures are widely implemented in Japan, contributing to management of risks and supporting development in agricultural sector. One of the prominent institutional supports in Japan is the Agricultural Insurance Scheme known as NOSAI insurance. NOSAI stands for Nogyo Kyosai Seido (Agricultural Insurance Scheme). The Japanese Government has established NOSAI in order to support farmers suffering from damage caused by natural disasters and whilst contributing to the growth of Japanese agriculture [MAFF, 2016]. One critical concern in Japanese society is the decreasing population, which might cause a decline in the agriculture industry. Farmers are increasingly abandoning their farmlands; resulting in farming declining in rural areas. This trend is seen as a threat to the food security to the country. Owing to this, demand for institutional support including insurance is growing not only for farmers but also for the society. Another concern in Japanese society is that natural disasters are causing debilitating impacts on agriculture sector; this is motivating farmers to take risk reduction measures. Keeping in view the importance of agricultural insurance in Japan, this paper reviews the history of agriculture insurance in Japan and presents the findings of stakeholder surveys conducted as a part of the APN project on risk insurance.

4.2. Agricultural Insurance in Japan

Risk management in agricultural sector

Agricultural development in Japan is characterized by the vertical development through diversification of crops and crop varieties rather than the horizontal diversification that would have utilized more resources (Yagi, 2000). Farmers take measures to minimize losses and damages associated with weather changes based on the accumulated experience and knowledge. Introduction of new techniques including pesticides, soil management, and machinery has helped farmers to reduce risks associated with farming (Hasebe, 1999). The adoption and efficacy of these measures vary from farmer to farmer depending on their competency and local feasibility. Ohe et.al (1993) revealed that wheat farmers in Hokkaido who have better conditions for wheat production are more risk avert, and hence they made more efforts to introduce multiple crop varieties as a means of reducing the risk of crop loss. Interestingly, farmers who planted multiple varieties with a combination of beans and rice preferred high-risk wheat species. This may imply that, even though farmers introduce a wheat variety which has higher risk among other species, risk of other crops are mitigated by introducing the wheat species. Therefore, the overall risk mitigation in a farming unit is optimized. In addition, this is presumably because of the high potential of income premiums in market that the high-risk variety offers (Ohe et al., 1993; Koito, 2003). The risk avoidance is also featured by characteristics of the farmer. For example, the study by Kim (2013) showed that older farmers have higher risk avoidance, which reflects preference over lower-risk varieties or crops.

The relatively small landholding size and limited land available for cultivation, when compared to the other developed countries are known to hinder the horizontal diversification in Japan (Yagi, 2000). Despite these limitations, agriculture in Japan has experienced a transformation because of the harmonization of rural and urban societies over the years, leading to the emergence of incorporate farming in the country (Saito, 2000) which caught the pace of the rapid economic growth during 1970s to 1980s. During this period, the agricultural sector has seen encouragement of further vertical diversification which helped various risk management options evolve in the country (Yokoyama, 2014) (See Table 12).

Table 12. Risk management measures in the agricultural sector of Japan

Risk types	Measures		
	Risk control	Risk finance	Measures provided by the government
1. Price risk: Uncertainty associated with price fluctuations	Selection of varieties with stable demand in the market, farm diversification, diversification of sales timing, diversification of sales channel and contract farming	Cash reserves	Policies for price stabilization and tariffs
2. Production risk: Risk of decreasing or fluctuation in production associated with weather, diseases and insects	Introducing risk mitigation technologies such as resistant and tolerant varieties, diversification of farm management, diversification of farm location, and adoption of appropriate management measures	Climate derivatives and cash reserves	Insurance products offered by NOSAI, financial aid by Act to Finance Sufferers of Natural Calamities, disaster reconstruction, financial aid by the Law Concerning Special Fiscal Aid for Coping with Disaster and tax relief measures
3. Human risk: Risk of injury to the employed labor	Improvement in working condition and environment e.g. Safety devices for machinery operation	Insurance (e.g. liability insurance, life insurance, and workers' accident insurance)	Public insurance

Risk types	Measures		
	Risk control	Risk finance	Measures provided by the government
4. Financial risk: Risk of debt and rise in interest rates	Maintaining and assuring credibility	Securing financial liquidity and securing financial plans	General public aid, subsidy, and support
5. Institutional risk: Risk associated with the law and regulations	Information collection for competency to make appropriate management decisions	Cash reserves	General public aid, subsidy, and support
6. Liability risk: Risk of residual pesticides, foreign objects in products, and associated damage claims	Quality management	Cash reserves	General public aid, subsidy, and support

Source: Authors based on (Yokoyama, 2014)

For addressing the climate related risks, the practice of weather forecasting has been highly accepted in agricultural planning in Japan. However, technical issues remain to be addressed which include the accuracy of timing, scale and frequency of rainfall events. In addition, the climate uncertainties are yet to be fully understood as the compounding climate change factors influence weather patterns.

Industrialization and associated modernization combined with improvements in efficiency and labour conditions and the need for additional income has led to farmers diversifying their livelihoods (Hasebe, 1999). As a result, farmers have transformed their emphasis from farming to other off-farm jobs, with some having dual or even multiple occupations. This shift has left agriculture more vulnerable against climatic risks as few and few farmers engage and depend on farming as their primary livelihood. For climate risk reduction, there is a need to introduce measures that directly connect with the revenue of the farmers and financial risk management instruments such as insurances. These emerging needs called for the introduction of agricultural insurance in the country and NOSAI has been instrumental in fulfilling this need. NOSAI is a financial compensation for loss and damage caused by natural hazards. The design is based on statistical data and individual financial information including actual revenue.

Agricultural insurance development

Agricultural insurance in Japan has roots in the Agricultural Disaster Compensation Act (農業災害補償法), which was ratified in 1947, that aimed to achieve food security in the country and assist in stabilizing rural areas that were recovering from the World War II. The act was in particular cognizant of the small-scale farmers in rural area who were not able to allocate sufficient resources for risk management. The Act configured NOSAI as a countermeasure for financial loss with the support of the government so that farmers could recover from natural disasters. The role of NOSAI in reducing production risks and stabilizing farmer's income has been regarded as an important development in the agricultural sector (Shigeno, 1986; Iizumi, 2005; Yoshii, 2014]. NOSAI is administered by the Agricultural Mutual Relief (AMR) Associations or municipal governments providing agricultural insurance. AMRs provided three types of insurance products in the beginning 1) insurance for paddy rice, upland rice, and wheat, 2) sericulture insurance, and 3) livestock insurance. With the increasing demand for insurance for other crops, NOSAI introduced additional insurance products including fruit and fruit-tree insurance, field crop and sericulture insurance, and greenhouse insurance. NOSAI also offers optional insurance for housing and machinery, which is available for subscription by NOSAI farmers (Table 13) (Hongo, 1995).

Table 13. Details of NOSAI insurance products

Product	Subject item	Coverage
Rice, wheat and barley insurance	Paddy rice, upland rice, wheat	nationwide program
Livestock insurance	Milk cow, calf for milk cow, fattening cow and bull, calf for fattening cow and bull, breeding cow and bull, fattening horse, breeding horse, fattening pig, breeding pig	nationwide program
Fruit and fruit-tree insurance	Citrus fruits, apple, grape, pear, peach, loquat, persimmon, chestnut, plum, kiwi fruit, pineapple	optional program
Field crop and sericulture insurance	Potato, soybeans, adzuki bean, beans, sugar beet, sugar cane, tea, buck wheat, maize, onion, pumpkin, hop, silkworms and cocoons	optional program
Greenhouse insurance	Greenhouse made of plastic and glass, rain shielding devices, greenhouse nets, horticultural facility, heating system, and crops cultivated in the facility	optional program
Farmers' house insurance	House, adjacent construction, and installed equipment owned by NOSAI farmers	optional program
Agricultural machinery insurance	Machines worth more than 50,000 JPY	optional program

Source: (National Agricultural Insurance Association, 2016)

During the early years of the insurance policy, only those farmers who cultivated a certain area of land were entitled to enter into the insurance program. Subsequently these conditions were relaxed to accommodate the diversifying farming sector. NOSAI insurance covers perils such as wind, flood, drought, cold, snow, and others perils including earthquakes, volcanic eruption, fire, diseases, harmful insects, and damages caused by wild animals [MAFF, 2016]. Compared with other insurance products, the net price of NOSAI insurance can be higher because of the high risk and multiple perils that the agricultural insurance covers. In principle, much of the financial risk is ultimately transferred to the government since 50% of the premium price has been subsidized by the government [MAFF, 2016].

Rice, wheat and barley insurance adopted a progressive rate of premium fee system to avoid rising premium fees in high-risk areas, with the premium fee for these areas is subsidized by the government at a higher rate. After reforming of Agricultural Disaster Compensation Act in 1971, the subsidy rate decreased to reduce the financial burden on the national treasury. The progress rate system has not been applied for the rice insurance since 1995 and the current subsidy rate is fixed at 50%. Such a change in rating system clearly indicates increasing fiscal burden on the government imposed by the subsidies. Since the implementation of Agricultural Disaster Compensation Act in 1947, changing social and economic situations have influenced farmers, leading to diversified farming. As a result, the NOSAI insurance hardly fulfilled farmer's needs, which grew dissatisfaction among farmers. Responding to the growing dissatisfaction, NOSAI reformed its own body by introducing additional insured crops, new mutual aids products, differentiated premiums, relaxed the requirement of voluntary subscribers, repealed progressive government subsidies, and enhanced the cost efficiency (Fukuda, 2005). While NOSAI is a semi-public insurance subsidized by the government, its initial characteristic as a mutual aid association was subsequently lost as the agriculture sector in the country evolved with the industrialization and modernization (Fukuda, 2005).

Agricultural insurance in Japan is seen as a means of stabilizing farmers' income. It is to be noted that the farmers' income can be prone to fluctuations by both the changes in weather and related crop loss and changes in price of the farm produce. Hence, policies in agriculture sector would have to deal with income fluctuations emerging from the changes in crop yield and price fluctuations. Dealing with the income fluctuations became even more complicated as farming communities in Japan are increasingly relegated to the aged members of the society. Some 40% of farmers in Japan have an age of 65 years and above [MAFF, 2015]. Over the years, the number of elderly farmers are on the rise and fewer younger farmers are entering into farming (Ookuma, 2011; Yokoyama, 2014). As a result of this, individual farming units are shrinking in size and decreasing in their number while the

remaining farmers have continued to engage in farming (MAFF, 2016) by leasing land to other farmers [Furuta Hattori, 2016], entrusting agricultural activities and work sharing (Kim, 1999; Uemura, 2016). The “Income Security Program for Farmers (農業者戸別所得補償制度)”, introduced in 2009, became one of the important laws pertaining to supplementing financial losses caused by market fluctuations. The program set minimum size of farmland to open possibilities for corporate farming. The program was subsequently abolished in 2013 with the change of government to Liberal Democratic Party (MAFF, 2016). “The Program for Stabilization of Management Income” was introduced to provide compensation for income deficit. The compensation amount is calculated by using quantity-and-quality of the produce and the area of production. There are both positive and negative arguments for introducing the income compensation insurance to farmers in Japan that are presented in the Table 14 and the approach is still under discussion among the policy community in Japan.

Table 14. Positive and negative arguments for the income-compensation insurance policy

Positive arguments	Reference	Negative arguments	Reference
Income-based criteria can evaluate high-quality and high-price products regardless of the amount of harvest. Total insurance value offsets price differences among crops, so that insurance payment can be reduced. As for insurance policyholder, unifying different insurance based on agricultural products can decrease total premium to be paid.	[Yoshii, 2014]	Income-compensation insurance increases workload of damage evaluation for both insurance company and policyholders. No insurance can fulfil everyone’s need. Thus, insurance company should narrow down the objective to some extent.	[Yoshii, 2014]
Due to the requirement of Income – compensation insurance, farmers are motivated to extend their farm unit scale and organize community farming: individual unit 4 ha, community farming 20 ha	(Iwamoto, 2013)	Decrease in rice price can result in significant amount of compensation. The government needs to prepare for the financial risk.	(Kim, 2013)
Income-compensation insurance can benefit medium-scale farmers the most.	(Sumimoto and Kusakari, 2013)	Based on achievements in past years, it is difficult to predict normalized compensation level.	(Fujino, 2011)
Income-compensation insurance gives impetus to liberalization of rice market as a part of policy of reducing the production of rice.	(Kim, 2013)	The reason why farmers are not entitled is to make and sell products by their own will without any production target.	(Wang, 2012)
Income-compensation insurance can offset annual income fluctuation.	(Yoshii, 2002)		
It can contribute to financial stabilization of farmers.	(Wang, 2012)		

Effectiveness of agriculture insurance

Agricultural insurance in Japan is considered effective compared to agriculture insurance in many other countries (Table 15) as indicated by the least producer loss ratio and relatively smaller Hazell ratio during the earlier years of the insurance with lower administrative costs. The Table 16 provides the compensation rate for various insurance products offered in by NOSAI. Discussion on agricultural insurance effectiveness in Japan is not complete without a discussion on premium subsidies. Often, disaster insurance in Japan is designed on no-loss and no-profit basis since the expected damages are large especially in the case of earthquake insurance. When the Great East Japan Earthquake occurred in 2011, the government compensated earthquake insurance by utilizing the statutory reserves in the special account. Similarly, a significant insurance payout of 440 billion JPY had to be made when an

extreme cold weather event occurred in 1993 (Yokoyama, 2014). In such an eventuality, the ministry of finance will increase the proportion of the statutory reserves to be allotted (Kougami, 2013). In the case of NOSAI, Agricultural Mutual Relief as administration body is prescribed under “the Agricultural Disaster Compensation Law (ADCL)” (Law No.185 of 1947). Based on the ADCL, unlike earthquake insurance, NOSAI is allowed to manage and invest the collected premium for the purpose of stabilizing the livelihoods of farmers. Individual premium price is determined by a combination of probability rate and optional information including statistics in an objective area and farmer’s information. The premium price is partly subsidized by the government depending on the statutory ratio that is stipulated in ADCL. Historically, revisions of the ratio have been influenced by agricultural production trends (Hirose, 2000); the revision in 1993 included the change of the ratio for rice insurance from progressive rating system to 50% of flat rating system. Regarding the progressive rating system, farmers in high vulnerable area could get more benefit from subsidy than low vulnerable area (Shigeno, 1986). Expanding paddy rice in high-risk areas led to a heavy burden on national finance. (Hongo, 1995; Hongo and Shiga, 1996). Approximately 40~55% of total cost is financially supported by the government depending on the mutual aid premium rate which is redefined every 3 years based on hazard occurrence and risk rate. Nevertheless, compared to other insurance products, rice farming has been significantly protected by the government.

Table 15. Insurance performance in Japan: Indemnity/producer premium ratio (I/P)

Country	Period	I/P Ratio
Brazil	1975-81	4.29
Costa Rica	1970-89	2.26
India	1985-89	5.11
Japan	1947-77	1.48
	1985-89	0.99
Mexico	1980-89	3.18
Philippines	1981-89	3.94
USA	1980-89	1.87

Source: (FAO, 2011)

Table 16. NOSAI insurance and its compensation rate

Insurance	Category	Compensation rate
Rice, wheat and barley insurance	Paddy rice	50%
	Wheat	50% or 55%
Livestock insurance	Cattle	50%
	Pig	60%
Field crop and sericulture insurance	Potato, soybeans, buckwheat	55%
	Sericulture	50%
Fruit and fruit-tree insurance	-	50%

Source: (National Agricultural Insurance Association, 2016)

NOSAI is a compulsory insurance for paddy farmers who own a 20-40 a (0.2-0.4 ha) of land (30-100 a (0.3-1 ha) in Hokkaido). NOSAI policy holders can designate insurance coverage ratio from several configured options. However, there are no full-cover options provided in the current insurance product portfolio offered by NOSAI. The coverage ratio acts as a triggering point for insurance payout. If the maximum insurance coverage is 70% of losses, the insurance is paid once damages reach a loss of 30% of the total income (Table 17). There are two ways to initiate the payment procedure. The insurance can be paid once the area is designated as serious disaster areas in accordance with the regional serious disaster designation standards (激甚災害法) or if farmers submit damage report requesting NOSAI to conduct survey for damage appraisal, which is assessed by multiple institutions by using approved surveys.

Table 17. NOSAI insurance design parameters for paddy rice

Basis	Reference	Insured percentage (Max.)	Loss percentage triggering insurance
Farm land	Yield from the field	70%	30%
Farmers unit	Yield from the damaged field	80%	20%
Farmers unit	Total yield	90%	10%

Source: (NOSAI, 2016)

Rice, wheat and barley insurance and the livestock insurance are compulsory insurances that are prescribed in the ADCL. However, governors or each prefecture are allowed to modify the qualification of insurance subscriber based on own agricultural condition and determine exceptional cases (Law No.185 of 1947, Article 16). For other products, some insurance products have been introduced as an optional insurance, whilst other qualifications have been relaxed (Hongo, 1995). The mixed structure with compulsory and optional insurance illustrates that NOSAI is continuously improving its insurance design. The current discussions over the design of NOSAI insurance regarding target setting concludes that there is no universal NOSAI insurance to be accepted comprehensively [Yoshii, A Preliminary Study of the Whole-farm Revenue Insurance Scheme in Japan, 2014; Hongo and Shiga, 1996]. Therefore, the design of insurance should be modified continuously with respect to changing society, without missing the original purpose as mutual aid.

The review of literature indicated a mixed response to NOSAI insurance in Japan (Table 18). Even though there are conventional ways of risk reduction, there are farmers who are in favour of insurance. In general, cheaper premiums were preferred under any condition and variable premium rates made insurance an unpopular option among farmers (Iizumi, 2005). Farmers who cultivated multiple crops have a strong preference for NOSAI insurance (Iizumi, 2005). Since agriculture is the main business in rural areas, the contribution of NOSAI made an impetus in recovering from natural disasters (Hasebe, 1999) and in stabilizing rural economy and production (Shigeno, 1986). The relatively better performance of NOSAI among farmers appears to be its mutual-aid principles and its management structure. In order to work with local farmers, NOSAI employs a coordinator or so-called *NOSAI Bu-Chou* who is designated from local NOSAI union members. The activities of coordinator include promoting the insurance among the farmers, collecting the premium, and reporting damages. The presence of the coordinator made large difference in the performance of the NOSAI leading to a sustainable financial support for agricultural sector (Fukuda, 2005).

Table 18. Studies about NOSAI insurance

Positive opinions	Reference	Negative opinions	Reference
(Insurance company perspective) NOSAI is a compulsory insurance, increasing number of policyholders make risks dispersed and contributes to reduce adverse selection.	(Shigeno, 1986)	(Insurance company perspective) Insurance should be designed, with prioritizing risks, in accordance with situation surrounding farmers.	(Hongo & Shiga, 1996)
Individual farmers cannot fully deal with disasters and insurance support as a public service is required. NOSAI plays an important role in agricultural sector.	(Hasebe, 1999)	NOSAI causes a moral hazard problem due to inconsistency of premium and expected value, together with a decline in the quality of the agricultural labour.	(Iizumi, 2005)
NOSAI with Agricultural Disaster Compensation Act can contribute to stable agricultural sector in Japan which is prone to natural disasters.	MAFF, 2012	Under the current drastic changes in agricultural politics, NOSAI provides other public services in addition to agricultural insurance.	MAFF, 2012
Effectiveness in operational cost is realized in area where segmented NOSAI unions are unified and the efficiency of management of unions is improved.	(Yoshii, 1992)	Reduction in the number of employed personnel in AMRs does not lead to improvement of the service's effectiveness	(Yoshii, 1992)

Source: Authors

4.3. Methodology

The results presented in the paper are based on a survey of stakeholders engaged in agriculture insurance sector in Japan. Interviews were conducted in Tokyo with NOSAI staff and Sompō Japan. Focus discussions were conducted with farmers in Aomori city in Aomori prefecture and Kesennuma city in Miyagi prefecture in Tohoku region of North-eastern Japan. Interviews were also conducted with the prefectural government staff in Okinawa, NOSAI staff, and a group discussion with 12 farmers in Irabu island. Questionnaire surveys were conducted with paddy rice farmers in 6 prefectures (Oita, Saga, Fukui, Hokkaido, Aomori and Okinawa facilitated with the help of NOSAI staff. A total of 38 farmers returned their questionnaires. In addition, one questionnaire was obtained from the prefectural government, 16 NOSAI staff and one private insurance company. Questionnaires consisted of 35 multiple choice and open-ended questions to ascertain the performance of the agriculture insurance in the selected prefectures of Japan. The questionnaire in Japanese was developed in consultation with the NOSAI staff to reflect the elements applicable for the agriculture insurance in Japan. The selection of prefectures was based on the willingness of farmers to participate in the survey following initial consultations with NOSAI. The interviews and questionnaire surveys described in this study took place over the period during 2013-2016. While the interviews with farmers in Aomori and Kesennuma helped in understanding various risks faced by farmers in Japan, the questionnaire survey conducted in six prefectures and discussions in Okinawa helped to get structured feedback on the performance of the agriculture insurance in Japan.

Individual farmer interviews were conducted with farmers in Aomori city (farmers A and B in Figure 9), which consisted of large plain in north and mountainous areas in south and east. These farmers were cultivating primarily paddy rice with a combination of other agricultural crops. Farmers (farmer C and agricultural cooperative F) in Kesennuma city were farming in the area along the coast of Kesennuma-city. The area along the coastline was severely damaged from the Tsunami in 2011. Because of tsunami, the soil in the study area needed years to desalinate, with new soil being brought in from unaffected areas. Other farmers (farmer D and E) in Kesennuma-city were farming in mountainous areas where the geographical conditions are favourable for paddy rice farming.

4.4. Results and Discussion

Risks faced by farmers

The interviews conducted identified various production and market risks faced by farmers in Japan (Table 19), with weather associated risks appearing prominently. The extreme high and low temperatures and variability in temperature are reported to be causing negative impact on the quality of paddy. Low temperatures from early spring to summer has been regarded as a production risk of paddy rice farming in Japan (Bokura and Yamashita, 1983; Hasebe, 1991; Takahashi, 2004; Sendai Regional Headquarters, 2011). This is attributed to underdevelopment of ripening caused by low temperatures. Continuous constant high day and night temperatures during May to September increases disease and insect risk or poor quality (Sendai Regional Headquarters, 2011; Hakodate Marine Observatory, 2015). Farmers took various countermeasures against these risks in order to obtain stable yields.

Aomori and Miyagi prefectures are frequently threatened by cold wind blowing from Pacific Ocean especially during May to September [Bokura and Yamashita, 1983]. This cold wind *Yamase* has been historically considered as the most serious production risk for rice farmers and consumers in other regions of Japan as well (Jyumonji and Uchiyama, 1989). Cold weather exacerbates the rice blast (*Pyricularia oryzae Cavara*). High day and night temperatures are known to affect nutrient distribution in grains and will enhance rice bugs infestation (*Stenotus rubrovittatus*, *Trigonotylus caelestialium*, *Stenodema calcarata*). According to Miyagi prefecture, the occurrence of rice bugs has been increasing since 2008 (Miyagi Prefectural Government, 2014) and are negatively affecting the quality and price of rice (Takahashi, Analysis and Assignment of 2003 Cool Weather Damage on Rice Plant in Iwate Prefecture, 2004). The impacts of heat on paddy rice were originally reported

from Western Japan. However, detrimental impacts of high temperature have also been reported from Northern Japan more recently (Shiratsuchi et al., 2012; Matsunami et al., 2016).

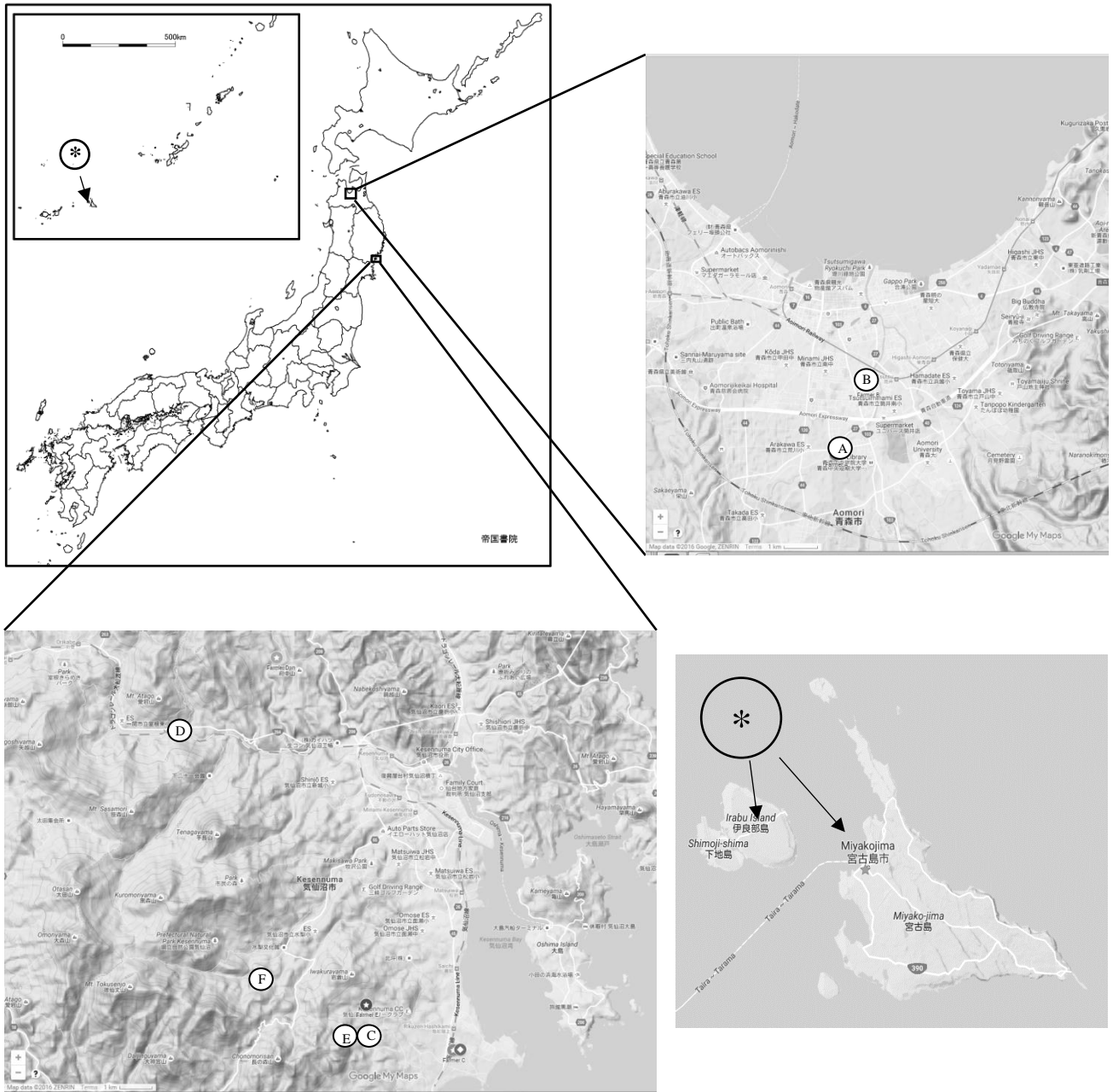


Figure 9. Map of the study sites

Top left is a map of Japan with prefectural boundary. Top right is Aomori city area in Aomori prefecture, bottom left is Kesenuma city area in Miyagi prefecture and bottom right is Irabu island. Sources: Google Maps, Okinawa Japan, 2014 and Wikipedia, 2017.

Table 19. Production and market risks faced by farmers in Aomori and Kesennuma in Japan

Farmers	Products	Market	Production risks	Measures against production risks	Market risks	Measures against market risks
Aomori farmer A	Paddy rice, cherry	Self-marketing	- Insects - Diseases - Weather (temperature, precipitation, typhoon), - Water shortage	- Irrigation - Pesticide management - Manure management	Decreasing rice consumption/demand,	- Disclosure of product information - Marketing by farmer using internet
Aomori farmer B	Paddy rice, grape, flower	Self-marketing	- Insects - Diseases - Weather (temperature, precipitation, typhoon), - Water shortage	- Irrigation - Pesticide management - Manure management	Decreasing rice consumption/demand, Harmful rumors, misinformation	Disclosure of product information - Marketing by farmer using internet
Kesennuma farmer C	Strawberry	JA market including selling at local JA store	- Weather (temperature, typhoon) - Expenditure (energy price)	- Heating/ Cooling system equipped with greenhouse - Enhance energy efficiency by introducing innovative technology	Price fluctuation due to seasonal vogue	Planning and managing the farming schedule
Kesennuma farmer D	Paddy rice, vegetable	Self-marketing	- Weather (temperature, typhoon) - Wild animals	- Irrigation - Pesticide management - Manure management	Decreasing rice consumption/demand, harmful rumors	- Disclosure of product information - Marketing by farmer based on personal connections.
Kesennuma farmer E	Paddy rice, vegetable	Self-marketing	- Weather (temperature, typhoon) - Wild animals	- Irrigation - Pesticide management - Manure management - Fence construction - Landscape management	Decreasing rice consumption/demand	- Marketing by farmer based on personal connections.
Farmers association F	Paddy rice, soybeans	JA	- Weather (temperature, typhoon)	- Irrigation - Pesticide management - Manure management	Decreasing rice consumption/demand	- Utilizing JA market

Source: Authors from interviews

Typhoon is another production risk that affects yield and quality. Historically, typhoons are a major cause of concern in the Southern Japan. However, risks associated with typhoon including heavy rainfall and strong winds have been on the rise in the study areas, illustrated by floods and landslides in Miyagi prefecture (Cabinet Office, Government of Japan, 2015). Agriculture including paddy rice was severely damaged to the tune of 1,555 million JPY by recent typhoons (Miyagi Prefecture, 2016). Tsunami is not a regular risk as listed in the

Table 19 and the Tsunami 2011 was one of the most devastating natural disasters during recent years. The coastal area in Miyagi prefecture was devastated by Tsunami in 2011. Financial aids including NOSAI insurance was delivered more quickly than usual. Financial aids including loans and subsidies were offered to re-initiate agriculture in the area.

Managing risks

Farmers employ various means for managing the risks discussed in the previous section. The Table 20 provides a discussion on whether or not the NOSAI insurance covers all the risks faced by farmers. The indicate that the farmers in Japan face variety of risks which they manage by risk control and risk finance (Yokoyama, 2014). For risk control, famers need to acquire information in advance and take measures against losses before they occur and the agriculture information provided by MAFF through local governments play a crucial role in the same. The information includes weather trends, associated forecasts and precautionary measures to be followed. JA and NOSAI offices also disseminate informative knowledge but only to their members. In the JA case, the information is provided as supportive material for selling agriculture products through JA. From the survey, it was evident that the information provided to farmers is often generic in nature and most farmers needed location-specific information with detailed technical knowledge. As a result, young farmers are developing their own communication networks within and beyond their local areas as a result of which they are able to share information about subsidies in different prefectures.

Even though agricultural policies are set at national level, their implementation at prefectural level depends on the prefectural leadership leaving possibility for policy gaps at the local level. Information networks formed by farmers are helping them to identify these policy implementation gaps. As a result, famers approach local governments to avail the policy benefits that they otherwise wouldn't be able to access. Forming agricultural cooperatives is helping farmers to sell their produce at relatively higher profit. Ohe et al (1993) reported that large-scale farmers are more likely to adapt new varieties and agricultural practices. The survey indicated that large-scale farmers, represented by cooperatives and associations, are able to diversify their farming so that they can manage risks better (Ohe et al., 1993). Even though farmers sell their produce to JA, they are also selling directly to stores that are helping them to promote their own brand and providing opportunities to get direct feedback from consumers. Individual farmers who do not sell to JA need to develop their own market. Farmer A and B are full-time farmers and sell crops directly to consumers using social networks such as Facebook. Similarly, farmers are adopting measures such as obtaining organic certification that will help their products stand out in the market, selling through direct social contacts, by adopting eco-friendly agronomic practices, and maintaining good relationships with consumers. The study areas in Aomori experienced very few major losses during the recent past and hence the interviewed farmers had not experienced receiving any insurance payout. According NOSAI in Aomori, the percentage of payout in the total premiums collected (payment for insured case/sum of premium fee) stood approximately at 0.1% for the last 5 years (2011-2015) (NOSAI Aomori, 2016). Livelihood diversification and a shifting focus from agriculture to non-agricultural income in specific is helping farmers to reduce their agriculture-related financial risks. According to agricultural census, 66% of farmers were part-time farmers whilst only 33% were full-time farmers (MAFF, 2015). The majority of farmers have multiple income sources, losses occurring in their agricultural businesses may not have a severe impact on their lives and livelihoods.

Performance of agricultural insurance

There has been a steady decline in the number of farmers and the premiums collected under rice and wheat insurance programs in the country over the years (Figure 10) due to decline in number of farmers engaged in farming, a loss among farmers on the initial concept of mutual aid, and a shift from family business to agricultural cooperatives (Watanabe, 2012). This decline in premiums collected and number of farmers has implications for the agriculture insurance in Japan. The main implications are changing farming units and therefore the demand to be fulfilled and implications to income compensation insurance, which considers household income as a basis (Shimizu, 2012).

Table 20. Risks faced by farmers and management options available to them

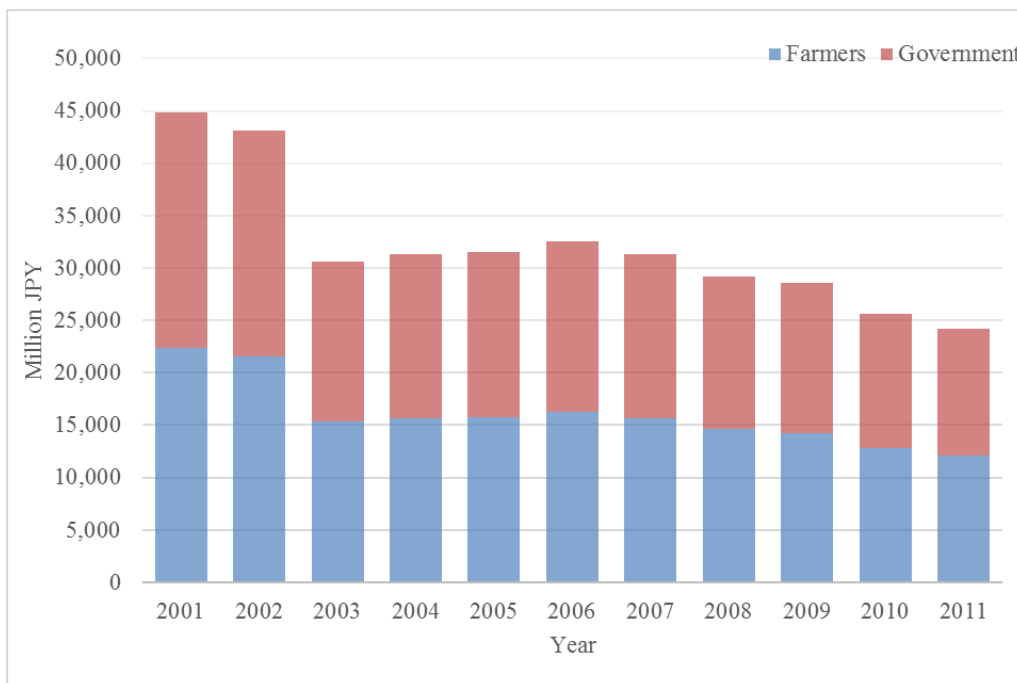
Risk faced by farmers	Management option by farmers	Whether or not covered by insurance	Notes
Insects and diseases	Pesticide management Irrigation management	Covered by NOSAI insurance. The ratio of insurance coverage is based on insurance configuration. Currently, no insurance products covers the total loss.	Farmers manage these risks with pesticides and they determine the amount and timing of pesticide inputs and by maintaining micro-climate through irrigation. JA, prefecture and municipality are helping farmers by providing necessary technical advice.
Weather related risks (temperature, precipitation, typhoon)	Irrigation management Manure management	NOSAI insurance covers the losses caused by weather fluctuations.	Farmers manage the temperature fluctuations through irrigation management. Hot weather is compensated by continuous flowing irrigation water and cold weather is managed by maintaining the depth of water. Nitrogen and silica are effective for grain development.
Expenditure (e.g. energy prices)	Enhance energy efficiency Introducing innovative technologies	There are no insurances against this risk.	Energy related expenditure is an important risk for farmers.
Wild animals	-Landscape management -Fence construction	NOSAI insurance covers losses caused by wild animals.	The damages caused by animals are a serious issue especially in mountainous areas.
Decreasing rice consumption/demand	- Development of own market -Utilizing JA market	Income compensation insurance.	Farmers manage this risk through selling the produce on the internet and personal connections. MAFF has initiated research on income compensation insurance, which aims at losses caused by market risks.
Harmful rumors	Development of own market Disclosure of full information about product	Currently, there are no insurances particularly for this risk.	Harmful rumors are managed together with consumption/demand change. This risk is going to be included into the scheme of income compensation insurance.
Market risk	Crop diversification Development of own market	Income compensation insurance.	Farmers manage this risk by farming multiple crops to provide redundancy.

Source: Authors based on interviews

To assess the performance of the agriculture insurance, structured questionnaire surveys were conducted in six prefectures of Japan and discussions were conducted with various stakeholders in Okinawa prefecture (please refer to the methodology section). All of the returned questionnaires were filled by male respondents who were growing paddy rice, 53% were in the age group of 60-70 years and the rest were between 40-60 years. Most of the respondents were part time farmers (67%) and 47% of respondents owned agriculture land of 4 ha and above and the rest owned between 1-3 ha. 37% of the respondents earned an annual income of more than 10 million JPY and 27% didn't disclose their income. 94% of the respondents reported having received some kind of farm subsidy other than the insurance subsidy and all the respondents have been subscribing to agricultural insurance for several years. 90% felt insurance is necessary for recovering from crop loss (highest among all the study countries) and the rest thought it is a good policy for the government to implement. 57% didn't find any loopholes in the system while 30% felt that the damage assessment was not up to their satisfaction. 57% received the compensation within 3 months of damage assessment whilst others received this even sooner. Payment was timely for 83% and helped them to recover from the disaster. The majority felt that the damage assessment process was 'fair'. 43% felt

that they recovered ‘mostly’ from the disaster with the help of insurance while the rest felt either recovered fully (30%) or didn’t recover at all (10%). On the subsidy issue, most farmers felt the current level of subsidy is sufficient while 37% felt that it should be increased to 70%. None favoured the removal of subsidy.

The interviews with sugarcane farmers provided some useful insights into the cost-benefit ratio for the insurance that they have been subscribing from NOSAI. Sugarcane farmers in Okinawa island received insurance payout due to typhoons during 2011-12 that resulted in one of the lowest sugarcane output since Okinawa’s reversion to Japan in 1971 (Table 21) (Ryukyu Shimpo, 2011). The farmers reported a favourable cost-benefit ratio of subscribing to insurance and the insurance payout more than helped them recover the sum of the premium they paid before triggering of the insurance payout. A focus group discussion conducted with sugarcane farmers in Okinawa helped understand the strengths and weaknesses of sugarcane insurance that these farmers have been subscribing (Table 22). The SWOT analysis indicated a great potential for promoting sugarcane in Japan in general and Okinawa in specific due to the increasing export demand for the sugar produced in Japan (this may have implications for the government, in terms of an increasing need for sugarcane insurance support to farmers). Farmers were of the opinion that the NOSAI has been losing its initial purpose as a mutual aid association. Farmers have thought that the changing socio-economic situation in rural areas and the uncertainty of climate projections are hindering NOSAI insurance from securing farmers income. Partly, this could be because of disaggregation of farming units, diversification of crops for risk management, and livelihood diversification away from agriculture (Sook Kim, 1998). Even though the paddy farming still plays an important role in agricultural policy in Japan (MAFF, 2017; Moriguchi, 2013), the risks posed to other crops are considered to have received less attention in the NOSAI insurance. There is an argument that farmers may grow out of NOSAI system once they establish their own marketing system (Watanabe, 2012). This also implies that the more risk reduction measures could lead to low dependency on NOSAI insurance. As for the sugarcane farmers, there have not been promising investigations to reason why farmers are showing decreasing satisfaction, calling for the need for further research to be conducted.



Source: (MAFF, 2014)

Figure 10. Trend in premiums collected under rice and wheat insurance in Japan

Table 21. Cost-benefit ratio of sugarcane insurance for three farmers in Okinawa prefecture of Japan

Farmer	Location	Premiums paid before triggering of payout (JPY)	Payout received (JPY)	Cost-benefit ratio
Farmer 1	Okinawa mainland	63,000 (sum of 7 years)	83,000	0.76
Farmer 2	Okinawa mainland	700,000 (sum of 10 years)	1,470,000	0.48
Farmer 3	Irabu island	3,000,000 (sum of 20 years)	5,000,000	0.6
Farmer 4	Miyako island	300,000 (sum of 5 years)	350,000	0.86

Source: Authors from interviews

Table 22. SWOT analysis of sugarcane insurance in Okinawa

Strengths	Weaknesses	Opportunities	Threats
Sugarcane is a key crop for Okinawa and its quality is well known	Lack of knowledge about insurance among farmers is a major issue and there has been decrease in the spirit of mutual support and satisfaction of the mutual-aid program largely due to increasing subsistence farmers who are not positive about agriculture.	There has been an increase in export demand for Okinawa sugarcane (e.g., to Hong Kong), the government is determined to promote sugarcane production and there are opportunities for expansion of agricultural insurance utilizing subsidies under Okinawa Special Promotion measures	Decline in farming population and threat to the sugarcane industry from Trans-Pacific Strategic Economic Partnership Agreement (TPP)

Source: Authors from interviews

Issues with the insurance

Voluntary nature of property insurance: Unlike the paddy rice insurance that is compulsory, NOSAI insurance for greenhouse, housing and properties are not compulsory with many farmers in the study area did not subscribing to the property insurance. Without the property insurance, the affected farmers had to pay off the debt themselves even though their agricultural facilities were severely damaged. In the case of strawberry farmers in Kesenuma (farmer C), greenhouses were not entitled to NOSAI insurance before the disaster, so they had to pay off debts on their own. The farmers are increasingly subscribing to agricultural asset insurance after the tsunami. This observation is in line with the earlier observations that farmers often increase their insurance subscription after experiencing a major disaster (Itoh and Tsukui, 1992).

Conditions for insurance coverage: Certain conditions set for enrolling in insurance appears to hinder farmers from availing the crop insurance even though the insurance services are available in their vicinity. NOSA designates certain agricultural products, varieties, and area of the land in order to avoid possible moral hazard. *Koshihikari* is a well know paddy variety for its good taste and most popularly planted variety in Japan (Rice Stable Supply Support Organization, 2014). This variety is regarded as suitable for cultivating only in the central region, while other varieties such as *Akitakomachi*, *Hitomebore* have been recommended to be grown in other regions. Cultivating *Koshihikari* in Northern Japan has been deemed as a production risk due to its sensitiveness to cold. Hence *Koshihikari* farmers are not covered by the paddy insurance being offered by NOSAI even though some paddy farmers in Aomori are successful in cultivating it (For example, Farmer A's attempts have been highly appreciated at various national agricultural fairs since 2013). In spite of such achievements, *Koshihikari* is still not covered by the NOSAI insurance. As a result these farmers are not able to cover their risks through agricultural insurance. It is speculated that more and more farmers will produce *Koshihikari* variety outside of its recommended area and that there is a need for NOSAI to consider these new cases for possible insurance coverage.

Aging farming society and related business continuity risks: Aging farming society is of concern for the agriculture sector in Japan, both from the perspective of food security as well as farmers' ability to address new and emerging risks. After the Tsunami in 2011, only 50% of the strawberry

farmers in the study area resumed their business after the disaster, with the remainder of the farmers having either suspended or stopped agriculture. 40% of farmers in Japan are over 65 years-old (MAFF, 2015) and old farmers accounts for 63% of total famers in Kesenuma (MAFF, 2015). From the interviews, it was concluded that the production risk arising from the disaster threatened the continuity of the agricultural business in the region. To address the issues of aging population, decreasing population and declining agriculture industry, the government implemented the Regional Revitalization Project as a means of helping to maintain agriculture in rural areas. The project supports agriculture associated activities with the maintenance of rural landscape (Prime Minister's Office, 2014), financially supports local or municipality administration offices (Intermediate-and-mountainous-area Direct Payment System: 中山間地域等直接支払制度) and arrange farmlands from dispersed and abandoned farmlands to manageable areas.

Cost of production: Increasing material and energy costs are being considered as important risks by strawberry farmers in Japan. The seedlings of strawberry are raised from the end of August and harvesting begins from late November to July. Strawberries are grown in areas that are not too cold and not too warm and hence maintaining constant temperatures by cooling in summer and warming in winter is essential for greenhouses. Even though the temperature adjustment is manageable by shading in summer, maintaining low temperatures requires heating in winter which adds to the expenditure. JA is helping farmers by providing energy efficient double wall poly construction, providing technical information on insect and disease control and supply of pesticides and other chemicals. However, these services appear to vary, depending on the JA office and the person in charge. Prefectural and municipality agricultural departments provide information that appears to be too general and insufficient for some farmers who require more specific information. Farmers were also of the opinion that the supply of information through government sources is outdated due to the time it takes to reach the farmers. In order to obtain site-specific and up-to-date information, internet-based sources and farmers' networks are utilized by these farmers.

Market risks: Farmers have three channels to market their produce, JA provides main channel through which approximately 60% of farmers sell their products (MAFF, 2009). The profit margin for rice farmers can be lower than other crops since large number of farmers rely on JA by paying commission to sell their produce, thus reducing profit margins (Fujita, 2012). As a result, 26% of farmers are developing own sales channel (MAFF, 2009) that involves direct selling between distributors and producers without JA involvement. However, JA farmers have fewer market risks due to the stability of the JA market. JA has a predominant market whose share of total rice market accounts for 40% (Japanese Agriculture Association, 2016). In addition, JA farmers are eligible to apply for national subsidies for buying machinery, facilities, land management etc. and being a JA farmer is a condition for farmers to avail these services. Self-marketing farmers are more likely be exposed to market risks, which are managed by enhancing cost-efficiency or making products with high-quality (Koito, Economic Analysis of Rice Farming Behavior with Production Risk, 2003). For risk management, it is important to diversify agricultural business and differentiating products from other farmers, for e.g. by direct selling and food processing (Nanseki, 2012). Farmers who participated in the survey sell their produce by fully disclosing information about the product's profile, production process and environmental information so as to keep a clean reputation. Some of the produce acquires organic farming certification with farmers maintaining good communication with customers through personal contacts.

Farmers also face other risks that are often not covered by insurance. For example, some agriculture produce has a peak time to sell in the market; missing that time of the year means missing the premium price for farmers. Strawberries have a peak demand during Christmas season. During 2012 to 2013, the harvesting of strawberries was delayed for a month due to management failure that exposed seedlings to high temperature during summer, resulting in farmers losing 70% of the profit compared to a normal year due to missing marketing their strawberries during the Christmas season.

4.5. Conclusions

The farmers in this survey recognize the importance of risks faced by agriculture and the role of agricultural insurance in mitigating these risks. Farmers are of the opinion that agriculture by its nature is vulnerable to natural vagaries and the farming community has been dealing with the losses through autonomous adaptation over the years; there is a growing recognition that farmers are no longer able to deal with these vagaries without external support. Such assistance can come in the form of delivery of information required to improve agriculture practices, help support networking among farmers that helps them to share the information to use in their day to day decision making. Internet-based information sources are particularly proving helpful as new and innovative agriculture technologies are rapidly emerging and the traditional information channels are not able to provide timely information. There is a growing need for the farmers to provide location-specific information that can be effective to farmers since farming conditions vary in Japan from location to location (due to its varied geographical and agro-climatic features). These differences are significant determinant factors in selection of crop varieties, agronomic practices etc.

As a part of the national agricultural reform, the Farmland Intermediary Management Project is being implemented for farmlands consolidation. This is helping to motivate new players such as corporations, large-scale family farmers, companies to enter into agriculture. (Japan's Economic Revitalization, 2013). Evidence from the surveys conducted indicated that more and more farmers are able to utilize this opportunity to strengthen their agriculture prospects as in the case of Aomori prefecture. On the other hand, farmers in mountainous areas, for example as in the case of Kesennuma, have difficulties in accessing consolidating farmlands due to their geographical conditions which has made it difficult for them to access certain subsidies that were available to farmers in Aomori. Farmers were of the opinion that such inter-regional and intraregional differences are of concern to them, in terms of how agriculture policies including subsidies and insurance are designed and implemented. Farmers recognized that not every farmer is the same as others in terms of socioeconomic conditions and their ability to access and benefit from latest information and government policies.

Overall, the surveys indicated positive opinions about agriculture insurance amongst the farmers involved in this study. Farmers have reported net benefits from crop insurance in questionnaire surveys (paddy). In terms of indemnities received (Sugarcane) the subsidy played a major role in farmers finding the insurance profitable and useful. Insurance helped in recovery from disasters, according to 73% of respondents. No major issues were reported in terms of moral hazard and hence both the insurance company and the farmers prefer indemnity-based insurance (corroborated by the least I/P ratio of insurance in Japan as discussed earlier). The survey also revealed a lack of preference for farmers for changing from indemnity-based insurance to weather index-based insurance. Farmers found that the mutual insurance setup has worked well for the Japanese farmers, in that they have been working for years in perfecting it and they were of the opinion that each farmer should receive the payout in commensuration with the damage incurred by each farmer. It was considered that this may not be possible if a weather index insurance were to be introduced, since the weather index may result in uniform payouts for a group of farmers.

The survey indicated that not all risks are covered by the agricultural insurance and government support programs. Farmers were found to be making efforts to cover the policy gaps as a means to address uncovered risks through their own farm management practices. These approaches provided insight about essential factors to be considered for designing an effective risk management strategy in general and agricultural insurance in specific in the country. Adaptation measures to risks were found to vary between farmers, farming systems, and regions and they needed to be tailored to local conditions and included into decision making processes. However, policy reaction for adaptation measures have been implemented uniformly without taking into account the diversity of agriculture situation and different competencies farmers have. Even if voluntary adaptation measures by farmers are successful to some extent, institutional measures that are implemented across the board without considering the location-specific circumstances could fail. Therefore, it is concluded that the existing

NOSAI insurance needs to consider the autonomous actions by farmers and develop agricultural insurance products that address location-specific agriculture production concerns.

4.6. References

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5. Costs and Benefits of Government-Supported Agricultural Insurance : Case Studies from the Philippines

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Abstract

Investment in agricultural production in the Philippines is a risky venture due to the growing impacts of climatic variability and change. To manage climate-related risks, the Philippines government has introduced the agricultural risk insurance program. This study assessed the costs, benefits and effectiveness of the government agriculture insurance in reducing climatic risks. Results showed that the program is effective in terms of timeliness and insurance payout and has helped farmers to partially recover from agricultural losses and damages as well as reduce financial risks. However, there is a need to employ measures to improve the delivery system and the payout. Benefit-cost analysis showed that crop insurance increases the financial profitability of crop production due to higher NPV and BCR of insured over non-insured farmers.

5.1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2015) confirmed that the warming of the climate system is unequivocal and portends irreversible and dangerous impacts. The same is true in the case of the Philippines since the country is highly vulnerable to the impacts of climate change given its geographic location, population pressures and with limited adaptive capacity. In 2013, the Philippines ranked first among the countries that suffered losses from extreme weather events (Kreft et al. 2014) and the country ranked 4th among the most affected countries in 2014 (Kreft et al. 2015). It is evident that the weather and climate related vagaries severely threaten the agricultural economy, the environment and communities who are dependent on agriculture and natural resources for their livelihoods. Despite the high vulnerability to weather vagaries, the agriculture sector in the country is considered the most neglected in terms of investment and development. About 32 percent of the country's total land area is devoted to agriculture (Philippine Statistic Authority, 2016) and two-thirds of its population is directly or indirectly exposed to the impacts of climate change events (Pagaddu, 2016) making investment in agriculture production a risky business for farmers.

Agricultural risk insurance has been promoted to minimize the adverse impacts of weather and climatic vagaries and increase the resilience of farming communities. Crop insurance is a financial instrument used to manage risks associated with agricultural production due to adverse weather condition and pest and diseases phenomena (Mamhot and Bangsal, 2012). It allows farmers to lessen their financial hurdles due to impacts brought by climate change. Governments in developing countries like the Philippines have increasingly been supporting agricultural crop insurance programs (Mahul and Stutley, 2010). Insurance has the ability to compensate for the financial losses and damages and reduces the associated insecurity arising from weather-related financial losses among farmers. Raju and Chand (2008) indicated that crop insurance is an important mechanism to safeguard against production risks of farmers. Pagaddu (2016) mentioned that crop insurance is an effective risk management and transfer strategy to address the impacts of climate change.

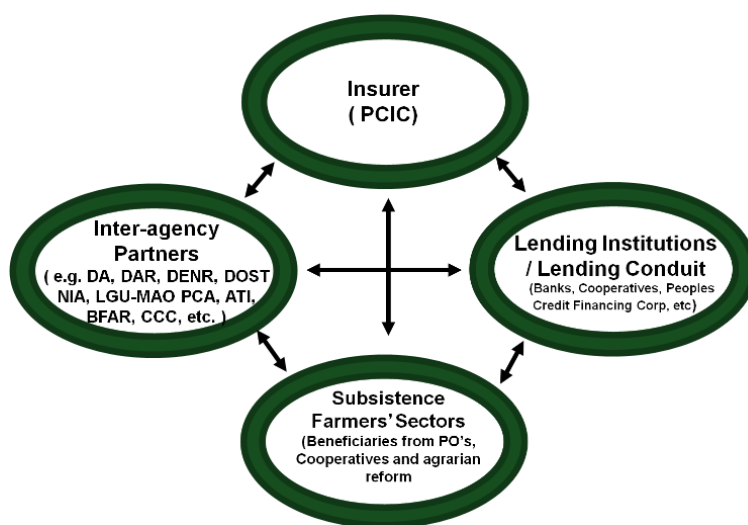
Based on the reported potential of the risk insurance, this research attempted to assess the costs, benefits and effectiveness of the government-supported agricultural insurance in reducing climate risks through case studies of insured rice farmers in the municipalities of Sta. Cruz and Sta. Maria, in the Province of Laguna, Philippines.

5.2. Agricultural Insurance in the Philippines

In the Philippines, the government agricultural insurance program is implemented by the Philippine Crop Insurance Corporation (PCIC). PCIC is an attached agency of the Department of Agriculture (DA) and is mandated to provide insurance protection to the country's agricultural producers particularly the subsistence farmers who depend primarily on farming for their subsistence and till their own land with the help of members of their household. PCIC provides protection to farmers against losses arising from natural calamities such as typhoon, flood events, droughts, earthquake and volcanic eruptions, lightning, plant diseases and pest infestation. Insurance products are being made available for rice and corn crops, livestock, and non-crop agricultural assets including but not limited to machinery, equipment, transport facilities and other related infrastructures.

PCIC is a government owned and controlled corporation (GOCC) created by Presidential Decree (PD) 1467 in June 11, 1978, and amended by PD 1733 in October 21, 1980. Its operation started in May 1981 and was initially focused on palay (rice) crops insurance and later, it covered the corn crop in 1982. Livestock insurance started in 1988, and high valued crop insurance for short-gestating and perennial types of crops was included in 1991. The presidential decree was strengthened by Republic Act (RA) 8175 in December 29, 1995 to include the non-agricultural assets insurance in 1996. In 2005, credit and life term insurance packages were covered by PCIC addressing the vulnerability of farmers and fisher folks against the loss of lives and limbs due to extreme weather events, illness and accidents (Cajucum, 2016). The RA 8550 also known as Philippine Fisheries Code (1998) included the fisheries/aquaculture insurance starting from 2011. This offered fisher folks coverage against losses in unharvested fisheries stocks due to natural calamities or fortuitous events. PCIC also provides insurance coverage for production loans extended by lending institutions to agricultural producers for crops not covered by the insurance.

To effectively implement the insurance program, the PCIC as insurer requires the full support and cooperation of various key players in its community-based agricultural insurance system (Figure 11). These include Landbank of the Philippines, rural banks, cooperative banks, microfinance institutions, local government units, Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), Department of Agrarian Reform (DAR), Department of Finance (DOF), Department of Science and Technology (DOST), Department of Budget and Management (DBM), Philippine Coconut Authority (PCA), Climate Change Commission (CCC), National Economic and Development Authority (NEDA), National Irrigation Administration (NIA), farmers and fisher folks, cooperatives/associations, research institutions, insurers, reinsurers, brokers, international cooperating agencies and non-government organizations.



Source: Authors

Figure 11. Key players in community-based insurance system

The Philippines has been conducting pilot-test of weather index-based crop insurance (WIBCI) in Regions 2 and 6 since 2012 (Cajucum, 2016), wherein the payout is based on agreed index, e.g., rainfall index for rice/corn crop. The farmer's crop is insured against low rainfall (drought) and excessive rainfall during its policy period. The index is subdivided into crop stages and threshold levels are set scientifically. Daily monitoring of rainfall done by PCIC based on the data provided by PAGASA in order to analyse if the rainfall level has reached the set trigger/threshold level upon which immediate payout will be done to the affected farmers without farm inspection and hence being able to provide timely help to farmers and avoiding the bureaucratic delays.

The penetration rate of agricultural insurance for rice and corn crops was on the decline during the 1982-2011 (Mamhot and Bangsal, 2012). In this period, the number of rice and corn insurance enrollees averaged around 50,000 (2%) of the 5.2 million estimated number of smallholder farmers in the Philippines. However, the number of farmers insured for all product lines increased during the period 2010-2015 (Cajucum, 2016). For 35 years (1981-2015) the PCIC agricultural insurance program has served 7,640,360 farmers and with a coverage of PhP (M) 181,940.143 and paid claims to 1,515,8768 farmers amounting to PhP (M) 6,506.307.

Registry System for Basic Sectors in Agriculture (RSBSA) Agriculture Insurance Program: The Registry System for Basic Sectors in Agriculture (RSBSA) - Agricultural Insurance Program (RSBSA-AIP) is an insurance program for all subsistence farmers and fisher folks listed in the RSBSA (PCIC, 2016). Based on the Annual report of PCIC (2014), the national government, through the Department of Agriculture (DA) and the PCIC, had increased social protection for the farmers and fisher folks by providing free full premium. RSBSA was a pioneering attempt by the Department of Budget and Management (DBM), Department of Agriculture (DA) and statistical agencies to come up with a comprehensive list of farmers and fisher folks in the country. Started in 2012, it created a national database of basic information about farmers, farm labours and fisher folks that lists their names and their households. Under the RSBSA insurance program, starting from January 2015, the national government created PhP 1.183 billion in premium subsidy fund, pursuant to FY 2014 General Appropriations Act (GAA) RA 10633. For FY 2015 GAA (RA 10651), the national government allocated PhP 1.3 billion premium subsidy funds to PCIC (PCIC, 2016) which was used for the full (100%) cost of insurance premiums of the subsistence farmers and fisher folks listed in the RSBSA. Farmers and fisher folks eligible for this insurance coverage are those who are not receiving any other subsidy for similar types of insurance from the local government, and have insurable interest on the farm, fish farm, livestock, and agricultural assets. The limit of coverage is not more than seven hectares for rice, corn and high valued crops. The amount of coverage is PhP 20,000 per hectare for rice and corn insurance program for self-financed farmers. For borrowing farmers however, the amount of coverage is equal to the actual amount of loan.

Self-financed farmers and fisher folks can avail this program by filling loan application directly at the PCIC regional office or extension office, office of the municipal agriculturist (OMA) or at any accredited PCIC underwriters. However, group application scheme (either by barangay/irrigators' association/cooperative or farmers' organization) is more preferred. Borrowing farmers and fisher folks may avail of this program by submitting loan application for agricultural and fishery financing to Landbank of the Philippines or People's Credit Financing Corporations or to other lending conduits. Insured farmers should file a notice of loss (NL) within twenty (20) days after occurrence of typhoon/flood/earthquake before the harvest. Filing of NL should be done within 10 days before the expected harvest in the case of drought, plant pest and occurrence of disease for rice and corn crops and high value crops and within two days for fisheries.

5.3. Methodology

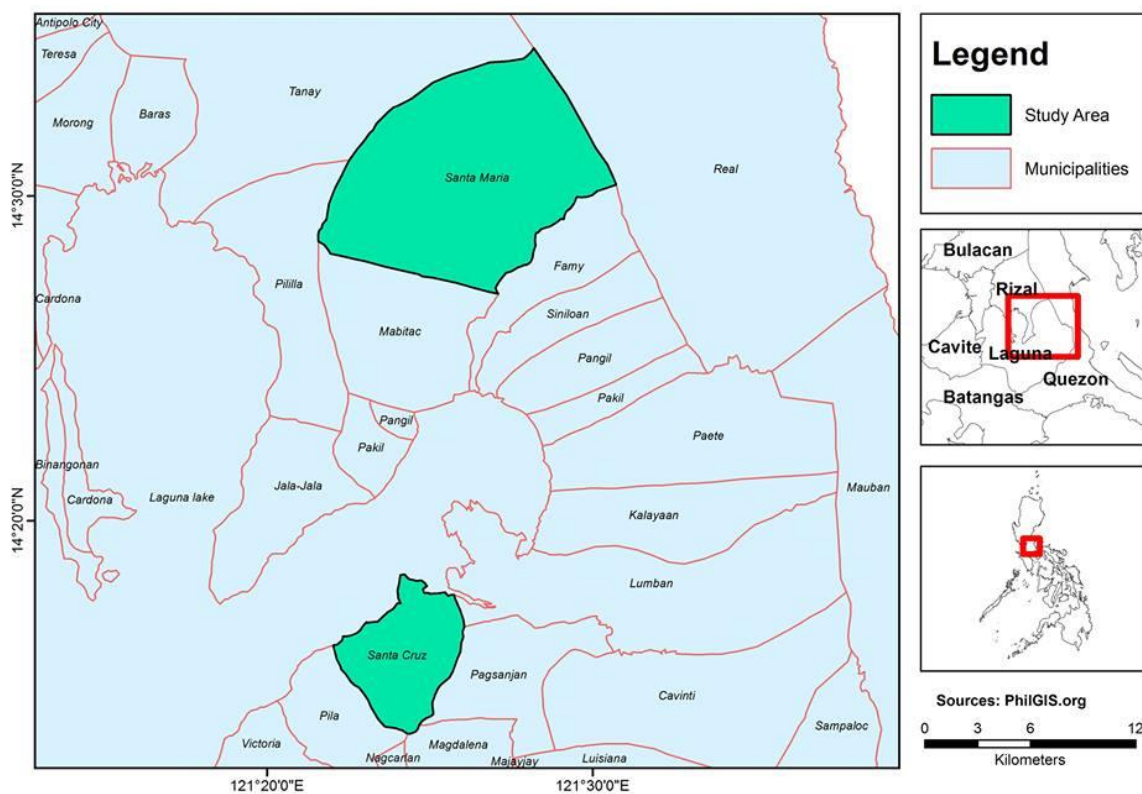
Study location

The study was conducted in the Province of Laguna, Philippines in the form of two case studies of insured rice farmers in the municipalities of Sta. Cruz and Sta. Maria (Figure 12). These municipalities were chosen since they have the largest number of insured rice farmers and are

adjacent to each other. The disaster years in the study locations are September 26-29, 2009 - Typhoon Ondoy (Ketsana), October 2009 Typhoon Pepeng (Parma), August 2012- Southwest Monsoon, October 2013 - Typhoon Santi (Nari), July 2014 - Typhoon Glenda (Rammasun).

Sta. Cruz, Laguna Province: Sta. Cruz is the capital town of the Province of Laguna in the 4th district of Laguna province in Region 1V-A (CALABARZON), Philippines. It is politically subdivided into 26 barangays. It has a total land area of 38.59 km² and with a population of 117,606 (PSA-Population Census 2015). Santa Cruz is located along the shores of Laguna de Bay, the largest lake in the Philippines. The town is flat and low-lying, where the cause of flooding is the rise of lake water during the rainy season and heavy rains brought by storms. Two thirds of the land area- are below 15 meters above mean sea level (GIS Sta. Cruz, 2015). The people are mainly dependent on fishing and agriculture as their main source of livelihoods. Sta. Cruz is known for its abundant coconut and rice crops.

Sta. Maria, Laguna Province: Sta. Maria is located in the Province of Laguna. It is politically subdivided into 25 barangays and has a population of 36,799 (Municipal Disaster Risk Reduction and Management, 2016). Santa Maria is a landlocked town with a combination of flat, rugged, rolling hills and mountainous boundaries. It has a land area of 12,841.5 hectares where 61.3 percent of which has been classified for agricultural use while 34 percent are forest lands. The major industry is rice, feed milling and coffee processing. In addition, the people are mainly dependent on the agriculture industry as their main source of livelihood where rice, coconut, coffee, corn, fruits and vegetables are the major products (Municipal Planning and Development, 2016).



Source: Authors

Figure 12. Location map of the study sites

Research Design and Methods

Data was gathered through a household survey involving 137 insured rice crop farmers and 426 uninsured farmers complemented with focus group discussions (FGDs) and field observations. For the household survey, the number of respondents was computed following the formula given in Equation 1. The survey employed stratified random sampling with proportional allocation in order to determine the sample size per municipality to achieve a representative sample.

Equation No. 1..... $n = \frac{NZ^2pq}{(N-1)(ME)^2 + Z^2pq}$

where: N = is the population size; Z = abscissa of the normal curve that cuts off an area of α at the tails (1.96); p = estimated proportion of units in class that has been agreed on 0.5; q = $(1-p) - 0.5$ and ME is the desired limits of error (in percentage).

Four indicators were used in assessing the level of effectiveness of the government-supported agricultural insurance that is anchored on the principal mandate of the Philippine Crop Insurance Corporation (PCIC) i.e. to provide insurance protection to farmers against losses arising from natural calamities, plant diseases and pest infestation. These indicators are: 1) insured farmers receiving the insurance claims; 2) timeliness of insurance payout; 3) if the amount of insurance payout is commensurate with the losses incurred; and 4) if the insurance payout helped in the recovery of the insured farmers (See Table 23). Indicators and sub-indicators were normalized for aggregation purposes (Equation 2).

Equation No.2 $y = \frac{Max(X_i) - X_i}{Max(X_i) - Min(X_i)}$

Where: y - normalized value, X_i - value of the observation, $Min\{X_i\}$ - minimum value for all observations, and $Max\{X_i\}$ - maximum value for all observations.

Table 23. Effectiveness indicators and their corresponding normalized values

Effectiveness Indicators				
Normalized value	Received insurance claim	Timeliness	Payout commensurate with the incurred losses	Insurance payout helpful in farmers' recovery
0.00-0.25	Not effective	Not effective	Not effective	Not effective
0.26-0.50	Slightly effective	Slightly effective	Slightly effective	Slightly effective
0.51-0.75	Effective	Effective	Effective	Effective
0.76-1.00	Very effective	Very effective	Very effective	Very effective

Source: Authors

The overall effectiveness rating of rice crop insurance was assessed using two approaches for the purposes of comparison. First, the average of the four indicators was obtained using equal weights for each variable. Second, relative weights per variable were assigned based on the researchers' judgement and understanding on the situation in the study area. The normalized values fall within the range of 0.00 to 1.00. The values close to 1 imply that the government-supported crop insurance is very effective and values closer to 0 imply not effective. In addition, benefit cost analysis (BCA) was conducted to compare different scenarios of farmers with insurance and without insurance assuming with and without catastrophic events using 15% discount rate. A third scenario was based on the actual disaster event data. The disaster years in the study locations are 2009 (Typhoon Ondoy and Typhoon Pepeng), 2012, 2013 (Typhoon Santi) and 2014 (Typhoon Glenda). The net present value (NPV) and BCR were used to assess the financial profitability of farmers with insurance and without insurance. The NPV was computed using the Equation 3.

Equation No.3..... $NPV = \sum_{t=0}^T \frac{(B_t - C_t)}{(1+r)^t}$

where: where: B_t = benefit at time t , C_t = cost at time t , r = discount rate, t = time (years) where observation is noted, and T = life span of investment (years).

The BCR was computed as the ratio of discounted stream of benefits and discounted stream of costs over the time horizon considered in the analysis. Below is the formula used to compute BCR.

Equation No.4.....

$$BCR = \sum_{t=0}^T \frac{B_t / (1+r)^t}{C_t / (1+r)^t}$$

5.4. Results and Discussion

Socio-economic profile of respondents

The following discussion presents the results of the survey on the socio-economic profile of rice farmers in Sta. Cruz and Sta. Maria municipalities of Laguna province. The result is based on the 563 survey respondents with 24% insured and 76% uninsured rice farmers. The insured respondents were composed of 65% males 35% females and the uninsured were composed of 72% males and 28% females. Majority of the insured rice farmers were high school graduates (39%), followed by those with elementary education (30%), and college degrees (26%). Among the uninsured rice farmers, majority were educated up to the elementary level (37%) followed by high school (33%) and college (26%).

The family size of the respondents varied across the sample. Majority of both insured and uninsured households had 1-5 household members per family (75% for insured and 80% for uninsured) followed by 6-10 members (23% for insured and 19% for uninsured) and 11-15 members (1.5% for insured and 1.6% for uninsured). In terms of house ownership, majority of insured and uninsured rice farmers owned their houses (90% and 82% respectively). Most of the insured lived in houses made of concrete (47%) while most of the uninsured lived in houses made of a combination of concrete and light materials (44%).

The primary income source of the respondents was rice farming (53% of the insured and 59% of the uninsured), followed by employment in the government and private institutions (13% of the insured and 11% of the uninsured). In addition, 10% of the uninsured and 8 % of the insured also engaged in livestock rearing (e.g. pig, cow, chicken, goat, carabao, horse and ducks), involved in trading or businesses of selling agricultural produce and livestock (4% of the insured and 7% of the uninsured). The products from both municipalities are often traded in Sta. Cruz as it is nearest major commercial center in the eastern part of Laguna province. Other sources of income include furniture making, farm laborers, tricycle drivers and barangay officials. The highest average income comes from those who are employed in government and private institutions (P13,862 for insured and 14,061 for uninsured). The average income from rice farming of both insured and uninsured farmers is PhP 8,352 and PhP 8,644, respectively. Livestock raising provided a low monthly income as they were raised for household consumption.

Vulnerability profile

Results of the focus group discussions (FGDs) in the municipalities of Sta. Maria and Sta. Cruz revealed that both communities observed a change in climate in their locations over the past thirty years which affected their cropping pattern, sowing, planting and harvesting. Harvesting is severely hampered since the harvest period is increasingly coinciding with the wetter periods. The dry period is reported to have shifted from January-April to March-April and the wet season from June-December to August-December combined with intense heat, high intensity rainfall or typhoons. The communities in both sites are vulnerable to weather events such as intense heat, excessive rainfall and typhoons. They suffer from relatively higher damage cost from flooding during the southwest monsoon. Typhoon Ondoy (Tropical storm Ketsana in September 2009) was the strongest storm experienced by both the communities. It caused loss of lives and damages to properties, houses, and livelihood. In August 2012, the low lying communities in both municipalities experienced flooding due to massive rainfall brought by the southwest monsoon (*habagat*). During the FGDs, the participants revealed their vulnerability to the price volatility of farm inputs and farm produce. Increasing occurrences of pests (locusts, army worms, steam borer, corn borer and plant hopper) and diseases (tungro, rice blasts, neck rot, grass stunt, bacterial leaf blight and sheath blight) were also identified as a major risk in agricultural production brought by the changing climate.

Risk reduction strategies

According to Harvey et al (2014) climate change is expected to disproportionately affect smallholder farmers by stressing their livelihoods. The respondents believed that climate change is increasing the agricultural production risks of farmers in the study area. Farmers in both the sites were dependent on irrigation for rice production. With the changing climate, irrigation scheduling is being implemented which is making farmers to wait for their schedule thereby affecting their cropping calendar. Limited irrigation supply is leading to drying of fields during which fertilizer applications couldn't be done. Increase in temperatures, reduction in rainy days and extreme weather events have caused rice and corn production to decline over the years leading to 30-40% decrease in crop yields.

Several CCA strategies have been implemented by farmers. Though the common strategy has been to change the planting calendar, some farmers prefer to use heat resistant rice varieties. However, there is a scarcity for such seeds hindering their adaptation and some farmers have diversified their cropping due to limited irrigation facilities. Respondents are also of the opinion that there is a need to review the listed farmers in RSBSA, increase the payout to fully cover the damages caused by tornadoes, establishment of a farmer field school on agricultural insurance to increase their knowledge and to promote more seed producers for varieties tolerant to submergence, droughts, pests and diseases.

Effectiveness of crop insurance

In the Philippines, the government-supported crop insurance has been designed to mitigate the yield risks associated with adverse climate events such as typhoon, drought, pest and diseases. However, government subsidy for premiums and administrative expenses has been proving costly and the concern is on the financial sustainability and viability of the program (Mamhot and Bangsal, 2012). In the business context, "viability" is defined as the capacity to operate or be sustained (Dictionary.com); or the capacity of success or continuing effectiveness (freedictionary.com). According to Hazell (1992), to ensure the viability of the insurance program, the premium collected must exceed the average payout where average payout is the sum of the administrative costs per insurance contract and indemnities. Mamhot and Bangsal (2012) indicated that government subsidy for premium payments of subsistence farmers is supposed to serve as an incentive to attract enrolment in the insurance program. Thus, insuring the low-income farmers against perils on a financially sound basis is the greatest challenge.

The effectiveness of the government-supported agricultural insurance was assessed using following indicators: a) insured farmers receiving insurance claims/payout; b) timeliness of insurance payout; c) amount of insurance payout commensurate with the losses incurred; and d) insurance payout being helpful in farmer's recovery. Household survey involving 137 insured rice farmers revealed that majority of the farmers (86.6%) have received the payout, 4.4% have not received the payout and 8.8% didn't claim for the insurance. In terms of timeliness of receiving the payout, 37.7% of the respondents received the claims in less than a month and it took two months for 37.2% of the respondents. This indicates that the payout has been made as per the timeframe mentioned in the guidelines of the PCIC which stipulates the payout to be made within 60 days after the claim. When asked if payout was commensurate with the losses incurred, majority of the respondents (83.2%) mentioned that the insurance payout was less than 50% of the damages incurred and only 3% reported that the payout covered 75% of the crop loss. 77% of the respondents indicated that the government-supported insurance payout partially helped them recover from the damages caused by climate related events while 20% reported that the payout has not helped them to recover from the loss. Only 3% indicated that they have fully recovered from the loss due to the insurance payout.

As stated in the methodology, the overall effectiveness of the government supported agricultural insurance was assessed using two approaches. In the first approach, equal weights (25% per indicator) were assigned to all the four indicators while different weights were assigned for every indicator in the second approach. The values assigned were based on the researcher's understanding of the local situation with 50% weight given for the insured farmers receiving insurance claims, 20% for the timeliness of insurance payout, 15% for the amount of payout being commensurate with the losses

and 15 % for the insurance payout helping farmers to recover from damage. Indicators and sub-indicators were normalized for aggregation purposes. The values of both approaches fall within the range of 0.00 to 1.00. The closer the computed value to the upper limit, the higher is the level of effectiveness of the program.

Results revealed that effectiveness of the government-supported crop insurance ranged between 0.06-0.74 using the first approach (i.e. equal weightages) with a mean value of 0.46 which indicated slightly effective (Table 24). Using the second approach, the rating ranged between 0.07-0.89, with a mean value of 0.62, rated as effective (Table 25). The insurance program of the government has helped farmers in reducing the financial risks associated with climate related events. However, there is a need to have corrective measures to improve the program particularly on its delivery system and the payout amount.

Table 24. Effectiveness of agricultural insurance based on set of indicators having equal weights

Effectiveness Indicators						
Category	Normalized value	Received payout	Timeliness	Payout commensurate with losses	Payout helpful in recovery	Overall effectiveness
Not effective	0.00-0.25	0.00	0.08	0.000	0.14	0.06
Slightly effective	0.26-0.50	0.50	0.41	0.33	0.38	0.41
Effective	0.51-0.75	-	0.75	0.67	0.69	0.70
Very effective	0.76-1.00	1.00	0.97	1.00	0.00	0.74
Average		0.89	0.59	0.07	0.30	0.46*

* means slightly effective, please refer to methodology section for the classification. Source: Authors

Table 25. Effectiveness of agricultural insurance based on set of indicators having different weights

Effectiveness Indicators					
	Received payout	Timeliness	Payout commensurate with losses	Payout helpful in recovery	Overall effectiveness
Avg. normalized values	0.89	0.59	0.07	0.30	0.46
Assigned weights	0.5	0.2	0.15	0.15	1.00
Aggregation	0.45	0.12	0.01	0.05	0.62*

* means government-supported agricultural insurance is effective.

Source: Authors

Benefits-cost analysis

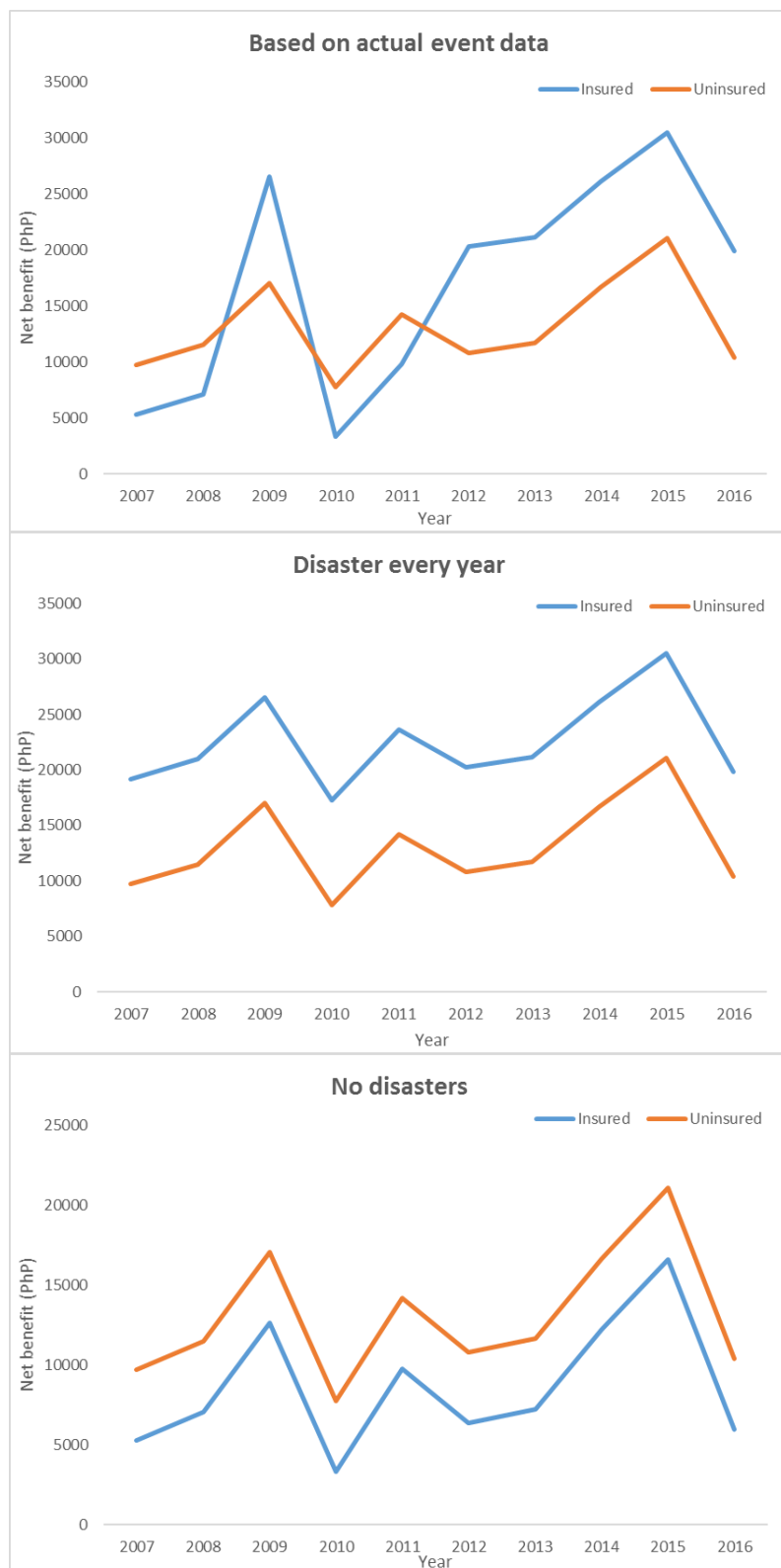
The benefit-cost ratios were computed to compare farmers with insurance and without insurance under the scenarios of with and without catastrophic events. Figure 13 and Table 26 shows the summary of benefit-cost analysis results. The disaster years in the study locations are September 26-29, 2009 - Typhoon Ondoy (Ketsana), October 2009 Typhoon Pepeng (Parma), August 2012-Southwest Monsoon, October 2013 - Typhoon Santi (Nari), July 2014 - Typhoon Glenda (Rammasun). When catastrophic events were assumed to occur every year, the net present value (NPV) for a 10-year period at 15% discount rate was PhP110,375 per ha and PhP62,925 per ha for rice production with and without crop insurance, respectively. The corresponding benefit-cost ratio (BCR) is found to be 1.49 for insured farms and 1.31 for uninsured ones. The results suggest that subscribing to insurance is profitable when the farmers face catastrophic events every year as seen from NPV values higher than zero and BCR greater than 1, which are also higher when compared with farmers without insurance. There is a significant difference between the NPV of insured and uninsured farmers (PhP47,450) and the premium paid in present value terms (PhP22,244) is only about 32% of the payout received (PhP69,694).

Similar trend was observed in the scenario with catastrophic events based on actual data. With catastrophic events occurring at 60% probability (6 out of 10 years), the NPV of insured farms have reduced to PhP72,956 per ha and the BCR to 1.32. These are still higher than uninsured farms with NPV of PhP62,925 per ha and BCR of 1.31. It is still financially attractive to enrol in crop insurance since the premium paid in present value terms is relatively smaller than the payout received by the farmers.

In the scenario without catastrophic events, rice production for both insured and uninsured farmers was profitable but uninsured farmers will obtain relatively higher benefits than insured since the uninsured will not pay for the crop insurance. It is therefore not financially attractive to enrol in crop insurance if no catastrophic events occur in which case farmers will incur additional costs of premium payment for the insurance coverage without receiving payout. However, it may not be possible for the farmers and the government to predict the occurrence of catastrophic events in the climate change scenario due to large uncertainty involved.

5.5. Conclusion

Overall, the Philippine government-supported agricultural insurance can be considered as effective in terms of timeliness and insurance payout and in helping the farmers to partially recover from agricultural losses and damages. It aids in reducing the farmers' financial risks associated with climate-related events in the study locations. In addition, results from the benefit-cost analysis showed that availing of crop insurance increases the financial profitability of rice production since farmers



Source: Authors

Figure 13. Net benefits obtained by insured and uninsured rice farmers in three scenarios

that availing of crop insurance increases the financial profitability of rice production since farmers

with insurance have higher NPV and BCR compared to farmers without insurance. Overall, there is an incentive to avail of crop insurance given that the difference between the NPV of insured and uninsured is significant. Investment in crop insurance is useful when catastrophic climate events are known with certainty. Crop insurance is particularly helpful for those communities which are highly vulnerable to climate change and can help in reducing the associated financial risks. Based on responses given by the survey respondents, it is recommended that corrective measures should be introduced by the government to improve the program particularly on its delivery system and the loss coverage.

Table 26. Summary of benefit-cost analysis results for a 10-year period at 15% discount rate and scenarios of catastrophic events

Scenario	NPV	BCR
With catastrophic events every year		
Insured	110,375	1.49
Uninsured	62,925	1.31
Difference	47,450	
Payout	69,694	
Premium	22,244	
With catastrophic events based on actual data		
Insured	72,956	1.32
Uninsured	62,925	1.31
Difference	10,031	
Payout	32,274	
Premium	22,244	
Without catastrophic events		
Insured	40,681	1.18
Uninsured	62,925	1.31
Difference	-22,244	
Payout	0	
Premium	22,244	

Source: Authors

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6. Costs and Benefits of Flood Insurance for Communities in Malaysia

Arpah Abu-Bakar, S.V.R.K. Prabhakar, Er Ah Choy and Joy J Pereira

Abstract

A case study on household flood insurance was conducted in the Kemaman district of Terengganu state in Malaysia. The objective was to explore the effectiveness of house owner/householder insurance in communities' recovery process from flood impacts. The findings indicate that insurance supports the community in recovering and may have positive impact on the DRR. The results indicated that the flood insurance has significant benefits compared to costs. For every Ringgit spent on insurance, the insured derived almost RM14 in benefits. The study has revealed two main reasons for purchasing house owner/householder insurance such as desire to get insurance payout for losses incurred and the need to meet the housing loan provider's requirement. The results also indicated that the high exposure to risk could motivate the communities to enroll into insurance.

6.1. Introduction

Malaysia has recorded significant economic losses due to natural disasters. Flood disaster is a recurring phenomenon in Malaysia and has been putting increasingly significant strain on the government budget. It is estimated that economic losses due to floods stood at RM60 million per year (Lee and Mohamad, 2013). Flood damage has caused approximately RM2 billion losses in infrastructure and property damages in Kelantan, Terengganu and Pahang in December 2014. The losses interrupted businesses and led to dislocation of communities as their properties were destroyed. In 2011, the government aid to flood victims amounted to more than RM45 million (Khalid and Shafiai, 2015) and about RM800 million were allocated for relief efforts in December 2014. Table 27 shows the government expenditure on relief funds in different states from November 2010 and April 2011. The huge cost in providing disaster relief fund has caused policymakers to consider insurance coverage against flood as a preferred alternative.

Table 27. Government expenditures on relief funds from Nov 2010 to Apr 2011

No	State	Level of Urbanization (%)	Total Distributed (RM)	Victims of Receiving
1	Kelantan	42.4	82,500	165
2	Terengganu	59.1	684,500	1369
3	Perlis	51.4	8,612,000	17,224
4	Kedah	64.6	20,405,000	40,810
5	Johor	71.9	14,201,500	28,358
6	Melaka	86.5	15,000	21
7	Pahang	50.5	229,000	458
8	Sabah	54	325,500	624
9	Negeri Sembilan	66.5	521,000	1042
	Total		45,076,000	90,071

Source: Khalid and Shafiai, 2015; Department of Statistics Malaysia, 2015

Insurance is seen as proactive pre-disaster approach and can lead to DRR. DRR has been described as 'the process of reducing exposure, lessening underlying vulnerabilities, better management of resources and improved preparedness towards future hazards' (Setiyadi et al., 2010). Insurance against natural perils such as floods not only helps to accelerate economic and social recovery after disaster occurrence but also promotes risk mitigation efforts such as avoiding hazard-prone area and investing in better protection measures. The payout received from the insurance company gives households and small businesses with the necessary post-disaster liquidity. In this regard, insurance lessens the burdens from disasters by securing livelihoods and expediting the recovery process.

In view of the advantages associated with the insurance, the National Disaster Management Agency (NADMA), an agency established under the Prime Minister's Department to coordinate disaster management efforts, has prepared a proposal to Cabinet on the establishment of an insurance program to cover losses due to disasters since Malaysia does not have a flood insurance program (Penubuhan NADMA, 2016). Currently, insurance coverage for flood risk is available in the form of house owner/householder insurance policy. However, not all households can benefit due to the underwriting policy imposed by the insurance companies, particularly wooden houses are not insurable under this policy.

6.2. Flood Insurance in Malaysia

Despite the increasing risk exposure due to floods, the market penetration for general insurance in Malaysia is very low which is only 1.7% (Bank Negara Malaysia, 2013). For households, coverage for flood is available in house owner/householder insurance policy as a standard cover and in motor insurance policy with additional premium. Apart from flood, these policies cover losses due to other perils like fire, lightning, hurricane and windstorm. The premium for the house owner/householder insurance is the product of total sum insured with the insurance rate according to category of the building. The rates range from as low as 0.106% to 0.645%. The lowest rate is for Class 1A building which is for houses with brick walls and non-combustible roof.

The house owner/householder insurance covers house structures including roof, fixtures, garages and fences. The householder insurance covers the house contents like household goods and other moveable items. The Allianz Home Shield offered by Allianz provides coverage up to RM20,000 for household contents with an annual premium of RM131.90. This policy also covers the cost of hotel accommodation for household who has to evacuate their home due to covered perils. In December 2013, an insurance policy similar to house owner/householder insurance but provides protection for wooden houses was introduced by Allianz General Insurance. This policy provides coverage for loss or damage caused by fire and lightning to building and/or household contents with a maximum sum insured of RM10,000. Insurance payout for losses due to flood and windstorm is paid as emergency cash fund and is limited to RM1,000.

To the best of authors' knowledge, only households in the district of Kemaman have subscribed to Kampungku policy. The policy is purchased through the village head committee (JKKK) who helps to coordinate premium collection and submission to the Kemaman Parliament Office which in turn is responsible for liaising with the insurance company. The communities pay RM50 towards the annual premium and the balance of the premium is subsidized (actual cost is RM84.20) by the Kemaman Parliament Office. The collection of premium is coordinated by the village head committee (JKKK) in October every year and the annual insurance coverage starts from November.

6.3. Issues for Insurance Uptake

From the individual perspective, insurance contract is a type of hedging technique against personal risks such as loss of property. As a mechanism to protect against financial loss due to personal risks, one would assume that insurance coverage is desirable. However, evidence suggests that people do not purchase insurance despite facing the risk exposure (Kunreuther and Pauly, 2006). For example, many of the property owners in flood prone areas do not have insurance coverage for their property though it is needed for them. Kunreuther (2006) highlights that individuals are not willing to voluntarily take mitigation measures due to the perceived low probability of a disaster occurrence that may cause damage to their homes. In addition, individuals who purchased insurance are more likely to terminate their policies if they have not made a claim a few years after owning the policies (Kunreuther, 1996).

The low interest in purchasing insurance is also due to the individual's risk perception (Aliaga, et al., 2014; 2015; Kunreuther, 1996). Studies on insurance coverage against flood are limited in Malaysia and Aliagha et. al (2014) and Aliagha et. al (2015) investigated factors affecting flood insurance purchase by comparing the insured and uninsured. As flood insurance is not available in Malaysia, it

is assumed that the study focused on house owner/householder insurance which include flood in the standard policy. They found that those households which have high physical exposure/susceptibility are tend to purchase the insurance to cover flood suggesting higher overall effect of perception on vulnerability and insurance uptake (Aliagha, et al, 2015). The important factors influencing the insurance uptake are perception that insurance premium is high, number of high-impact floods experienced, distance from flood-prone river and perception of unreliability of insurance firms to pay insurance claims. Some of the reasons cited for not purchasing the insurance were lack of knowledge about flood insurance, no flood in the area, and not necessary (Aliagha, et al, 2014).

The role of disaster assistance may also influence the decision to voluntarily purchase insurance to cover losses due to disasters (Kunreuther, 2006; Kunreuther, 1996). Researchers have identified a situation called charity hazard, where individuals at risk decided not to purchase insurance because they expect NGOs or a government emergency program to help them in the event of a disaster (Botzen, 2013; Browne and Hoyte, 2002). It was argued that disaster relief is not socially optimal and that private provision may be better off in assisting communities to recover post disaster (Shughart, 2011). The US Department of Housing and Urban Development in its report entitled “Insurance and Other Programs for Financial Assistance to Flood Victims” indicated that a flood insurance program would be a feasible program to replace reliance on government relief fund if the flood insurance program has the following essential elements: “a) accurate estimates of risk, b) compensation to risk bearer, c) the possibility of some level of premium subsidy, if publicly desirable, d) incentives to policyholders to reduce risks, e) incentives to states and local governments for the wise management of flood-prone areas and f) continuous reappraisal” (The National Flood Insurance Program). Lack of these elements in the existing insurance programs are some of the challenges facing many countries. Another problem with the limited progress in insurance uptake is lack of sufficient empirical evidence on its effectiveness to reduce disaster risks. The major limitations to effectiveness measurement methodologies are a lack of a uniform set of indicators to measure insurance outcomes and lack of a clear definition of expected insurance outcomes for DRR (Prabhakar, et al., 2015).

In general, effectiveness is the extent to which stated objectives are met or the policy intended to achieve. The goal can be as outcomes such as improving community wellbeing. In assessing the insurance effectiveness, the important questions are: a) Does ownership of insurance significantly alter the household behaviour in the desired directions in particular increase awareness of flood risk reduction activities? b) Are the perceived benefits of insurances outweigh its perceived costs? and c) Could the resources for disaster relief fund be allocated more efficiently?

With this background in view, the study proposes indicators for valuation of costs and benefits of a flood insurance program in Malaysia. As Malaysia does not have an exclusive national flood insurance program, this study evaluates the costs and benefits of house owner and householder insurance in communities’ post-disaster recovery, particularly from losses due to flood.

6.4. Methodology

The data collection was done in two phases. In phase 1, the indicators for costs and benefits were developed using experts’ opinions. In phase 2, the identified indicators were used in the questionnaire development. Then, the data was collected through household survey. The respondents are households in Kemaman, a district in Terengganu. The households are counted as insured if they owned house owner/householder insurance only. Those who own Kampungku policy, own other insurance policy and do not own any insurance policy are counted as ‘uninsured’ in the survey. Kampungku policy not considered as an insurance coverage for flood losses as it only provides emergency cash fund of RM1,000 for losses due to flood regardless of the amount of damages incurred.

Trengganu is divided into 7 districts and Kemaman is the 3rd largest district by land area. Kemaman is divided into 17 sub-districts (mukim) (Data Asas Negeri Trengganu 2015, 2016). Malays were the majority ethnic group (192,200), followed by Chinese (7,400), Indians (800), other ethnic groups (1,600), and non-citizens (6,900). Kemaman is the second highest populated area after Kuala Terengganu. Further details on Kemaman district is presented in Table 28.

Table 28. Background of Kemaman district

	Trengganu	Kemaman
Residents	1,011,363 (2010)	208,900 (2015)
Households	242,400 households (156.7 Urban; 85.7 Rural) (2015)	46,943 (2015)
Living quarters	239,300 (85.5% owned by individuals) (2010)	52,094 (2015)
Average household income	RM4816 per month (RM5356 Urban; RM3863 Rural) (2014)	Not available
Number of villages	991	122

Source: Data Asas Malaysia, 2017; KPKT, 2015; Data Asas Negeri Trengganu 2015, 2016

In the year 2013, Kemaman was affected by a severe flood. Since then flood has occurred every year with less severity. Table 29 records the number of families affected by flood during 2014 to 2017 according to the political districts. Kemaman has been active in DRR efforts and it is the only district in Malaysia that provide cash incentive to households who purchase Kampungku Policy.

Table 29. Number of families affected by flood in Kemaman

Political Districts	Flood Seasons		
	Flood in 2014/2015	Flood in 2015/2016	Flood in 2016/2017
DUN Air Putih	5758	477	91
DUN Chukai	5499	0	0
DUN Kijal	297	127	230
DUN Kemasik	271	0	168
Total	11,825	604	489

Source: M. S., Anuar, personal communication, February 15, 2017

According to the Kemaman district office, DUN Air Putih and DUN Chukai are considered as high risk areas i.e. more prone to floods, while DUN Kijal and DUN Kemasik are low risk areas. Both DUN Air Putih and DUN Chukai are located near Kemaman River. During the 2016/2017 flood season, the flood occurred five times and the flood evacuation centres were in operations for a total of 16 days. The number of families affected shows that the severity of flood is decreasing in Kemaman.

Purposive random sampling method was employed to select the respondents. Two housing estates were chosen i.e. bricked houses (DUN Air Putih) and wooden houses (DUN Kijal). Then 30 questionnaires were distributed to households from each village. Table 30 shows the flood occurrence in the selected villages from year 2014. Bandar Baru Bukit Mentok is the housing estate with bricked houses and Kampung Padang Kemunting is the housing estate with wooden houses.

Table 30. Sample data selection

Selected Villages	Flood in 2014/2015	Flood in 2015/2016	Flood in 2016/2017
Bandar Baru Bukit Mentok (DUN Air Putih)	Yes	No	No
Kampung Padang Kemunting (DUN Kijal)	Yes	Yes	Yes

Source: Authors

The indicators for costs and benefits of insurance are derived from literature reviews and confirmed by experts from academic and insurance industry. The indicators for measuring costs and benefits of flood insurance and their proxy are listed in Table 31. The benefits of having flood insurance coverage includes the cost of not having insurance. Households who owned house owner/householder insurance are expected to receive sufficient insurance payout to cover their losses against flood. In addition, we hypothesized that households with insurance coverage would incur lower amount of damages due to their tendency to invest in risk reduction measures and risk awareness.

Table 31. Indicators and proxy for measuring the cost and benefits of insurance to community

Indicators	Proxy
COSTS	
Premium	Annual premium
Moral Hazard	Average amount of insurance payout used for other than replacing/repairing damage property
BENEFITS	
Insurance pay-out	Average amount of insurance payout received
Estimated value of damages	Average amount of damages incurred [Difference between without insurance and with insurance]
Increase awareness on pre-cautionary measures	Average amount spent on home upgrades to reduce future losses [difference between with insurance and without insurance]
Opportunity cost of premium	The possibility of amount of money allocated for premium payment can be used for generating income activities

Source: Authors

For this study, the estimation of costs and benefits are based on flood incidents from 2013/2014 until 2015/2016. The value is estimated on the basis of annual average costs/benefits per household. In particular, the analysis of the costs and benefits of insurance is problematic due to the fact that respondents are unable to estimate the value. The responses on the amount of damages incurred and the amount of insurance payout used for other than repairing/replacing the damaged property were found to be subjective and were therefore susceptible to recall bias.

6.5. Results and Discussion

A total of 47 questionnaires were returned. Majority of the respondents are female (61.7%) and worked as housewives (51.1%). The highest education level attained was secondary level (68.9%) while the rest completed primary level education. All respondents had flood experience. The summary statistics are presented in Table 32.

Table 32. Definition and Summary Statistics of Variables

Variable	Description	Mean (Standard Deviation)	
		Insured Households	Uninsured Households
Household Income	Household income	5,011.1 (5,049.86)	1,770.8 (1,449.89)
House value	Estimated market value of house	177,780 (192,778)	73,389 (82,951.03)
Content value	Estimated value of household items	48,125 (39,091.24)	26,939 (37,360.52)
Damages	Total damages to house and household content incurred from Dec 2013 to Jan 2017	42,600 (24,382.14)	12,164 (9,611.15)
Repairs	Amount spent for repair and replacement	10,400 (12,447.22)	4,375 (3,449.03)
Compensation	Total payout from house owner/householders insurance for losses incurred in Dec 2013 to Jan 2017	18,650 (25,020.05)	0
Premium	Annual insurance premium for house owner/householder Insurance	184.50 (106.44)	0
Lost work days	Number of loss working days	12.78 (6.57)	8.44 (5.11)
Age	Age in years	46.4 (8.72)	46 (14.2)

Note: Values in parenthesis are standard deviation

Source: Authors

It can be observed that the insured households earned higher income. However, the insured households incurred higher mean damages compared to uninsured households. This can be explained by higher mean property and household content values owned by the insured households. It is also interesting to note that the mean number of lost work days is higher for the insured households compared to uninsured households. Perhaps the insured households were salaried individuals thus they could afford to take leave to manage their damaged houses after flood occurrence. Contrary to expectation, this study did not find evidence that there were significant differences between insured and uninsured in terms of household adjustment on consumption, the willingness to invest in DRR efforts and the economic status 6 months after the flood occurrence. The results indicate that majority of the households owned some types of insurance policies. Only 21.3 percent households owned a house owner/householder insurance policy.

Table 33. Households with insurance policies in year 2016

Types of Insurance	Insurance ownership	
	Own	Did not own
Owned house owner/householder insurance	21.3%	78.7%
Any types of insurance	91.5%	8.5%
Owned Kampungku policy only	97.7%	2.3%

Source: Authors

It seems possible that the motivation to purchase insurance are influenced by the flood experience which was also reported by Kunreuther (1996). Both households in the two housing estates were affected by major flood during the flood seasons December 2012 to January 2013 (and the recurrence of flood in the following years) has influenced the households to purchase insurance. In this study, the two main reasons for purchasing house owner/householder insurance are the desire to get timely compensation for losses incurred and the need to meet the housing loan provider's requirement. Interestingly, the reason for purchasing the Kampungku policy, aside from the desire to get the payout, is affordable price. Thus, insurance design is important factor to encourage purchase among the communities (Prabhakar, 2015).

In an interview with the JKKK, most households in the wooden housing estate received assistance from various agencies to cover the cost of repairs to the damaged houses. In addition, the amount of cash received for flood relief has been consistent for the past few years. The respondents received RM1000 from the state government and RM500 from the federal government. Cumulatively, household with Kampungku policy received RM2500 in cash. Based on the data presented in the Table 34, the average damages per flood seasons per uninsured households are RM3,041. It means that on average, 82 percent of the damages are covered by the amount of cash received. On the front of the insurance payout for the insured households, only 44 percent of those who received insurance payout managed to cover the damages that had occurred.

The Table 34 presents the estimated costs and benefits of flood insurance for community. The data is based on experience from the past four flood seasons. None of the respondents incurred interest charges due to borrowing, thus the value is nil. In fact, only two respondents indicated that they had to borrow from relatives. The need to borrow is minimal as the district office had allocated sufficient support (food and shelter) during and after the flood occurrence. The majority of them did not feel that the money invested in insurance premium can be used for more gainful livelihood activities. Contrary to hypothesis, insured households didn't incur a lower amount of damage compared to uninsured households. The amount of damages seemed to correlate with the value of the house. Perhaps it is due to the fact that house owners in Malaysia received no incentive from insurance companies for risk reduction measures. As the benefit from lower amount of damages by the insured cannot be captured the benefit is stated as nil.

Table 34. Estimated cost and benefits of insurance to community

Measures	Value per household per year
COSTS	RM
Premium	184
Moral Hazard	500
BENEFITS	
Insurance pay-out	4,662.50
Estimated value of damages	0
Increase awareness on pre-cautionary measures	375
Opportunity cost	0
BENEFITS – COSTS	4,353.50

From the analysis, it is found that the estimated benefits of insurance is RM4,353,50. In other words, for every Ringgit spent on insurance, the insured derived almost RM14 in benefits. It is interesting to note that although the respondents who owned house owner/householder insurance and had received insurance payout due to the flood losses, none had indicated that they recovered fully. Nonetheless, all respondents asserted that insurance is an important tool to help them to recover from losses due to flood. The majority of them indicated an intention to renew their insurance policies.

6.6. Conclusion

These findings, while a modest step towards understanding the costs and benefits associated with the insurance, suggest that insurance may assist the community to recover and may influence DRR as the estimated benefits of insurance outweigh the estimated costs. Despite these results, questions remain on the effectiveness of insurance in DRR. This study is limited by the lack of information on the actual amount of government relief fund and the amount spent by the various government agencies on the repair cost of damaged houses. In addition, the costs and benefits assessed cover only a small proportion of all the costs and benefits that could be assessed (including the indirect costs and benefits). In addition, this research is limited by the inability of the respondents to estimate objectively the amount of losses incurred, the premium paid to the insurance company and the cost for protection measures. As owning insurance is not a self-initiated effort (at least for some since) it is required by loan providers. More efforts are needed to identify other purchase drivers in order to develop better understanding on insurance purchase decision against flood risks. Further studies need to be carried out in order to adequately validate the benefits of insurance by ensuring that respondents have similar risk exposures.

6.7. References

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7. Stakeholders' Perspectives and Policy Suggestions for Insurance in Malaysia

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Abstract

This paper presents a case study on the perception of communities on insurance in Bukit Cerakah in the state of Selangor, Malaysia. The findings indicate that very few community members have subscribed to livestock insurance, as they have not experienced in the past the severe floods that often disrupt their lives and livelihoods. Notwithstanding this, the study revealed that those insured have a lesser reliance on government in compensation to the uninsured group. Most of the community members are open to consider insurance as an option and indicated the willingness to understand existing schemes. There is a need for the government and other stakeholders to engage with communities and improve their understanding on the insurance-based risk management options in order for the insurance to spread amongst the vulnerable communities in Malaysia. The paper also provides several policy level suggestions for the promotion of risk insurance in Malaysia, including pooling of resources, moving away from subsidy regimes and infusing science and technology at the grassroots level.

7.1. Introduction

Economic losses due to weather related disasters are increasing world-wide and the impacts of climate change and variability is expected to compound this situation in the future, this is likely to have significant financial impacts on governments (Prabhakar et al., 2015). Insurance coverage offers protection from weather risks and plays a major role in ensuring financial stability for individuals, organizations and governments. However, several issues hinder the spread of insurance including the high insurance premium costs that result in farmers having the belief that insurance is meant for rich farmers (Ghazanfar et al., 2015a). Ignorance about the disaster risks due to low probability of occurrence and the high premium costs associated with crop insurance are part of the reason why farmers hesitate to invest in risk insurance (Ghazanfar et al., 2015b). In order to promote crop and livestock insurance coverage among farmers and to reduce the financial burden for farmers taking out policies, insurance premiums were subsidized in several countries. For example, United States, Canada, European Union, and Japan have introduced various forms of subsidies in agriculture (Barnett and Mahul, 2007). Research has shown that the impact on the rate of insurance uptake as a result of offering subsidies on the cost of insurance has had mixed results, ranging from a very low impact (Cole et al., 2013) to a high impact high (Xu and Liao, 2014).

Malaysian government had spent approximately RM 1 billion from 2007 to 2012 on disaster relief to reduce farmers' financial stress after disasters (Abdullah et al., 2014) which prove to put a significant toll on the financial status of the government. Currently, the agriculture insurance in Malaysia is offered by the private insurers. The crop insurance policy or better known as the insurance for growing trees is an extension of a fire insurance policy and it mainly covers the industrial crops such as rubber and palm oil where majority of the policyholders are large-scaled plantation companies. Efforts have been made to introduce insurance coverage for food crops for farmers by the National Insurance Association of Malaysia (NIAM) and the Ministry of Agriculture. The proposals include Paddy Yield Shortfall Insurance Scheme in 2002, Multiple Peril Crop Insurance (MPCI) program in 2004. In addition, a proposal for introduction of crop insurance coverage to agricultural farmers has been submitted to the Cabinet for approval in June 2012, which identified paddy crop as an entry point to promote crop insurance coverage among farmers (Prabhakar et. al, 2013). Though it was well received by the NIAM members, the program was not implemented due to high premium rates (Reyes et al., 2017). Recently, the Agriculture and Agro-based Industry Ministry has taken the initiative to introduce the crop insurance to protect farmers from risks linked to climate change such as drought,

diseases and floods (The Star, 2016). There is no detailed information on how the insurance program will be managed and financed.

In 2008, NIAM initiated Tani Malaysia Livestock insurance, an insurance policy for commercial livestock and poultry farms. In 2010, NIAM's chairman announced that few matters need to be addressed, including making these schemes affordable, before the policy is fully introduced into the market (The Star, 2010).

Keeping the above background in view, this study aims to assess the perception of communities in Bukit Cerakah, Selangor about the insurance. This study provides an opportunity to understand the importance of insurance coverage from the community's point of view to improve the current insurance policy in the country. Since no field crop insurance has been offered in Malaysia, the responses from the non-agriculture insurance subscribers are presented in this paper to provide an insight into the perceptions of communities on the insurance as a risk management tool which provides implications for designing a crop insurance in Malaysia.

7.2. Methodology

This study was conducted for the purpose to evaluate the perceptions of community members on insurance as a tool for financial risk reduction. The study was conducted in the Bukit Cerakah, Selangor, Malaysia (Figure 14). Agriculture in Selangor contributes to 3.1 % to the state GDP. Selangor is a significant state involved in the cultivation and growth of star fruits, papayas and bananas, whilst also producing palm oil and rubber. While the state is not a major producer of rice, the paddy fields in Kuala Selangor contribute to the economic prosperity of the district. The climate of the study location is characterized by fairly high but uniform average daily temperatures ranging from 21-32 °C, with a mean annual temperature of 26 °C, average daily humidity levels exceeding 80%, mean annual rainfall of about 2,500 mm. The climate of Selangor, Kuala Lumpur and Putrajaya is governed by two monsoonal winds, which originate from the northeast between October and February, and the southwest from May to September (Cheong et al., 2013).

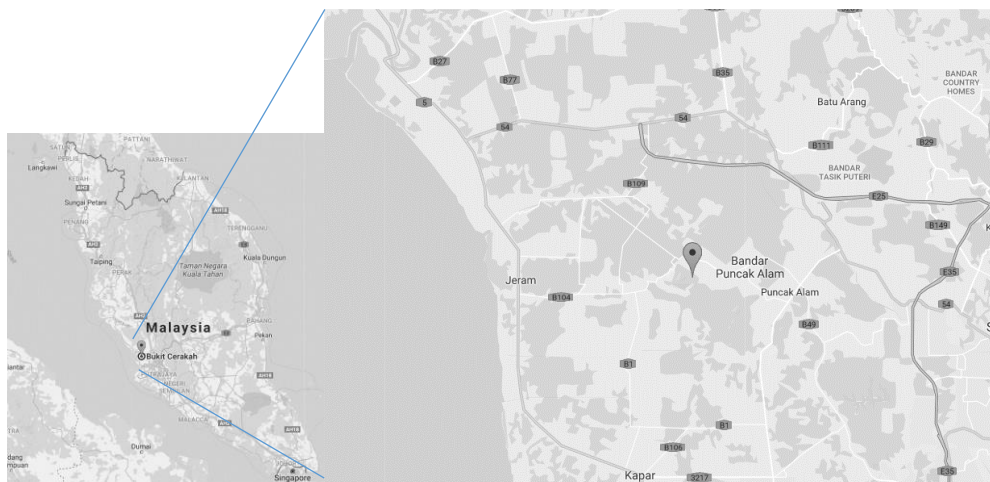


Figure 14. Location of Bukit Cerakah, Selangor (©Google Maps)

A semi-structured questionnaire distributed amongst farmers was used to elicit the responses comprising multiple choices and open-ended questions. Investigations were conducted to i) investigate popularity of crop and livestock insurance, ii) factors influencing insurance subscription among respondents, and iii) strategies adopted to recover from disaster impacts. A focus group discussion was held at the research site with various stakeholders (village residents, village heads, officers from various related government agencies). The participants were briefed about the objectives of the study and followed by a focus group discussion led by enumerators. The questionnaires were filled during the focus group discussions. 105 respondent farmers have participated in the focus group discussions and the questionnaire survey. Descriptive analysis was used to analyse the data and illustrated via percentages.

7.3. Results and Discussion

The gender profile of respondents completing the survey comprised 81% males and 19% females. Analysis of results found that 52.4 % of the total respondents subscribed to some kind of insurance (mainly health, or life insurance), with the remaining 47.6% did not have insurance subscription. Specific losses to agricultural production were due to drought, floods and other related climate extremes. These affected a range of agricultural enterprises, such as livestock, forage production and crop production. Both insured and uninsured groups reported similar incidents and impacts, with floods considered by all to be the most significant cause of livestock losses (primarily due to the risk of flash flooding following heavy rains in the effected study area). The Malaysian government has been providing relief support for livestock farmers in the event of major natural disasters causing significant losses. The majority of respondents from both survey groups considered the level of compensation offered to be insufficient to cover the losses incurred (47.3% and 96% for insured and uninsured respectively) (Figure 15). It is interesting to note that 45.5% of the insured found the government compensation partially helpful, which is higher than the uninsured.

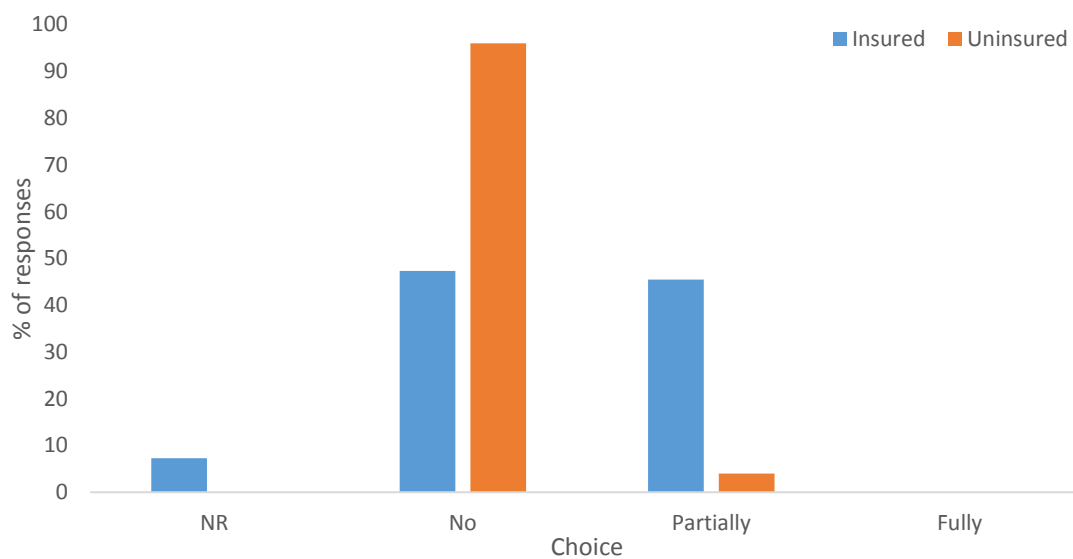
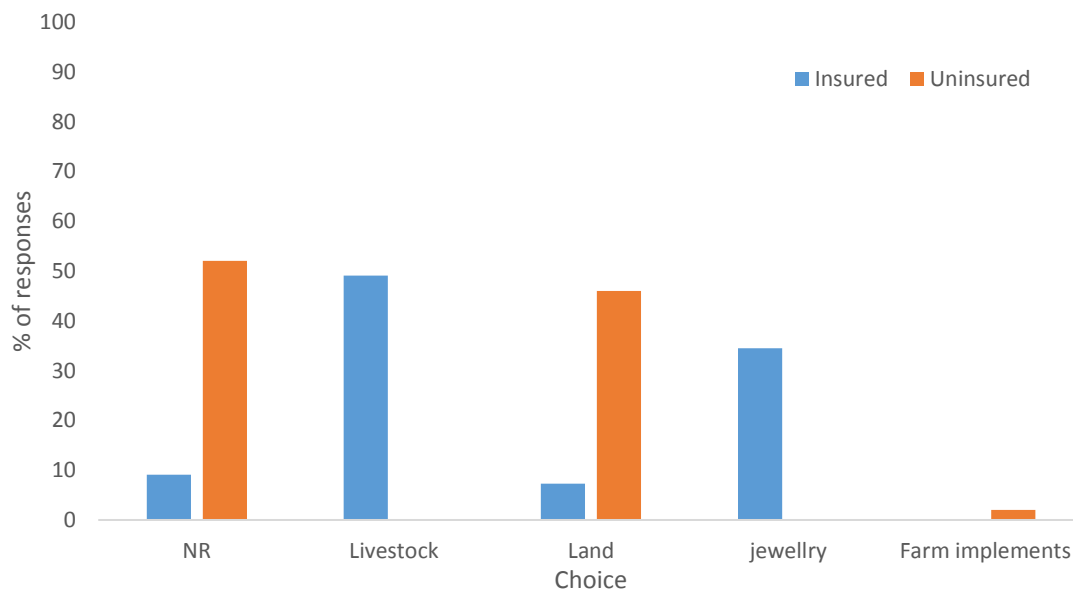


Figure 15. Adequacy of government compensation to cover losses



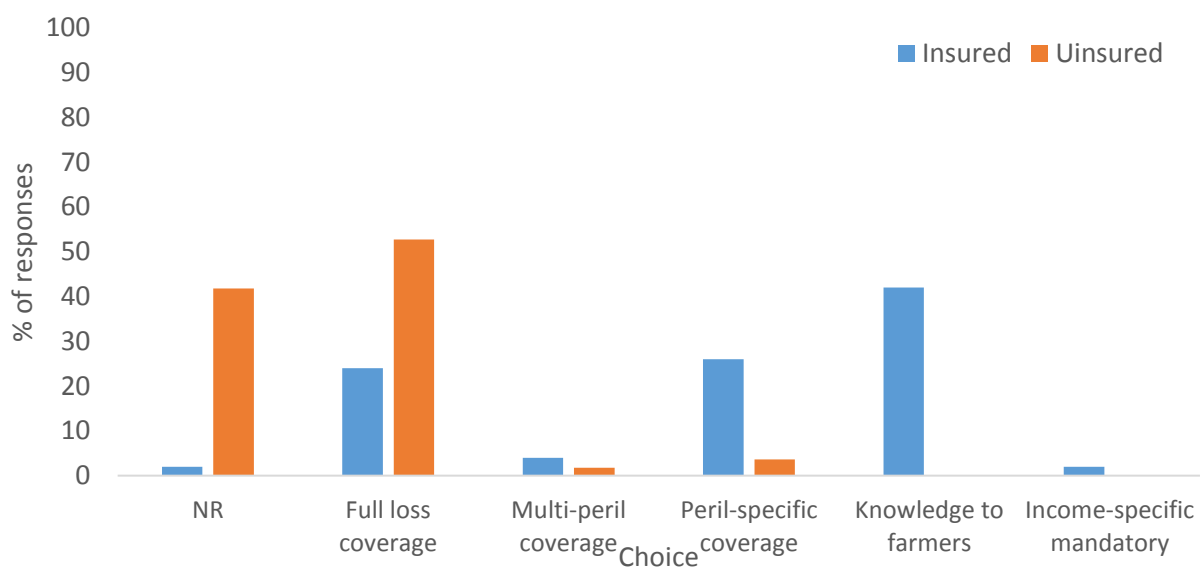
Source: Authors

Figure 16. Willingness to sell or mortgage assets during financial losses

With regard to the distress sale of assets, the majority of the insured (49.1%) choose to sell their livestock, whilst 34.5% prefer to sell their jewellery and only a small proportion (7.3%) preferred to sell their land. Among the uninsured, majority of respondents (52%) preferred to sell their land whilst only 2% of the respondents preferred to sell their livestock and farm equipment (Figure 16). This indicates that respondents with insurance coverage are more likely to be more dependent on their land for cultivation as their main income source and hence do not prefer to sell. An important mechanism to assist farmers survive through the financial crisis was found to be through informal avenues of financial support, with 85.5 % of the insured choose to borrow from family (this value for the uninsured group was found to be higher at 94.1%). In terms of willingness to migrate, the majority (92.7%) of the insured preferred to stay and only 1.8% were willing to migrate (similar results were also found for the uninsured). This may be driven by the fact that Bukit Cerakah has no historical record of severe disasters unlike areas like Kelantan which has experienced the impacts of major disasters in the past (Karim et al., 2016).

Most respondents had experienced no change in their savings over the past 5 years (40%), whilst only 1.8% had experienced a decrease in their savings. An increased investment in livestock was observed in the study location among most of the respondents (54.5%). Only 2.0% of respondents had increased their land holding area that they owned. An overwhelming majority of respondents (98%) had invested in irrigation facilities (98%), increased household assets (96.1%) and leased land (96.1%). These observations indicate the increasing well-being in the study location over the years and less disaster impacts. Respondents attributed these changes to better animal husbandry skills by observing the insured neighbours/friends (54.9%). Some 62.7 % of respondents were also able to obtain additional income to invest in other income generating activities. The major reasons provided by respondents for not adopting insurance (by the uninsured group) were a lack of need for the financial protection, lack of financial status to pay for the premium and a lack of knowledge about insurance. These findings are consistent with similar findings reported amongst Mongolian farmers (Boyd et al., 2016).

Respondents from the insured group identified a range of improvements for the insurance enabling environment, including the need for better insurance knowledge dissemination to farmers (42%), the availability of full loss coverage (24%), the option of having peril-specific insurance (26%) and the need to offer the introduction of multi-peril insurance (4%) (Figure 17). The majority of the uninsured group (53%) preferred that coverage for full entire loss be made available. Most uninsured farmers showed a willingness to learn and understand insurance and related policies so that they could then make informed decisions in relation to deciding on risk management strategies.



Source: Authors

Figure 17. Preferred improvements in crop insurance products in Malaysia

7.4. Policy Level Challenges

The study presented in the previous section has identified several perception and practical issues related to the insurance penetration in Malaysia. Addressing these gaps require proactive policy support at the national level. The Malaysian Government has a lot of interest in the disaster risk and risk financing via insurance but the insurance program is yet to be robustly implemented. The National Disaster Management Agency (NADMA) is currently engaging the insurance sector to participate in DRR. There are several opportunities and challenges particularly with respect to enhancing capacity among various stakeholders. The following critical aspects need to be considered, identified through the consultations organized by UKM, while promoting the risk insurance in the country:

- Flow of information through dialogues and meaningful cooperation between the scientific and technological community (and other relevant stakeholders), particularly the policy makers has to be improved. This is important to strengthen the science policy interface for effective decision making in disaster risk management.
- Formation of partnerships to facilitate uptake of scientific and technological knowledge to facilitate informed policy and decision making for DRR particularly with respect to climatic hazards. The government alone cannot shoulder the cost of disasters. The private sector and particularly the insurance sector have to participate actively and play a greater role.
- Innovative ideas that can bring about successful collaboration and partnerships that can be nurtured have to be given priority. Such collaboration should aim to transfer scientific knowledge that improve local government decision making and make the public-private partnerships a routine practice in DRR.
- The private sector needs to focus on disaster issues particularly in view of the high level of losses anticipated due to climate change. The insurance sector should also develop a culture of growing socially acceptable science and technology to build climate resilience in the country. Collaboration between practitioners and researchers as well as the public and private sector including civil society and non-government organizations is critical to advance disaster management in the country.

Members of the Malaysian Association for Risk and Insurance Management (MARIM), an association representing corporate insurance buyers, have suffered several disasters recently. The private sector in Malaysia faces several challenges with respect to disaster risk management and how the current insurance products addresses the risks. Although insurance has been an important tool in risk management practices among members of MARIM, there are two important areas that need urgent attention. First, the fact that not all risks are insurable. The flood of 2014 affected many businesses and resulted in claims of over RM 100 million for damages to property, vehicles and equipment. The claim amount would be higher if losses related to business interruption and cost incurred for providing emergency relief are considered. Second, the condition imposed by insurance policy before insured can file claims. For losses due to flood, no claim can be filed unless the flood duration exceeds 72 hours. Another contractual limitation is the deductible or excess clause and whether it is per occurrence or aggregate. One case in particular faced by one of the MARIM member with RM3 million per occurrence excess clause where the member company faced multiple events in Kelantan, Terengganu and Pahang with losses below RM3 million but couldn't claim. The following challenges need to be addressed for strengthening the insurance sector in the country.

Critical Mass of Policy Holders

The critical mass for insurance in Malaysia is relatively small compared to Japan and India, where the coverage is greater and the exposure to a variety of disasters is high. Notwithstanding this, there are sectors such as the sugar cane insurance scheme which are popular and have a significant demand. One possibility is for insurance to be designed in such a way where monthly crop insurance can be brought. For example, the insurance could be a general insurance, but the cost is subsidized between different crops. There is an example of insurance coverage for crops for paddy and sugarcanes. This is done by a body that implements a variety of insurances schemes, making them flexible. In Malaysia,

there is a need to establish a national pool of funds similar to the national disaster management funds, which can be used to subsidize the insurance products.

Acceptability of Premium Cost

The acceptability of the farmers to insurance is limited because the current premium rates are considered expensive. In areas where farmers are not affected by disasters, insurance would be difficult to sell. An insurance company has to present a product that will cover all the areas, not just the disaster inflicted areas. Insurance education has to be made in the non-affected areas to ensure sufficient insurance scale and allow for cross- subsidy mechanisms.

Framework Conditions for Promoting Insurance

The Ministry of Agriculture has previously held discussions to set up a national scheme for disaster insurance in the agriculture sector. However, the insurance company want the program to be managed by the private insurance companies. There is a widespread view that transferring funds to a private company to develop an insurance scheme is not a right approach. It was viewed that the mere involvement of private companies in insurance program would need the program to be profit driven commercial activity which may not work for the agriculture sector in the country. An ecosystem has to be developed where the private companies and the government departments work together building the capacity of farmers and the system to provide needed support and build trust among the farmers. Once the mutual support mechanism is in place, moral hazards can be reduced as there will be social pressure among the farmer to reduce inaccurate reporting of losses. In Japan, agriculture insurance is promoted through farmers' associations, which also provides technical assistance for development of the sector. There is a need to develop such a system in Malaysia.

Transforming the Subsidy Mentality

A major barrier in Malaysia has been that farmers receive a significant assistance from the Government. For example, they are provided with seedling, fertilisers, buffalos, goats etc. This makes it very difficult for farmers to have the mind-set to purchase insurance on their own. As a result, there is an expectation that the Government should provide the insurance coverage. This subsidy mentality has become a financial burden for the government. Malaysia is now in the process of developing a disaster risk management law and the process is being led by the National Disaster Management Agency (NADMA). An aspect that could be considered is the incorporation of mandatory insurance coverage subject to hazard zonation. Bank Negara should work closely with NADMA to develop a framework for insurance coverage in the country and make it legally binding.

Need for Science and Technology

Big insurers and re-insurers are more concerned about large scale disasters such as the Bangkok floods of 2011 (Impact Forecasting, 2012). Issues such as flash floods and landslides were thought to be the business of national level insurance companies. The common view has been that science and technology has to improve at the local level, particularly for identification of hazardous zones, prevention and mitigating as well as preparedness measures. A project is being implemented in the Kuala Lumpur, supported by the Newton Ungku Omar Fund, to promote the susceptibility approach (British Council, 2017) that allows for the delineation of areas where catastrophic and non-catastrophic losses may occur. This will enable the government to cross subsidize areas based on their level of exposure and avoid catastrophic losses for the insurance sector. In this manner, the bottom 40 % population, in terms of household income, can also benefit from insurance coverage.

Pooling of Resources

Mechanisms have to be explored for pooling of resources. A global pool of insurance is being discussed with the involvement of insurance players for low income and developing countries as well as small island states. Governments can invest in data systems, observations and knowledge development to help understand risks. Malaysia could consider a region-wide approach for pooling of risks using ASEAN as a platform to bring together major insurance players and connect them with the national entities.

7.5. Conclusion

The survey results presented in this paper showed that majority of the stakeholders are small scale land owners with limited capacity. Lack of severe disaster impacts within the study area could be a factor limiting the spread of insurance in the study area. The survey has indicated that both the insured and uninsured are facing similar issues where they have to financially self-sustain after the disasters. Less than half of the insured respondents stated that they did not receive sufficient compensation from the government. There is a willingness among the farmers to learn and understand the insurance as a risk management tool where the role of the insurance companies and the government policies play a major role.

There are many challenges in developing the insurance scheme for DRR but they are entwined with a multitude of opportunities. Challenges include the lack of critical mass of farmers for the agriculture sector and the high costs of premium involved. The framework conditions for promoting insurance has to be improved in the country. At present there are several structural barriers. In terms of behaviour, there is a great need to shift away from the subsidy mentality and the imposition of mandatory insurance scheme with potential for future corrective measures is being proposed. This should be facilitated by enhanced science and technology at the local level to support the national insurance schemes. Another aspect suggested was the pooling of resources. Malaysia could consider a region-wide approach for pooling of risks using ASEAN as a platform to bring together major insurance players and connect them to national entities.

Malaysia has attempted to implement insurance schemes for the agriculture sector and floods in the East Coast of Peninsular Malaysia. Unfortunately, the schemes either never took off or had very limited success and were later abandoned. It is now the time to review past experiences and practices in other developing and developed countries. There are several fundamental aspects required and these include engagement with all stakeholders, transparency, bottom up approaches supported by top down coordination and trust building.

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Annexures

Annexure 1: Questionnaires used in Australia case study

Note: Please note that the final questionnaires used for household survey may slightly differ from the English versions presented here as these questionnaires were translated into local languages wherever necessary and modifications made in the local language versions couldn't be reflected into the English versions presented here.

Survey: Farmer survey relating to MPCl in Australia

Introduction

Hello, I am conducting a survey in relation to identifying farmer needs and attitudes relating to crop insurance. This survey is part of an international research project that is being conducted in Australia, India, the Philippines and Japan. Traditional crop insurance products only insure crops for incidents such as hail and fire. What if you were able to insure for other events, such as frost, drought, or weather damage at harvest? I know that as farmers you are always asked to participate in surveys, however it would be appreciated if you could spare me 15-20 minutes to complete the following questionnaire that would really be appreciated. All information will be treated in full confidentiality.

A. Some information about you

I would like to ask you a few questions about your general farming operation in order to provide some background information

A.1. Where do you farm?						
Eyre Peninsula	Mid North	Upper North	Yorke Peninsula	Mallee	South East	Other (specify)
A.2. What is your annual rainfall (mm): write down response: mm (and then tick category below)						
<250	251-300	301-350	351-400	401-450	451-500	>500
A.3. What is the size of your farm (in hectares) including any land that you may lease or share farm? hectares						
A.4. What is your role in the farm business? (for example, the main decision maker, partner, worker, could be the wife etc, so you will need to probe this) indicate if male or female:						
A.5. What types of crops do you grow? (tick boxes that apply)						
Cereals	Grain legumes	Canola	Hay	Other (specify)		
A.6. Do you run livestock? (if so, what type... sheep cattle etc)						

B. CURRENT ON-FARM RISKS

I would like to ask you a few questions about the types of risks that you face as a farmer, and how you generally manage these.

B.1. What are the main types of risks that you face in your farm business? (unprompted initially, but if they cannot think of any, suggest climate risk, grain prices, production risk etc)	B.2. How do you generally manage these risks? (ask this for each of the risks that they nominate, but only after they have asked all of the questions)
1.	
2.	
3.	
4.	

C. About your current Crop Insurance practices

The next lot of questions relate to your current crop insurance practices

C.1. Do you take out crop insurance? Yes / No

If answer is Yes:

C.2. What specific events does the insurance cover?

Event	Yes	No
Hail damage		
Fire damage		
Storage/transportation grain		
Other (specify)		

C.3. When did you last make an insurance claim (year)?

C.4. Were you happy with the compensation you received?

include any additional comments

C.5. If not, why not?

may require some probing

C.6. If Answer is No (they do not take out crop insurance):

4.6. (i) Why don't you take out crop insurance?

may require probing, such as the cost, perception that the risk is low, unhappy with the insurance company's service or past claims etc.

C.6. (ii) Are there any specific management practices you undertake to manage the specific risks that would be otherwise covered by the crop insurance?

(this may include different sowing practices for frost susceptible crops, putting in extra fire breaks, harvesting crop as quickly as possible etc., so may need to prompt)

C. Insuring Crops for other events

The next question is designed to get your feedback in relation to insuring for other events associated with crop growing.

C.1. Depending on the cost of the insurance premium, would you be interested in insuring your crops for the following events?

Event	Highly unlikely	Unlikely	Maybe	Likely	Highly likely
1. Weather-based insurance (Drought) <i>(Linked to weather related events, such as the amount of rainfall received during the growing season. If the rainfall is below a stipulated amount, then the insurance is paid out)</i>					
2. Frost damage to crops <i>(with a 50% or greater yield reduction caused by the frost incident)</i>					
3. Crop Disease outbreak <i>(with a stipulated level of crop loss, for example a 50% or greater yield reduction caused by the disease, where reasonable agronomic precautions are taken to prevent the specific disease)</i>					
4. Low Production – Low Price <i>(referred to as crop-revenue insurance, this product takes into consideration both production and price risk as determinants of gross revenue; consequences of either low yield, low price or a combination of both)</i>					
Other (please specify)					

C.2 How much would you be prepared to pay for each type of insurance?

Event	% value of expected crop income				
	< 5%	6-10%	11-15%	15-20%	>20%
6.1 Weather-based Insurance (Drought)					
6.2. Frost damage to crops					
6.3. Crop Disease outbreak					
6.4 Low production – low price					
6.5. Other (please specify)					

D. General Attitudes to Crop Insurance and management

We would like to gauge your personal attitude to crop insurance and management. There are a series of statements, and we would like you to indicate your level of agreement to each. The categories are Strongly Agree, Agree, Neither Disagree or Agree, Disagree and Strongly Disagree. There is no right or wrong answer

Statement	Level of agreement				
	Strongly disagree	Disagree	Neither Disagree or agree	Agree	Strongly agree
D.1. Having my crop insured for hail and fire puts my mind at rest					
D.2. When I make a claim on crop insurance, I never get back the full amount I think that I am entitled to					
D.3. The Government should subsidise drought and frost insurance premiums					
D.4. It doesn't matter how good you are as a farmer, it is always the weather that has the greatest impact on crop yield					
D.5. I consider that I am an innovative farmer					
D.6. I still hope to be farming in 10 years' time					
D.7. The adoption of new technologies (such as No-Till) has allowed me to grow crops having consistent yields, even in years of below average rainfall					
D.8. Farming is becoming more of a risky business because of the impact of climate change on my farming operations					
D.9. Australian farmers are the most efficient farmers in the World					
D.10 Farming in my district is not as risky as what it was 20 years ago.					

E. Final Comments

That concludes the Survey. However if you have some additional comments to make in relation to insurance, I welcome these....Thank you for your time. Whilst the survey is completely anonymous, if you would like a copy of the results, we are happy to email them to you.

Annexure 2: Questionnaires used in Malaysia case study

Insured

Village name _____ Questionnaire Number _____

Nature of respondent: Insured

Assessing the Disaster Risk Reduction and Climate Change Adaptation Benefits and Costs of Risk Insurance

Thank you very much for your acceptance to participate in this survey organized by IGES in collaboration with UKM. Your participation will help us get insight into risk insurance experiences and be able to provide better policy suggestions to relevant agencies involved in climate risk reduction.

1. Background of the respondent

1.1 Gender: Male Female

1.2 Occupation of the respondent: Farmer, Animal husbandry Merchant Rural artisan, Farm laborer, Rural entrepreneur, Others

Specify _____

1.3 What is the highest level of education that you have completed?

Illiterate , Pre-Primary School (1-5) , Upper primary (6-8) , High school (9-10) , PUC , Diploma Course , Graduation , Post-graduation and above , Technical Degree (medical, engineering, agriculture, etc.) , Others , Specify _____

1.4 A. Total number of family members _____

B. number of earning members _____

1.5 What type of housing do you currently occupy?

Katcha-Thatched roof , Katcha –Tiled roof , Semi pucca , Pucca (Through housing scheme) , Pucca (concrete slab) , Others _____

1.6 Area of land owned (ha)?

0-0.25 0.25-0.5, 0.5-1.0, 1-1.5, 1.5-2.0, 2.0-2.5, 2.0-2.5 >2.5

1.7 Do you lease land and how much?

Yes , No

Area of land taken on lease _____ (ha)

1.8 % of land under cultivation: <10, 20-40, 40-60, 60-80, 80-100

1.9 Livestock owned (type and number)

Pig _____ Cow _____ Chicken _____ Goat _____ Others : _____

1.10 Do you have savings(e.g. in cash, monetizable such as banknotes etc)?

Yes , No

1.12 Sources of household income

Source of Income	Tick appropriate box		% of annual income
	Primary	Secondary	
A. Agriculture	<input type="checkbox"/>	<input type="checkbox"/>	
B. Livestock	<input type="checkbox"/>	<input type="checkbox"/>	
C. Forest produce	<input type="checkbox"/>	<input type="checkbox"/>	
D. Manual labor in the village	<input type="checkbox"/>	<input type="checkbox"/>	
E. Seasonal migration to nearby city (Name the city: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
F. Business (Specify: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
G. Regular job (Specify: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
Others	<input type="checkbox"/>	<input type="checkbox"/>	

1.12 What kind of agricultural products you have been producing (crops, animals or aquatic products) in the normal year and stress (drought, flood, diseases) year?

	Arable crop	Dairy products	Meat	Aquatic	Others (mention)

A. Normal year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Stress year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Specify the nature of stress: _____

1.13 How many different crops do you grow during a particular season?

Year	Rabi	Kharif	Other
A. Normal	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>
B. Stress year	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>

1.14 Loans taken in the last five years:

	Year	Sources of Loan ¹	Loan as % of total annual income	Purpose	% Repaid
A					
B					
C					
D					
E					

¹ a) Bank, b) Money lender, c) friend, d) family member, e) neighbor, f) others

1.15 Who makes farming/ animal husbandry investment decisions in your household?

Elder male member , younger male members , elder female member , younger female members , all adults in the family , all family members

1.16 Are there months in the year you find it difficult to provide food for your family?

Yes , No

1.17 If yes, in what months (and number: _____) most difficult to provide adequate food for household members _____

Why? _____

1.18 How many times in a month des your family borrowed food grains?

A. Normal year: Once , twice , thrice and above (number of times _____)

Never

B. Stress year: Once , twice , thrice and above (number of times _____)

Never

1.19 Are there months in the year you find it difficult to provide fodder for the cattle

Yes No

1.20 If yes, in what months (and number: _____) most difficult to provide adequate fodder _____

Why? _____

1.21 How many times in a month does you had to borrowed fodder?

A. Normal year: Once , twice , thrice and above (number of times _____) , Never

B. Stress year: Once , twice , thrice and above (number of times _____) , Never

1.22 When did you purchase the cattle:

1.23 When did you purchase the cattle: dd/mm/yyyy: _____

1.24 What type of cattle do you grow? Deshi , cross breed , others (specify)

1.25 What kind of fodder do you feed he cattle? Grass Straw Processes straw

Grains Others (specify) _____

1.26 What type of medicines do you use for the cattle: _____

quantity of the one most important medicine used per cattle: _____

when was it used: _____

1.27 What type of immunization have you done for the cattle _____

Quantity of the most important immunization done recently per cattle: _____, and when was it done (last date of immunization dd/mm/yyyy):

1.28 Name the diseases have you observed in your cattle: _____, what kind of treatment have you provided:

2. Hazards and Impacts

2.1 Rank the leading causes of the livestock loss:

Peril	Rank
A. Drought	
B. Flood	
C. Delayed rainfall	
D. Pests and diseases (Specify: _____)	
E. Others: _____	

2.2 Frequency of livestock loss:

	Every year	Once in 2 Yr	Once in 3 yr	Once in 4 yr	Once in 5 yr	Once in 6 and above
A. Before insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. After insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.3 What was the average crop loss over the past five years?

Complete livestockloss , 90-80% loss , 70-60% loss , 40-50% loss , 20-30% loss , No loss , Didn't measure

2.4 When were the most recent crop failures due to natural calamity? Specify the calamity? Never

Year	Calamity (specify)	Total loss (BDT) ¹	Livestockloss (as % of total loss) ²	Insurance triggered?
A				Yes <input type="checkbox"/> No <input type="checkbox"/> Not insured <input type="checkbox"/>
B				Yes <input type="checkbox"/> No <input type="checkbox"/> Not insured <input type="checkbox"/>
C				Yes <input type="checkbox"/> No <input type="checkbox"/> Not insured <input type="checkbox"/>

¹ Total of all losses including crop, livestock and other income sources if any from the disaster

2.5 How did you come out of loss from the most recent disaster (Year from above table: _____)? (Tick multiple if needed)

Bank loan waived off , specify as % of total loss _____

Took bank loan , specify as % of total loss _____ Interest rate _____

Government paid the compensation , specify as % of total loss _____

Sold assets , specify as % of total loss _____

Informal Borrowing , specify as % of total loss _____ Interest rate _____

Government Insurance payout : specify as % of total loss _____

Non Government Insurance payout

Other income sources Specify source: _____

Couldn't come out, I am still at loss , _____

Others: _____

2.6 Was government compensation timely?

Yes , No

2.7 Was the government compensation sufficient to come out of loss?

Yes , No , Partially

2.8 If you sold mortgage assets to cover financial loss, what asset did you sell/ mortgage? (Tick multiple if applicable)

Livestock , Land , buildings , Farm implements , jewelry , Others (specify):

2.9 If you borrowed informally whom did you borrow from?

Family Friends/Neighbors Village money lender

2.10 Did you or any of your household members have to migrate (unseasonal) during the stress months/years (during drought/flood, diseases etc) to provide extra income?

Yes , No

2.11 Did you have to make household consumption adjustment during this period?

Yes , No

2.12 If 'Yes' how did you reduce expenditure?

Reduced nutrition , On health care , Reducing expenditure on education , Reducing cost on social functions , Reducing the leisure activities , others

2.13 Did you have any household food shortages during this period?

Yes , No

2.14 Did any of your livestock die due to the disaster related causes, specify type and number?

Pig _____ Cow _____ Chicken _____ Goat _____ Others : _____

2.15 If you sold livestock, specify the type and number of livestock sold

Pig Cow Chicken Goat Others

2.16 If yes, amount that the livestock was sold for (_____ BDT,) what is the price of the cattle during normal periods (_____ BDT)

2.17 Did you grow sufficient fodder at this time to feed your cattle?

Yes , No

2.18 If 'No' where did you obtain fodder from?

Bought from market

Informal borrowing

Migrated to area with better pasturing ground

2.19 If you bought fodder, where did you obtain money to buy fodder from?

Savings

Government paid the compensation ,

Sold assets

Informal Borrowing ,

Insurance payout

Other income source ,

2.20 How was the productivity (diary, farm work) of your livestock during the year of the disaster?

Less productive , More productive, Same

2.21 Did you provide any nutritional supplements to improve health of your cattle during this period?

Yes , No

2.22 If 'Yes' where did you obtain money to purchase the nutritional supplements ?

Government paid the compensation , Sold assets , Informal Borrowing , Other income source , Insurance payout

3. Insurance

3.1 What form of insurance do you have and for what amount (premium)

Health Premium (BDT): _____

Property Premium (BDT) _____

Livestock Premium (BDT) _____

Crop Premium (BDT) _____

Government Crop Insurance Premium (BDT) _____

Others (Specify) Premium (BDT) _____

3.2 When was the insurance taken: Less than a year ago , 1-2 years ago , 3-4 years ago , 5 and more years

3.3 Government subsidy received:

Completely subsidized , 80-90% subsidized , 75 % , 50% , Not subsidized

3.4 What support do you receive from the insurance provider?

A. Service	Response		
B. Weather related information	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/> Not expected
C. Advisory on best animal husbandry practices to mitigate hazard impacts on animals	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/> Not expected
D. Tips on farm financial management	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/> Not expected
E. Tips on risk management	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/> Not expected
F. Others: _____	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/> Not expected

3.5 Were you involved in designing the insurance product?

Yes , No , Others in our village were involved , Not required , Can't say

3.6 Why did you enroll for insurance (Expected benefits)? (Check multiple if required)

Expected benefit	Rank	How were expectations met?
For quick recovery from disaster losses		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
For income stabilization		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
To have some income during disaster		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
Reduces dependency on loans		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
So that I could take more risks in my agriculture practices		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
Had to in order to obtain bank loans		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)
Others (specify) _____		(Least) 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> (Fully)

3.7 How did you enroll into insurance (Tick multiple if necessary)? By coercion of insurance agency , Voluntary decision due to perceived benefits

4. Insurance effectiveness

4.1 What was the insurance payout you received from the last crop loss due to disaster (refer to same year as in previous section on year of last crop loss due to disaster)? (BDT) _____

4.2 How much of the loss did the payout cover?

Covered complete loss (100%) , Covered 75% , Covered 50% , Covered <50 %

4.3 Total time taken to receive your insurance payout after the livestock loss was reported to the insurance agency: <1 month , 2 months , 3 months , 4 months , >4 months

4.4 Was the payout disbursement 'timely' for you to get back to your normal life?

Yes , No

4.5 Of your recovery from disaster, how much of it do you attribute to the insurance payout?

Completely attribute to payout money , Partially attribute to the payout money , Do not attribute to payout money

4.6 Where you able to purchase any assets during that year after receiving the payment?

Major assets Specify _____, Minor assets , None

4.7 Could you payback some loans/mortgages in the year you received the insurance payout?

Yes , No , didn't take any loan to payback

4.8 Did you change following in the disaster year compared to a normal year?

Type of cattle (e.g. from drought/disease susceptible to tolerant ones) : Yes No change

Cattle management practices (from old practices to better practices): Yes No

Other changes if any triggered due to enrolling in insurance:

4.9 Could you provide better quality fodder and supplements to your livestock after receiving insurance payout?

Yes , No

4.10 Did you increase the coverage of your insurance after this experience?

Yes , No , Decreased it , Stopped taking insurance Planning to increase the insurance coverage

5. Opinion on the Insurance Product

5.1 Rate the insurance program on 1-5 scale on the following indicators. 1 is very good and 5 is very bad

Quantum of sum assured: 1 2 3 4 5

Number of risks covered: 1 2 3 4 5

Period of risk coverage: 1 2 3 4 5

Convenience in enrolment: 1 2 3 4 5

Basis for making insurance payment: 1 2 3 4 5

Mechanism of grievance redress: 1 2 3 4 5

Time taken for claim settlement: 1 2 3 4 5

5.2 Do you want to continue subscribing insurance? Yes , No , Only if insurance is subsidized , Can't say

5.3 What improvements would you like to see in the insurance product to make it more effective?

[Tick multiple if needed]

Full loss coverage , more perils covered , only specific peril covered , full subsidization , no-subsidy , more knowledge to farmers on insurance , more knowledge to farmers on risk reduction measures , make insurance compulsory to all farmers , make insurance compulsory only to borrowing farmers , make it compulsory only to certain income level farmers (specify the income nature i.e. poor, rich etc.): _____

6. Long-term DRR and CCA impacts of insurance

6.1 Does enrolling insurance made you feel that you can engage in more risky livestock rearing (e.g. high risk high profit crops) activities?

Yes , No , Maybe /can't say

6.2 If yes, what risky practices have you been practicing after enrolling into insurance? _____

6.3 Is the insurance agency aware about these practices and if so what was their response? Yes No Agency

Response: _____

6.4 Have you adopted any of the following practices in your livestock management practices (select multiple boxes if required)

	Adopted after taking the insurance	Adopted before taking the insurance	Not yet adopted but considering for the future	Not adopted or Not considered
A. Crop management-				
New drought/pest resilient varieties				
Change sowing dates				
Change in cropping system redesign ³				
Other (Specify):				
B. Water management-				
New management strategies using less water ⁴				
Water conservation during summer				
More effective uses of irrigation				
Change of irrigation systems/new technology				
Other (Specify):				
C. Soil management				
Soil micronutrient management				
Soil erosion prevention methods				
Methods to conserve soil				
Others (Specify):				
D. Livestock				
Shift to high yielding breeds of cattle				
Better micronutrient feeding for livestock				
Invest in multiple livestock breeds				
Shift to drought/disease tolerant breeds				
Safe drinking water methods				
Water saving methods				
Better feed practices (Specify _____)				

³ Crop rotation, intercropping, multi-storey cropping, inclusion of perennial water source in dry lands

⁴ Amount and timing of irrigation

Immunization				
Artificial insemination <input type="checkbox"/>				
Others (Specify: _____)				

6.5 What are the constraints you have faced in adopting any of the previously mentioned adaptations in your agricultural practice?

High cost , Lack of financial support (banks loans, government subsidies etc.) , Lack of technical support , Lack of labor , Others specify _____

6.6. How has your livestock inputs changed after taking insurance?

Input	Trend (tick multiple if needed)	Comment/details
A. Livestock fodder and feed	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
B. Artificial insemination	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
C. Vaccination	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
D. Number of livestock	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	If increased, was it beyond the carrying capacity of the farm/resources you have? Not beyond the capacity <input type="checkbox"/> Comment if any:
E. Shelter	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
F. Others (Specify) _____	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	

6.7 Are your crop/animal choices influenced by availability of insurance for a particular crop/animal breed?

Yes , No , Can't say

6.8 Have you changed the number of crops/animals that you grow in the year after taking insurance?

Yes No

	Stress Year		Normal Year	
	Increased	Decreased	Increased	Decreased
A. Kharif	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Rabi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6.9 Have you felt the need to make changes in your traditional practices in order to adjust to climatic changes after taking the insurance?

Yes , No

6.10 What made you to feel the need for such a change? (Tick as many relevant)

Greater awareness on risks and their management from engaging with insurance , increasing cost of production , increasing losses due to climatic/weather factors , to reduce the premium price , others Specify: _____

6.11 How has your savings changed after taking insurance?

Increased , decreased , No change , Can't say

6.12 If your savings have changed after insurance by what percentage have they changed?

10-20%, 20-30%, 30-50%, 50-75%, 100%

6.13 How have your investments have changed after taking insurance?

Asset	No change	Increased	Decreased	% Change from before insurance
A. Livestock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
B. Owned land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Leased land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Irrigation facilities (<input type="checkbox"/> ponds, <input type="checkbox"/> canals, <input type="checkbox"/> drip, <input type="checkbox"/> sprinkler etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. Household assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
F. Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

6.12 To what do you attribute the above changes? Insurance has helped reduce the income fluctuations , support services provided for better animal husbandry by insurance agency helped in reducing the losses , others _____

6.14 Do you have additional income in your household to invest in further income generating activities (Value addition for agricultural products, etc.) after taking up insurance? Yes No

6.15 Do you have additional income in the house for non-essential activities (recreational etc.) after taking up insurance? Yes No Same

6.16 Do you feel more confident that you will not have to sell your assets during disasters (livestock/land) after taking up insurance? Yes No Same

6.17 Have you seen any perceivable reduction in disease/ flood/drought impacts in your village that can be attributed to insurance after introduction of insurance?

Yes , No , Cant say

6.18 Specify the reason for the above if any: _____

6.19 Has the insurance contributed to stabilizing you income from animal husbandry?

Yes No Can't say Insurance pay off has not yet happened

6.20 Are you confident that insurance can lead to long-term wellbeing compared to without insurance? Yes , No , Can't say , Others: _____

6.21 If yes, how confident are you? Very high , High , Medium , Low , Very low

6.22 Do you feel that you could have used the money spent for insurance premium for more gainful livelihood activities?

Yes , No , Cant say

6.23 If yes, what are those better alternatives to invest? (Tick multiple if needed)

Income diversification options (Specify _____) , invest in better farm infrastructure (Specify: _____) , invest in better animal breeds , invest in better crop varieties , others: Specify _____

6.24 Do you think the insurance effectiveness will be different if the insurance pay out beneficiary is female member of the household rather than the male member? Yes , No , Can't say , will not make a difference as the farming decisions are made collectively in the family

6.25 Please rate the perceived impact of insurance on the following aspects in your household

	Very highly +ve	Highly +ve	+ve	No impact	-ve	Highly -ve	Very highly -ve
Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family nutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liquidity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk taking ability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk awareness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Recovery from loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Education of children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7.7. Insurance payout spending

7.1 How did you spend your last insurance pay out? Please explain _____

7.2 Did you receive advice or guidance on how to spend the payout to enhance your livelihood? Yes , No

If Yes, from whom _____ What advice did you receive?

7.3 If no, do you feel that you could have spent the insurance payout more gainfully for livelihood enhancement if you had received advice?

Yes No

Thank you!

Malaysia Uninsured

Village name _____

Questionnaire Number _____

Nature of respondent: Uninsured

1. Background of the respondent

1.1 Gender: Male Female

1.2 Occupation of the respondent: Farmer, Animal husbandry Merchant Rural artisan, Farm laborer, Rural entrepreneur, Others

1.3 What is the highest level of education that you have completed?

Illiterate , Pre-Primary School (1-5) , Upper primary (6-8) , High School (9-10) , PUC , Diploma Course , Graduation , Post-Graduation and above , Technical Degree (medical, engineering, agriculture, etc.) , Others Specify _____

1.4 **A.** Total number of family members _____ **B.** Number of earning members

1.5 What type of housing do you currently occupy?

Katcha-Thatched roof , Katcha -Tiled roof , Semi pucca , Pucca(Through housing scheme) , Pucca (concrete slab) , Others _____

1.6 Area of land owned (ha)?

0 , 0.25-0.5 , 0.5-1.0 , 1-1.5 , 1.5-2.0 , 2.0-2.5 , >2.5

1.7 Do you lease land and how much? Yes , No Area of land taken on lease _____ (ha)

1.8 % of land (ha) under arable cropping <10, 20-40, 40-60, 60-80, 80-100

1.9 Livestock owned (type and number)

Pig _____ Cow _____ Chicken _____ Goat _____ Others : _____

1.10 Do you have bank savings? Yes , No

1.11 Sources of household income

Source of Income	Tick appropriate box		% of annual income
	Primary	Secondary	
A. Agriculture	<input type="checkbox"/>	<input type="checkbox"/>	
B. Livestock	<input type="checkbox"/>	<input type="checkbox"/>	
C. Forest produce	<input type="checkbox"/>	<input type="checkbox"/>	
D. Manual labor in the village	<input type="checkbox"/>	<input type="checkbox"/>	
E. Seasonal migration to nearby city (Name the city: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
F. Business (Specify: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
G. Regular job	<input type="checkbox"/>	<input type="checkbox"/>	
Others	<input type="checkbox"/>	<input type="checkbox"/>	

1.12 What kind of agricultural products you have been producing (crops, animals or aquatic products)

in the normal year and deficit rainfall year?

	Arable crop	Diary products	Meat	Aquatic	Others (mention)
A. Normal year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Stress year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Specify the nature of stress: _____

1.13 How many different crops do you grow during a particular season?

Year	Rabi	Kharif	Other
A. Normal	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>
B. Deficit rainfall	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and above <input type="checkbox"/>

1.14 Loans taken in the last five years:

	Year	Sources of Loan ¹	Loan as % of total annual income	Purpose	% Repaid
A					
B					
C					
D					
E					

¹ a) Bank, b) Money lender, c) friend, d) family member, e) neighbor, f) others

1.15 Who makes farming/ animal husbandry investment decisions in your household?

Elder male member , younger male members , elder female member , younger female members , all adults in the family , all family members

1.16 Are there months in the year you find it difficult to provide food for your family?

Yes , No

1.17 If yes, in what months (and number: _____) most difficult to provide adequate food for household members _____

Why? _____

1.18 How many times in a month des your family borrowed food grains?

A. Normal year: Once , twice , thrice and above (number of times _____)

Never

B. Stress year: Once , twice , thrice and above (number of times _____)

Never

1.19 Are there months in the year you find it difficult to provide fodder for the cattle

Yes No

1.20 If yes, in what months (and number of months: _____) most difficult to provide adequate fodder _____

Why? _____

1.21 How many times in a month does you had to borrowed fodder?

A. Normal year: Once , twice , thrice and above (number of times _____) , Never

B. Stress year: Once , twice , thrice and above (number of times _____) , Never

1.22 When did you purchase the cattle:

1.23 When did you purchase the cattle: dd/mm/yyyy: _____

1.24 What type of cattle do you grow? Deshi , cross breed , others (specify)

1.25 What kind of fodder do you feed the cattle? Grass Straw Processed straw

Grains Others (specify) _____

1.26 What type of medicines do you use for the cattle: _____

quantity of the one most important medicine used per cattle: _____

when was it used: _____

1.27 What type of immunization have you done for the cattle _____ quantity of the most important immunization done recently per cattle: _____, and when was it done (last date of immunization dd/mm/yyyy): _____

1.28 Name the diseases have you observed in your cattle: _____, what kind of treatment have you provided: _____

2. Hazards and Impacts

2.1 Rank the leading causes of the livestock loss:

Peril	Rank
A. Drought	
B. Flood	
C. Delayed rainfall	
D. Pests and diseases (Specify: _____)	
E. Others:	

2.2 Frequency of livestock loss:

Every year	Once in 2 yr	Once in 3 yr	Once in 4 yr	Once in 5 yr	Once in 6 and above
A. <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.3 What was the average crop loss over the past five years?

Complete crop loss , 90-80% loss , 70-60% loss , 40-50% loss , 20-30% loss , No loss , Didn't measure/ can't remember

2.4 When were the recent livestock loss failures due to natural calamity? Specify the calamity. Never

Year	Calamity (specify)	Total loss (BDT) ¹	Livestock loss (% of total loss) ²
A			
B			
C			

¹ Total of all losses including crop, livestock and other income sources if any from the disaster

2.5 How did you come out of loss from the most recent disaster (Year from above table: _____)? (Tick multiple if needed)

Bank loan waived off , specify as % of total loss _____

Bank loan , specify as % of total loss _____ Interest rate _____

Government paid the compensation , specify as % of total loss _____

Sold assets , specify as % of total loss _____

Informal Borrowing , specify as % of total loss _____ Interest rate _____

Other income sources Specify source: _____

Couldn't come out, I am still at loss

Others: _____

2.6 Was government compensation timely? Yes , No

2.7 Was the government compensation sufficient to come out of loss? Yes , No , Partially

2.8 If you sold assets/ mortgaged, what asset did you sell/mortgage? (Tick multiple if applicable)

Livestock , Land , buildings , Farm implements , jewelry , Others (specify): _____

2.9 If you borrowed informally whom did you borrow from?

Family , Friends/Neighbors , Village money lender, Others(specify): _____

2.10 Did you or any of your household members have to migrate (unseasonal) during the drought/flood to provide extra income? Yes , No

2.11 Did you had to make household consumption adjustment during this period? Yes , No

2.12 If 'Yes' how did you reduce expenditure?

Reduced nutrition , On health care , Reducing expenditure on education , Reducing cost on social functions , Reducing the leisure activities , others

2.13 Did you have any household food shortages during this period? Yes , No

2.14 Did any of your livestock die due to the disaster related causes, specify type and number?

Pig _____ Cow _____ Chicken _____ Goat _____ Others: _____

- 2.15 If you sold livestock, specify the type and number of livestock sold
 Pig _____ Cow _____ Chicken _____ Goat _____ Others : _____
- 2.16 If yes, amount that the livestock was sold for (_____ BDT), what is the price of the cattle during normal periods (_____ BDT)
- 2.17 Did you grow sufficient fodder at this time to feed your cattle? Yes , No
- 2.18 If 'No' where did you obtain fodder from? Bought from market Informal borrowing
 Migrated to area with better pasturing ground
- 2.19 If you bought fodder, where did you obtain money to buy fodder from?
 Savings
 Compensation paid by government ,
 Sold assets
 Informal Borrowing
 Other income source
- 2.20 How was the productivity (diary, farm work) of your livestock during the year of the disaster?
 Less productive , More productive , Same
- 2.21 Did you provide any nutritional supplements to improve health of your cattle during this period?
 Yes , No
- 2.22 If 'Yes' where did you obtain money to purchase the nutritional supplements?
 Compensation paid by government , Sold assets , Informal Borrowing , Other income source

3. DRR and CCA practices

3.1 Have you adopted any of the following practices in your regular agriculture practices over the last five years (select multiple boxes if required)

	Adopted	Not yet adopted but considering for the future	Not adopted or Not considered
A. Crop management-			
New drought/pest resilient crop varieties			
Change sowing dates			
Change in cropping system ¹			
Other (specify):			
B. Water management-			
New management strategies using less water			
Water conservation during summer			
More effective use of water ²			
Change of irrigation systems/new technology			
Other (specify):			
C. Soil management			
Soil micronutrient management			
Soil erosion prevention methods			
Methods to conserve soil			
Other (specify):			
D. Livestock			
Shift to high yielding breeds of cattle			
Better micronutrient feeding for livestock			
Invest in multiple livestock species			
Shift to drought tolerant species			
Safe drinking water methods			

⁵ Crop rotation, intercropping, multi-storey cropping, inclusion of perennial water source in dry lands

Water saving methods			
Better feed practices (Specify _____)			
Immunization			
Artificial insemination			
Others (Specify: _____)			

3.2 Why have you not adopted any of the previously mentioned practices in?

High cost , Lack of financial support (banks loans, government subsidies etc.) ,

Lack of technical support , Lack of labor , Others specify

3.3 Has your expenditure in livestock inputs changed over the last five years?

Input	Trend (tick multiple if needed)	Comment/details
A.Livestock fodder and feed	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
B.Artificial insemination	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
C.Vaccination	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
D.Number of livestock	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	If increased, was it beyond the carrying capacity of the farm/ resources you have? Not beyond the capacity <input type="checkbox"/> Comment if any:
E.Shelter	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	
F. Others (Specify)	<input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Stayed the same <input type="checkbox"/> Better type	

3.4 What are the main factors that determine your crop choices?

Input costs , Availability of water , Weather conditions (rainfall etc.) , Diseases Others

Specify _____

3.5 Have you changed the number of crops that you usually grow in the last five years.

Yes No

	Stress Year		Normal Year	
	Increased	Decreased	Increased	Decreased
A. Kharif	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Rabi	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.6 Have you felt the need to make changes in your traditional practices in order to adjust to climatic changes in the last five years? Yes , No

3.7 What made you to feel the need for such a change? (Tick as many relevant)

Greater awareness on risks and their management from engaging with the insured neighbors/ friends , increasing cost of production , increasing losses due to climatic/ weather factors , Others

(Specify): _____

3.8 Are you able to pay debts and mortgages completely?
 Yes , No , Do not have any debts , Partially pay the debts

3.9 How are your savings changing in the past five years?
 Increased Decreased No change Can't say

3.10 How have your investment have changed within the last five years?

Asset	No change	Increased	Decreased
A. Livestock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Owned land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Leased land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Irrigation facilities (<input type="checkbox"/> ponds, <input type="checkbox"/> canals, <input type="checkbox"/> drip, <input type="checkbox"/> sprinkler etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Farm house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.11 To what do you attribute the above changes? Better animal husbandry skills by observing the insured neighbors/ friends , better extension support services by local animal husbandry department after introduction of cattle insurance in the village , better breeds due to government support Others (Specify): _____

3.12 Do you have additional income in your household to invest in further income generating activities (value addition for agricultural products, etc)? Yes No

3.13 Do you have additional income in the household for non-essential activities (recreational etc)? Yes No Same

3.14 Do you want to invest to diversify your livelihood strategies?

Want to but no resources Want to but do not have sufficient skills/expertise , Have already invested Others Specify: _____

3.15 Do you feel that you can provide sufficient fodder ad nutrition for livestock during disaster years? Yes No

3.16 Do you feel that the previous cattle losses are preventing you from coming out of poverty/ low income status Yes No

3.17 Have you observed any changes in the village after introducing insurance in the village? Yes No I am not aware that insurance has been introduced Can't say

3.18 If yes, what are they? Farmers have started taking risky agriculture production decisions , Less and less of farmers are taking loans now , more and more non-farm investment/activities , farmers are now more knowledge on better animal husbandry practices , Other specify

3.19 Why have you not taken up crop insurance?

Lack of knowledge on insurance , Non availability , No funds to pay premium Don't feel the need for it

3.20 What improvement would you like to see in the insurance product to make it more effective and for you take up insurance? (Tick multiple if needed)

Full loss coverage , more perils covered , Only specific peril covered Full subsidization , no-subsidy more knowledge to farmers on insurance more knowledge to farmers on risk reduction measures , Make insurance compulsory to all farmers Make insurance compulsory only to borrowing farmers , Make it compulsory only to certain income level farmers (Specify the income nature i.e poor, rich etc): _____

3.21 Would you enrol for the insurance if the above changes were made? Yes No

Can't say Specify if any other : _____

Annexure 3: Questionnaires used in India case study

India Insured

Village name:

Survey form Number: In

The aim of the project is to understand the effectiveness of crop insurance in India. It is therefore necessary the costs and benefits of the insurance program implemented are assessed for various economic classes

Start the interview by describing the purpose of the survey: for academic research only, accurate answers are important and gratefully acknowledged etc. We are going to ask you some questions about your farm, particularly the details regarding the insurance program that you have taken up. All the information will be treated confidentially.

Basic Information

1. Caste/Tribe		
2. Farming Land owned	a) Yes <input type="checkbox"/> b) No <input type="checkbox"/>	Land size (acres) _____
3. Leased land for farming	a) Yes <input type="checkbox"/> b) No <input type="checkbox"/>	Land size (acres) _____
4. Sex	Male <input type="checkbox"/> Female <input type="checkbox"/>	
5. Age		
6. Education	<input type="checkbox"/> Illiterate, <input type="checkbox"/> Below 5 th , <input type="checkbox"/> 6-9 th , <input type="checkbox"/> 10 th standard, <input type="checkbox"/> 10+2 <input type="checkbox"/> College degree <input type="checkbox"/> Post graduate, <input type="checkbox"/> Others	
7. Primary occupation	<input type="checkbox"/> Farmer, <input type="checkbox"/> Merchant, <input type="checkbox"/> Rural artisan, <input type="checkbox"/> Farm laborer, <input type="checkbox"/> Rural entrepreneur <input type="checkbox"/> Rural entrepreneur (Specify: _____), <input type="checkbox"/> others: Specify: _____	
8. Secondary occupation	<input type="checkbox"/> Farmer, <input type="checkbox"/> Merchant, <input type="checkbox"/> Rural artisan, <input type="checkbox"/> Farm laborer, <input type="checkbox"/> Rural entrepreneur (Specify: _____), <input type="checkbox"/> others: Specify: _____	
9. Income status	<input type="checkbox"/> Rich, <input type="checkbox"/> Middle income <input type="checkbox"/> Poor Type of house: <input type="checkbox"/> concrete slab house, <input type="checkbox"/> tiled roof, <input type="checkbox"/> thatched house Total landholding size in acres: _____	

10. % of total income from the secondary occupation (Approximate, Rs): _____

11. Nature of income from the secondary occupation: Regular income: Monthly, seasonal, annual; irregular income: sporadic but certain, uncertain

12. What are the main crops that you have cultivated over the last 3 years, list in order of acreage cultivated?

1. Crops	2. Acres	3. Hybrid =1 Indigenous =2	4. Chemical pesticides and fertilizers =1 Organic =2	5. Irrigated =1 Rainfed =2	6. Purpose of growing Market =1, own consumption =2, Both =3	7. Crop losses if any, Yes =1, No =2	8. Reason (list as many)*	9. Amount of loss in % and year
								% yr
								% yr
								% yr
								% yr

1. Crops	2. Acres	3. Hybrid =1 Indigenous=2	4. Chemical pesticides and fertilizers=1 Organic =2	5. Irrigated=1 Rainfed=2	6. Purpose of growing Market=1, own consumption=2, Both =3	7. Crop losses if any, Yes=1, No=2	8. Reason (list as many)*	9. Amount of loss in % and year
								% yr
								% yr
								% yr

*Reasons: Low Rainfall=1, Irregular rainfall=2, Pests=3, Diseases=4, Markets=5, Others=6. Specify _____

Insurance

1. Insurance that you have	2. Premium paid Rs/annum	3. Period of insurance (year)	4. Subsidy on premium received (%)	5. Payout received			
				a. Yes=1, No=2, Don't know=3	b. Year	c. Amount (Rs)	d. Time between claims submission and payout (days)
a. Agriculture <input type="checkbox"/>							
b. Livestock <input type="checkbox"/>							
c. Life <input type="checkbox"/>							
d. Health <input type="checkbox"/>							
e. Property <input type="checkbox"/>							
f. Others <input type="checkbox"/>							

6. Source of money to pay for insurance premiums: a. Own savings , b. Loans , c. Profits from last season , d. By selling assets , e. Others _____
If assets were sold: Which assets: Livestock , property , gold , Others _____

Details of agricultural insurance that you have

1. Type of agriculture Insurance	2. Crops insured	3. Year insured	4. Period of insurance (Kharif/Rabi)	5. Insured crop as % of total crop sown	6. Premium paid (Rs)	7. Subsidy (%) received on premium
Weather Index Insurance	1.					
	2.					
	3.					
	4.					
Indemnity	1.					
	2.					
	3.					
	4.					

8. Any other relief money received in addition to the insurance pay out after a disaster?

a. Yes Total relief amount in INR _____ in year _____
Source of relief money: Government, Others (e.g. NGO etc): _____

b. No , c. Don't know/cant tell

9. Do you feel that relief money received from the government was enough to cover losses?

a. Yes b. No c. Don't know/cant tell

10. Do you feel agriculture insurance is still useful a. Yes b. No c. Don't know/can't tell

Opportunity costs

1. Do you feel that you could have invested the premium money for more profitable/effective livelihood activities **to reduce losses** instead of investing in crop insurance?

a. Yes , b. no, insurance is the best means of buffering the shocks , c. Don't know/can't tell

2. Other livelihood activities you have taken up for buffering the weather related shocks, tick all relevant options

Investment	Investment Amount (Rs)	Net profits in a normal year (Rs)	Net profits in a disaster year (Rs)
a. Invest in cattle <input type="checkbox"/>			
b. Small business <input type="checkbox"/>			
c. Invest in poultry <input type="checkbox"/>			
d. Agriculture produce associated business <input type="checkbox"/>			
f. Other: _____			

3. Why invest in these rather than depositing in a savings account: better returns than bank interest, other reasons: (Please specify)

4. What are the other risk management strategies that **you could have invested the money spent on premium?**

Risk management strategy	Additional Cost	Additional Benefit (Rs)	Why did you not opt to use this method
a. Drilling of bore well or a. Others <input type="checkbox"/> _____			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Don't know <input type="checkbox"/> Cannot afford <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____
b. Installing new irrigation technology such as drip or sprinkler or b. Others <input type="checkbox"/> _____			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Don't know <input type="checkbox"/> Cannot afford <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____
c. Established rain water harvesting structure Or c. Others <input type="checkbox"/> _____			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Cannot afford <input type="checkbox"/> Don't know <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____

I do not know where to invest other than in insurance premium as I have no knowledge. However, I think there is a potential to find alternatives to insurance.

5. Based on your experience and opinion, rate the potential for implementing alternatives risk management strategies other than insurance: Very low, low, moderate, high, very high, No potential

6. How often does insurance **not** get triggered and you have **not** received payout although you have a significant crop loss?

a. once , b. twice , c. Twice , d. Never (If never, skip Q7)

7. Please list the last three times that this has occurred with the amount of loss incurred (i.e. loss occurred but insurance pay out was not received)

Year, season and crop	Amount of loss (Rs)	Reason for no payout
a. Year		Risk was not covered by insurance <input type="checkbox"/> Required threshold was not reached in order for insurance to be triggered <input type="checkbox"/> Uninsured area <input type="checkbox"/> Don't know <input type="checkbox"/> Others <input type="checkbox"/> Specify: __
season		
crop		How did you come out of the loss: Took loans <input type="checkbox"/> Government relief <input type="checkbox"/> NGO aid <input type="checkbox"/> Sold assets (property, cattle) <input type="checkbox"/> Specify: _____ Migrated for work <input type="checkbox"/> Got another job <input type="checkbox"/> Couldn't come out of loss <input type="checkbox"/> Others, specify <input type="checkbox"/> : _____
b. Year		Risk was not covered by insurance <input type="checkbox"/> Required threshold was not reached in order for insurance to be triggered <input type="checkbox"/> Uninsured area <input type="checkbox"/> Dont know <input type="checkbox"/> Others <input type="checkbox"/> Specify _____
season		
crop		How did you come out of the loss: Took loans <input type="checkbox"/> Government relief <input type="checkbox"/> NGO aid <input type="checkbox"/> Sold assets (property, cattle) <input type="checkbox"/> Migrated for work <input type="checkbox"/> Got another job <input type="checkbox"/> Couldn't come out of loss <input type="checkbox"/> Others
c. Year		Risk was not covered by insurance <input type="checkbox"/> Required threshold was not reached in order for insurance to be triggered <input type="checkbox"/> Don't know <input type="checkbox"/> Others <input type="checkbox"/> Specify _____
season		
crop		How did you come out of the loss: Took loans <input type="checkbox"/> Government relief <input type="checkbox"/> NGO aid <input type="checkbox"/> Sold assets (property, cattle) <input type="checkbox"/> Migrated for work <input type="checkbox"/> Got another job <input type="checkbox"/> Couldn't come out of loss <input type="checkbox"/> Others __

8. After the previous experience, how confident are you in the insurance scheme with regard to the following aspects

	Low	Medium	High
a. Timeliness of receiving payouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Loss coverage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Fairness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Ease of receiving payouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Regarding the previous negative experiences with insurance why do you still maintain the insurance scheme (multiple selections OK)

- a. Government regulation for taking a crop loan
 b. Have more confidence it will work now
 c. Have better understanding of the insurance product
 d. Don't know/cant tell
 e. Other Specify _____

Enrolling for insurance

1. What was the major reason for enrolment to insurance (only one option): a. Increased frequency of crop losses , b. To access credit from banks , c. Friends influence , d. Others : _____

2. What are the three top issues you faced during insurance enrolment? Rank top three issues.

	Rank top three issues (1 is high rank and 3 is lowest rank)
a. Number of documents required	
b. Mandatory bank account requirement	
c. Not enough knowledge	
d. High premium rate	
e. Inconvenience due to Long <input type="checkbox"/> complicated procedures <input type="checkbox"/>	
f. Others (specify)	

3. How many times has insurance been triggered since you have enrolled _____

4. Year that **insurance was triggered and payment was made**

Year	Insurance payout received (Rs)	Total premium paid before this payout was received (Rs)	% of total crop loss covered by insurance payout
a.			
b.			
c.			

Answer all of the following question with regards to the last year that insurance payout for crop loss was received (Year _____)

Regarding the losses of insured crop

1. Total investment in regular agricultural activities (labor, inputs etc.) (Rs)	
2. Total expected annual income from insured farm (Rs)	
3. Total losses (Rs) _____	Main reason for loss Unseasonal rainfall <input type="checkbox"/> No rains <input type="checkbox"/> Disease <input type="checkbox"/> Pests <input type="checkbox"/> Markets <input type="checkbox"/> Others <input type="checkbox"/>
4. Total investment in non-agricultural livelihoods (Rs) _____	What was the livelihood Cattle <input type="checkbox"/> Shop <input type="checkbox"/> Cottage industry <input type="checkbox"/> Agricultural processing unit <input type="checkbox"/> Others <input type="checkbox"/>
5. Total expected profits from non-agricultural livelihoods (Rs) _____	

6. Losses, if any, in non-agricultural livelihoods (Rs) _____	Main reason for loss

Regarding payout received

- Please tell me the last year when payment was received _____ (year), answer the following question with regard to the payment received for the same year
- What was the extent of crop loss in % _____ , Didn't measure
- What % of the crop loss were you compensated for by the insurance in % of loss _____
- How long did it take to receive payment after loss 1-3 weeks , 1-2 months, 3-4 months , 5-6 months , 7 and above
- How difficult was it to receive payment: Not difficult , Medium , Hard , Very hard , Not possible
- How did you come out of the loss in the year that you received the payout (Tick multiple if needed) and rank top three of them according to importance in your recovery from 1-3, 1 is most important and 3 is least important)

Recovery measure	Rank (1-3, 1 most important for recovery and 3 least important)
a. Took bank loan <input type="checkbox"/>	
b. Bank loan waived off <input type="checkbox"/>	
c. Received a government compensation <input type="checkbox"/>	
d. Sold assets <input type="checkbox"/> Specify _____	
e. Other income sources <input type="checkbox"/>	
f. Couldn't come out, I am still at loss. <input type="checkbox"/>	No need to include this in ranking
g. Others: _____	

- For the season that you received the insurance payout can you answer the following question (Provide more details on the above income sources)

a. Did you take any loans? Yes <input type="checkbox"/> No <input type="checkbox"/>	Source of loan	Amount (Rs)	Loan paid No=1, Yes=2, Partially=3
	Bank <input type="checkbox"/>		
	Money lender <input type="checkbox"/>		
	Friends relative <input type="checkbox"/>		
<u>Reason for loans</u> Agricultural inputs <input type="checkbox"/> , Buying assets <input type="checkbox"/> , Regular HH expenses <input type="checkbox"/> , Sudden HH expenditure (wedding, illness etc) <input type="checkbox"/> , Recover from disaster <input type="checkbox"/> , Insurance coverage not sufficient <input type="checkbox"/> , Others <input type="checkbox"/> specify _____			
b. Did you have to sell any cattle Yes <input type="checkbox"/> No <input type="checkbox"/>	Price sold for _____ (Rs) Above market price <input type="checkbox"/> , Below market price <input type="checkbox"/> , Don't know <input type="checkbox"/>		
	<u>Reason for selling</u> Agricultural inputs <input type="checkbox"/> , Buying assets <input type="checkbox"/> , Regular HH expenses <input type="checkbox"/> , HH expenditure (wedding, illness) <input type="checkbox"/> , Recover from disaster <input type="checkbox"/> , Insurance coverage not sufficient <input type="checkbox"/> , Others <input type="checkbox"/> specify _____		
c. Did you have to sell any land Yes <input type="checkbox"/> No <input type="checkbox"/>	Price sold for _____ (Rs) Above market price <input type="checkbox"/> , Below market price <input type="checkbox"/> , Don't know <input type="checkbox"/>		
	<u>Reason for selling</u> Agricultural inputs <input type="checkbox"/> Buying assets <input type="checkbox"/> Regular HH expenses <input type="checkbox"/> Sudden HH expenditure (wedding, death, illness) <input type="checkbox"/> Insurance coverage was not sufficient <input type="checkbox"/> , Recover from disaster <input type="checkbox"/>		

Unproductive land, Others specify _____

8. Did you made household consumption adjustment during this period? Yes , No

9. What kind of adjustments have you had to do to cope with the crop loss (**Note:** strike out reduced or increased depending on the response)?

a. Reduced/increased Nutrition , b. reduced/increased medical expenses , c. reduced/increased education , d. Reduced/increased social events (marriages etc.) , e. Reduced/increased leisure activities , f. reduced/increased investment in livelihoods , g. Others Specify:

10. At the end of the year you received the payout what is the total **outstanding debt** that you had (Rs)

11. In total, how much time did it take for you to fully recover from the crop loss?

1-3 months , 3-6months , 6months-9months , 9months-1year , >1 year , Have not come out of losses

Spending of the insurance payout received

1. Does the presence of insurance give you confidence to engage in more risky farming (high risk, high profit crops) activities?

Yes , No , Maybe/cant say

If yes, what crops, what area and since when: _____

2. How did you spend the insurance payout (can tick more than one)

	More than regular amount spent	Less than regular amount spent	Same as regular amount spent	% of insurance payout spent
a. Inputs for next cropping season	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. Specify: Seeds <input type="checkbox"/> , Fertilizer <input type="checkbox"/> , Pesticides <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. Farm equipment <input type="checkbox"/> Specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. Drilling bore well <input type="checkbox"/> , Pump <input type="checkbox"/> , Electricity connection for bore well <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. Irrigation equipment: Specify: Drip irrigation system <input type="checkbox"/> , Sprinkler system <input type="checkbox"/> , Others <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. Household expenses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. Paying off debts: Money lender <input type="checkbox"/> , Bank <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
h. Others <input type="checkbox"/> Specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

3. Have you made additional investments, which you may not be making in absence of insurance Yes , No

4. What are those additional investments? _____

5. What is the reason for these additional investments?

a. As an additional non-agriculture source of income

b. Due to increased risk in traditional agricultural livelihood

c. Others _____

6. Have you engaged in any of the following activities after signing up for crop insurance?

1. Cultivating high risk but high yield varieties <input type="checkbox"/> Specify crops and area _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
2. Invest in better quality seeds <input type="checkbox"/> Specify: _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>

3. Increased irrigation. Specify area increased under irrigation <input type="checkbox"/> : _	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
4. Increased mechanization <input type="checkbox"/> Details _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
5. Decreased crop diversification <input type="checkbox"/> Details: _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
6. Increase in growing of cash crops <input type="checkbox"/> Specify crops and area _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
7. Others <input type="checkbox"/> Details _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>

Others

1. Of your recovery from your losses, how much do you attribute it to the insurance payout?

a. Completely attribute to payout money

b. Partially attribute to the payout money

c. Do not attribute to payout money

2. Did you increase the coverage of your insurance after this experience?

Yes , No , Decreased it , Stopped taking insurance , others, specify :

If yes, how much did you increase the coverage? _____

If decreased, how much? _____

3. Do you think the government should subsidize the premium component of the crop insurance?

a. Yes , 100% subsidized , 75% , 50% , 25% , 10% , Subsidy rate should depend on the economic level of the farmer

b. No, the government should not subsidize the crop insurance ,

4. What proportion of your crop loss do you think the crop insurance should cover?

a. 100% loss is to be covered by the insurance

b. Partially covered but should be sufficient for full recovery from the loss

c. Other, specify: _____

5. If you have any queries or problems regarding your insurance are there any trusted representatives that you can approach?

Yes , No

6. Rate the following with regards to your experience 1-very bad 5 is very good

	Rating (1-5, 1 is very bad 5 is very good)
a. Knowledge on the product	
b. Ease of enrolment	
c. Information on calculation of premium	
d. Amount of premium	
e. Amount of payout received	
f. Time taken for payout	
g. Process of receiving payout	

Costs and benefits of Insurance

Costs

- Household income stress due to high premium
- Inability/difficulty in paying premium
- Crop failure but no compensation
- Unavailability of cash during crucial periods (Seed buying etc.)
- Can also lead to delayed recovery from disaster
- Losses from prevalent risks (disease, pests, markets) which remain uncovered
- Reducing sustainable risk mitigation activities (Eg. Soil conservation, irrigation technologies)
- Reduced consumption
- Loans
- Uncompensated crop losses of insured crops

- Time taken to receive payout after loss
- Debts
- Increased water usage
- Decreased soil fertility
- Reduced water availability

Benefits

- Consumption smoothing
- No income fluctuation
- Improved credit worthiness
- Increased agriculture profitability
- Increased confidence
- Increased high risk high yield crops planted
- Increased investment in livelihood assets
- Post disaster liquidity
- Ability to recover from disaster
- Timely insurance payout
- Increased bank loans taken for high yield crop/farm practices
- Increased monoculture
- Timely insurance payout
- Steady income in loss year
- Reduced debts
- Preserved assets
- Increased Investment expenditure
- Increased farm profits
- Increased profits

India Uninsured

UnIn

Village name:

Survey form Number:

Basic Information

1. Name of primary respondent		
2. Caste/Tribe		
3. Farming Land owned	a) Yes <input type="checkbox"/> b) No <input type="checkbox"/>	Land size (acres) _____
4. Leased land for farming	a) Yes <input type="checkbox"/> b) No <input type="checkbox"/>	Land size (acres) _____
5. Sex	Male <input type="checkbox"/> Female <input type="checkbox"/>	
6. Age		
7. Education	<input type="checkbox"/> Illiterate, <input type="checkbox"/> Below 5 th , <input type="checkbox"/> 6-9 th , <input type="checkbox"/> 10 th standard, <input type="checkbox"/> 10+2 <input type="checkbox"/> College degree <input type="checkbox"/> Post graduate, <input type="checkbox"/> Others	
8. Primary occupation	<input type="checkbox"/> Farmer, <input type="checkbox"/> Merchant, <input type="checkbox"/> Rural artisan, <input type="checkbox"/> Farm laborer, <input type="checkbox"/> Rural entrepreneur <input type="checkbox"/> Rural entrepreneur (Specify: _____), <input type="checkbox"/> others: Specify: _____	
9. Secondary occupation	<input type="checkbox"/> Farmer, <input type="checkbox"/> Merchant, <input type="checkbox"/> Rural artisan, <input type="checkbox"/> Farm laborer, <input type="checkbox"/> Rural entrepreneur (Specify: _____), <input type="checkbox"/> others: Specify: _____	
10. Income status	<input type="checkbox"/> Rich, <input type="checkbox"/> Middle income <input type="checkbox"/> Poor Type of house: <input type="checkbox"/> concrete slab <input type="checkbox"/> tiled roof, <input type="checkbox"/> thatched house Total landholding size in acres: _____	

11. % of total annual income from the secondary occupation (Approximate, Rs): _____

12. Nature of income from the secondary occupation: Regular income, Monthly, seasonal, annual), irregular income (sporadic but certain, uncertain)

13. What are the main crops that you have cultivated over the last 3 years, list in order of acreage cultivated?

1. Crops	2. Acres	3. Hybrid =1 Indigenous =2	4. Chemical pesticides and fertilizers =1 Organic =2	5. Irrigated =1 Rainfed =2	6. Purpose of growing Market =1, own consumption =2, Both =3	7. Crop losses if any, Yes =1, No =2	8. Reason (list as many)*	9. Amount of loss in % and year
								% yr
								% yr
								% yr
								% yr
								% yr
								% yr
								% yr
								% yr

*Reasons: Low Rainfall=1, Irregular rainfall=2, Pests=3, Diseases=4, Markets=5, Others=6. Specify _____

Previous disaster year- Coping

Please answer the following questions with regards to the last year when you suffered serious crop losses
Crop loss year _____ Crop _____

1. Total investment in regular agricultural activities (labor, inputs etc.) (Rs)	
2. Total expected annual income from insured farm (Rs)	
3. Total losses (Rs)	Main reason for loss Unseasonal rainfall <input type="checkbox"/> No rains <input type="checkbox"/> Disease <input type="checkbox"/> Pests <input type="checkbox"/> Markets <input type="checkbox"/> Others <input type="checkbox"/>
4. Total investment in non-agricultural livelihoods (Rs)	What was the livelihood Cattle <input type="checkbox"/> Shop <input type="checkbox"/> Cottage industry <input type="checkbox"/> Agricultural processing unit <input type="checkbox"/> Others <input type="checkbox"/>
5. Total expected profits from non agricultural livelihoods (Rs)	
6. Losses (if any) in non-agricultural livelihoods (Rs)	Main reason for loss _____ _____

7. How did you come out of the loss (Tick multiple if needed) and rank top three of them according to importance in your recovery. Tick the relevant ones and rank only among the ticked ones.

Recovery measure	Rank (1-3, 1 most important for recovery and 3 least important)
------------------	---

a. Took bank loan <input type="checkbox"/>	
b. Bank loan waived off <input type="checkbox"/>	
c. Received a government compensation <input type="checkbox"/>	
d. Sold assets <input type="checkbox"/> Specify _____	
e. Other income sources <input type="checkbox"/> _____	
f. Couldn't come out, I am still at loss. <input type="checkbox"/>	No need to include this in ranking
g. Others: _____	

8. Did you made household consumption adjustment during this period? Yes , No

9. What kind of adjustments have you had to do to cope with the crop loss?

a. Nutrition b. Medical expenses c. Education d. Social events (marriages etc.) e. Leisure activities f. Investment in livelihoods g. Others Specify: _____

10. For the season that you suffered the loss can you answer the following question			
a. Did you take any loans? Yes <input type="checkbox"/> No <input type="checkbox"/>	Source of loan	Amount (Rs)	Loan paid No=1, Yes=2, Partially=3
	Bank <input type="checkbox"/>		
	Money lender <input type="checkbox"/>		
	Friends relative <input type="checkbox"/>		
<u>Reason for loans</u> Agricultural inputs <input type="checkbox"/> Buying assets <input type="checkbox"/> Regular HH expenses <input type="checkbox"/> Sudden HH expenditure (wedding, illness etc) <input type="checkbox"/> Recover from disaster Others <input type="checkbox"/>			
b. Did you sell any cattle Yes <input type="checkbox"/> No <input type="checkbox"/>	<u>Price sold for</u> _____ (Rs) Above market price <input type="checkbox"/> Below market price <input type="checkbox"/> Don't know <input type="checkbox"/>		
	<u>Reason for selling</u> Agricultural inputs <input type="checkbox"/> Buying assets <input type="checkbox"/> Regular HH expenses <input type="checkbox"/> HH expenditure (wedding, illness) <input type="checkbox"/> Recover from disaster <input type="checkbox"/> Others <input type="checkbox"/> _____		
c. Did you sell any land Yes <input type="checkbox"/> No <input type="checkbox"/>	<u>Price sold for</u> _____ (Rs) Above market price <input type="checkbox"/> Below market price <input type="checkbox"/> Don't know <input type="checkbox"/>		
	<u>Reason for selling</u> Agricultural inputs <input type="checkbox"/> Buying assets <input type="checkbox"/> Regular HH expenses <input type="checkbox"/> Sudden HH expenditure (wedding, death, illness) <input type="checkbox"/> Recover from disaster <input type="checkbox"/> Unproductive land <input type="checkbox"/> Others <input type="checkbox"/> _____		

11. At the end of that year what is the total outstanding debt that you had (Rs) _____

12. In total, how much time did it take for you to fully recover from the crop loss?

1-3 months 3-6months 6months-9months 9months-1year
>1 year Have not come out of losses

13. Did you receive any relief money received from the government to help cover your loss?

a. Yes Relief as percentage of loss _____ or in amount in actual Rs _____

b. No

c. Don't know/cant tell

14. Do you feel that relief money received from the government was enough to cover losses?

a. Yes b. No c. Don't know/cant tell

Livelihood risk management strategies

1. Other livelihood activities you have taken up for buffering the weather related shocks, tick all relevant options

Investment	Amount (Rs)	Net profits in a normal year	Net profits in a disaster year
a. Invest in cattle <input type="checkbox"/>			
b. Small business <input type="checkbox"/>			
c. Invest in poultry <input type="checkbox"/>			
d. Agriculture produce associated business <input type="checkbox"/>			
e. Other: _____			

2. Why invest in these rather than depositing in a savings account: better returns than bank interest, other reasons: (Please specify): _____

3. What are the other risk management strategies that you have invested in the past five years?

I have no knowledge on alternative strategies have not done any investments

Risk management strategy	Additional Cost	Additional Benefit (Rs)	Why did you not opt to use this method
a. Drilling of bore well			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Don't know <input type="checkbox"/> Cannot afford <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____
b. Installing new irrigation technology such as drip or sprinkler			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Don't know <input type="checkbox"/> Cannot afford <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____
c. Established water harvesting			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Cannot afford <input type="checkbox"/> Don't know <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____
d. Others _____			Not effective <input type="checkbox"/> Felt insurance was the better option <input type="checkbox"/> No knowledge/support <input type="checkbox"/> Already using <input type="checkbox"/> Don't know <input type="checkbox"/> Cannot afford <input type="checkbox"/> Others <input type="checkbox"/> Specify: _____

4. Have you engaged in any of the following activities over the last five years?

1. Cultivating high risk but high yield varieties <input type="checkbox"/> Specify crops and area _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
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2. Invest in better quality seeds <input type="checkbox"/> Specify: _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
3. Increased irrigation. Specify area increased under irrigation: _____ <input type="checkbox"/>	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
4. Increased mechanization <input type="checkbox"/>	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
5. Decreased crop diversification <input type="checkbox"/>	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
6. Increase in growing of cash crops <input type="checkbox"/> Specify crops and area _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>
7. Others <input type="checkbox"/> Provide details _____	Has there been increase in your farm profits because of this strategy, Increase <input type="checkbox"/> , Decrease <input type="checkbox"/> , Same <input type="checkbox"/>

5. What encouraged you to engage in the risk management activities stated above?

- a. Increased profits available from: Farming , Off farm activities
b. Increased knowledge from: Insurance agency, NGO's , Government extension
c. Funds available from: Loans , NGO's , Other Specify _____
d. Increased accessibility due to : Insurance agency, NGO's , Government extension

6. What are the main reasons you have not enrolled in insurance? Rank top three reasons.

	Rank top three reasons (1 is high rank and 3 is lowest rank)
a. Number of documents required	
b. Mandatory bank account requirement	
c. Not enough knowledge	
d. High premium rate	
e. Inconvenience due to Long <input type="checkbox"/> complicated procedures <input type="checkbox"/>	
f. Others (specify)	

7. Would you enroll in insurance if there were more subsidies available on the premium?

- Yes , minimum amount of subsidy required for you to enroll 25-50% , 50-75%, 75-100%
No I don't know anything about insurance (skip the cost benefit sheet)

8. Do you feel there have been significant changes in the village since insurance was introduced?

- Yes , No , Don't know/can't tell

9. If yes what are the changes that you have observed

- a. Increased infrastructure
b. Increased modern farming practices (mechanization, water conservation etc.)
c. Increased irrigated land
d. Increased quality of life
e. More farm investment
f. Increased livelihood diversification

Others Specify: _____

Costs and benefits of Insurance

Costs

- Household income stress due to high premium
- Inability/difficulty in paying premium
- Crop failure but no compensation
- Unavailability of cash during crucial periods (Seed buying etc.)
- Can also lead to delayed recovery from disaster
- Losses from prevalent risks (disease, pests, markets) which remain uncovered
- Reducing sustainable risk mitigation activities (Eg. Soil conservation, irrigation technologies)
- Reduced consumption
- Loans
- Uncompensated crop losses of insured crops
- Time taken to receive payout after loss

- Debts
- Increased water usage
- Decreased soil fertility
- Reduced water availability

Benefits

- Consumption smoothing
- No income fluctuation
- Improved credit worthiness
- Increased agriculture profitability
- Increased confidence
- Increased high risk high yield crops planted
- Increased investment in livelihood assets
- Post disaster liquidity
- Ability to recover from disaster
- Timely insurance payout
- Increased bank loans taken for high yield crop/farm practices
- Increased monoculture
- Timely insurance payout
- Steady income in loss year
- Reduced debts
- Preserved assets
- Increased Investment expenditure
- Increased farm profits
- Increased profits

Annexure 4: Questionnaires used in Japan case study

Survey on Crop Insurance in Japan

Dear Respondent, thank you very much for your acceptance to participate in this survey organized in collaboration with the Asia-Pacific Adaptation Network, Bangkok. Your participation will help us get insight into risk insurance experiences and be able to provide better policy suggestions to relevant agencies involved in disaster risk reduction. The data collected through this survey will be kept confidential and be strictly used for research purposes only. S.V.R.K. Prabhakar, Senior Policy Researcher, IGES, Japan.

I. Opinion on the Crop Insurance program

1. Have you experienced crop loss due to natural calamities (floods, droughts, landslides, forest fires, insect outbreak, uncongenial weather conditions such as temperature, humidity etc) in the past 5 years? Yes No
2. If yes, when (year and month)? _____
3. When did you receive your latest crop insurance payment from government due to crop loss (state the year and month): _____
4. What was the largest extent of crop loss (in economic terms) you faced in a single instance?
 Complete crop loss, 75% loss, 50% loss, 25% loss, 10% loss, didn't measure
5. How did you come out of the loss? (tick multiple if needed)
 Took bank loan, Bank loan waived off, Government paid the compensation through crop insurance, Couldn't come out, I am still at loss. Others: _____
6. What is your opinion on the current crop insurance? (tick multiple if needed)
 Crop insurance is costly for the government, Crop insurance is costly for farmers, is necessary for helping farmers, Crop insurance is a bad policy for the government and for farmers, Crop insurance is a good policy but didn't work due to loopholes in the system, Crop insurance alone is not sufficient, we need alternatives, Others: _____
7. What loopholes did you observe in the crop insurance mechanism of the government?
 Same payment irrespective of amount of loss, delay in payment, losses were measured but it was not representative of actual loss
8. Your satisfaction levels on the overall crop insurance policy of the government:
 Very high, high, average, bad, very bad
9. Total time taken to receive your insurance pay-out after the crop loss was identified by the government:
 <1 month, 2 months, 3 months, 4 months, >4 months
10. Was the insurance disbursement 'timely' for you to get back to your normal life?
 Yes No
11. Rate the fairness with which the government has assessed your loss:
 Very fair, fair, uncertain, unfair, very unfair
12. Were your grievances related to insurance payment were addressed well by AMRs?
 Yes, no, I had no grievances.
13. Rate your recovery after the disaster:
 I am better than before disaster, I recovered fully, Not sure, my recovery is slow, my recovery is very slow, recovery is not in progress
14. Of your recovery from disaster, how much do you attribute it to the crop insurance program:
 Completely attribute to insurance money, partially attribute to the insurance money, do not attribute to insurance money.
15. Rate the crop insurance program on 1-5 scale on the following indicators. 1 is very good and 5 is very bad
 - a. Quantum of sum insured: 1 2 3 4 5
 - b. Basis for making insurance payment: 1 2 3 4 5
 - c. Mechanism of grievance redress: 1 2 3 4 5
 - d. Time taken for insurance payment: 1 2 3 4 5
16. What alternatives to crop insurance mechanisms do you have in your mind that you want the government to replace crop insurance with?

- Crop loans at reduced interest rates for effected areas, Contingent claim contracts
 None Others (Please specify): _____
17. How do you rate the efforts of the AMRs in making you understand the crop insurance policy:
 Very good, good, average, bad, very bad
18. Did the government catch (reflect) the real needs in the consultation process for formulating the crop insurance policy?
 Yes, very much Yes, a little Not at all No idea
19. If the 16 answer is “ a little” or “ not at all”, please mention what kind of need the government did not reflect. _____
20. Amount of premium you are willing to pay per 10 are (0.02471 acre) of your crop (total sum insured): _____, Don't want to disclose, No idea
21. Your opinion on the subsidy component the crop insurance premium?
 Crop insurance should be 100% subsidized, 75%, 50% (current), 25%, 10%, No, the government should not subsidize the crop insurance, Subsidy rate should depend on the economic level of the farmer
22. What proportion of your crop loss do you think the crop insurance should cover?
 100% loss is to be covered by the insurance, partially covered but should be insufficient enough for full recovery from loss, partially covered but should be sufficient for full recovery from the loss, the farmers should be given the choice of how much loss the insurance can cover
23. Your satisfaction level on the overall institutional arrangements by the government to implement the crop insurance policy:
 Very high, high, uncertain, bad, very bad
24. Please mention the reason for the answer No.22. _____
25. Your satisfaction levels on the overall crop insurance policy of the government:
 Very high, high, average, bad, very bad
26. What is your opinion on the AMRs involved in implementing the crop insurance program (tick multiple)?
 AMRs are trust worthy, AMRs are essential for the overall success of the crop insurance program, AMRs have less staff, AMRs are poorly funded, AMRs should be replaced by a more competitive institution, Government agriculture department should replace the role of AMRs, I have no comment on AMRs, Others: _____
27. Are you interested in Weather index insurance? Please refer as the explanation at the end of this questionnaire?
 Very interested interested no idea no interest not at all
28. Please mention your reason of answer
 No.26. _____

II. Respondent profile

29. Gender : Male Female
29. Age: <20, 20-30, 31-40, 41-50, 51-60, 61-70, 71-80, <81
30. Occupation: full-time farmer part-time farmer, Others (Specify): _____
31. Area of land owned (ha): <1 2 3 4 5 & above
32. Area of land (ha) under arable cropping (paddy etc): <1 2 3 4 5 & above
33. Major crops being cultivated except rice: _____
34. Economic status (as per national statistical organization classification): 100million-300 300-500 500-800 800-1000 more than 1000 million no answer
35. What kind of subsidies have you been availing?
 Support based on planted area
 Support based on production (e.g. output payments based on product quality)
 Support based on income (e.g. Compensation for income loss)
 Diversion payments (e.g. to divert from paddy to other crops such as wheat and soybean)
 Input subsidies (such as for irrigation etc)
 Input subsidies (such as for fertilizers, seeds, irrigation etc)
 Payments for maintenance of paddy fields
 Commodity transfers (e.g. for producing paddy, piggery, milk, sugarcane etc)

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