Agricultural Economics Research Review 2022, 35 (1), 133-144
DOI: 10.5958/0974-0279.2022.00012.X

An analysis of the demand and uptake of agricultural insurance in developing countries

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Abstract Climate change, natural risks, and market price fluctuations impact agricultural production and farm income. The risks can be smoothened by using concepts from insurance, but numerous challenges constrain the demand and uptake of agricultural insurance products. We review the products in developing countries for insights into formulating an agricultural insurance scheme for Sri Lanka and we find a range of products that have potential. The government and policymakers can use our findings to develop and implement an agricultural insurance scheme in Sri Lanka that serves as a risk management tool.

Keywords Agricultural insurance, demand, developing countries, Sri Lanka, uptake

JEL codes Q18, D81, O1

The main risks to the agricultural sector are price risk, due to price volatility, and production risk, due to production uncertainties (Ibrahim 2012). Agricultural insurance is a specialty line of property insurance that is used as a financial instrument to transfer agriculture-related production risks to third parties through the payment of premiums that reflect long-term costs (Turek-Rahoveanu and Andrei 2012). Mechanization has brought complexity to agricultural businesses, and a wide range of traditional insurance policies—personal accident, fire, vehicle, machinery, and liability insurance—have become important parts of an agricultural insurance package (Iturrioz 2009). Developing-country farmers prevent or mitigate the influences of disastrous events in ways that depend on their wealth and income (Smith and Watts 2019), but the real demand for agricultural insurance is unresolved in both developed and developing countries (Vandeveer 2001). We review the literature to identify the agriculture insurance products existing in developing countries, their strengths and limitations, and the factors that affect demand and uptake to identify the potential of agricultural insurance products in Sri Lanka.

Methodology

We reviewed the literature to analyse the demand and uptake of agricultural insurance in developing countries. We chose the studies so that we could answer the following research questions on agricultural insurance.

- What products do different countries use?
- What affects demand and uptake?
- What are the strengths and limitations of the existing schemes?
- What is the potential of agricultural insurance products in Sri Lanka?

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to develop this review. We included a standard protocol with an evidence-based framework. We performed the current literature survey on Google Scholar for the period from 2000 to September 2021.

We searched websites related to agricultural insurance using all the possible keywords: "agriculture AND

insurance", "agriculture AND insurance AND types", "agriculture AND insurance AND demand", "agriculture AND insurance AND uptake", "agriculture AND insurance AND strengths", "agriculture AND insurance AND limitations" and "agriculture AND insurance AND developing countries".

We added the terms "Sri Lanka", "China", and "India" to these phrases to maximize the number of related studies. We included studies on the agricultural insurance products currently used in developing countries and the demand, uptake, strengths, and limitations of the products.

We reduced the studies selected based on the research target. We excluded studies conducted before 2000 in developed countries, studies on the governance of agricultural insurance, and studies presenting information not related to insurance products or demand, uptake, strengths, or limitations.

Our systematic literature review comprised four steps: identification, screening, eligibility, and inclusion. We selected studies using web search engines such as Google Search and Google Scholar. The initial search included working papers, conference proceedings, and peer-reviewed journal articles. We used the PRISMA guidelines to filter the results (Figure 1).

The process generated 64 studies: 63 articles from Google Scholar and one article from the web search for "climate change, agriculture, and food security",

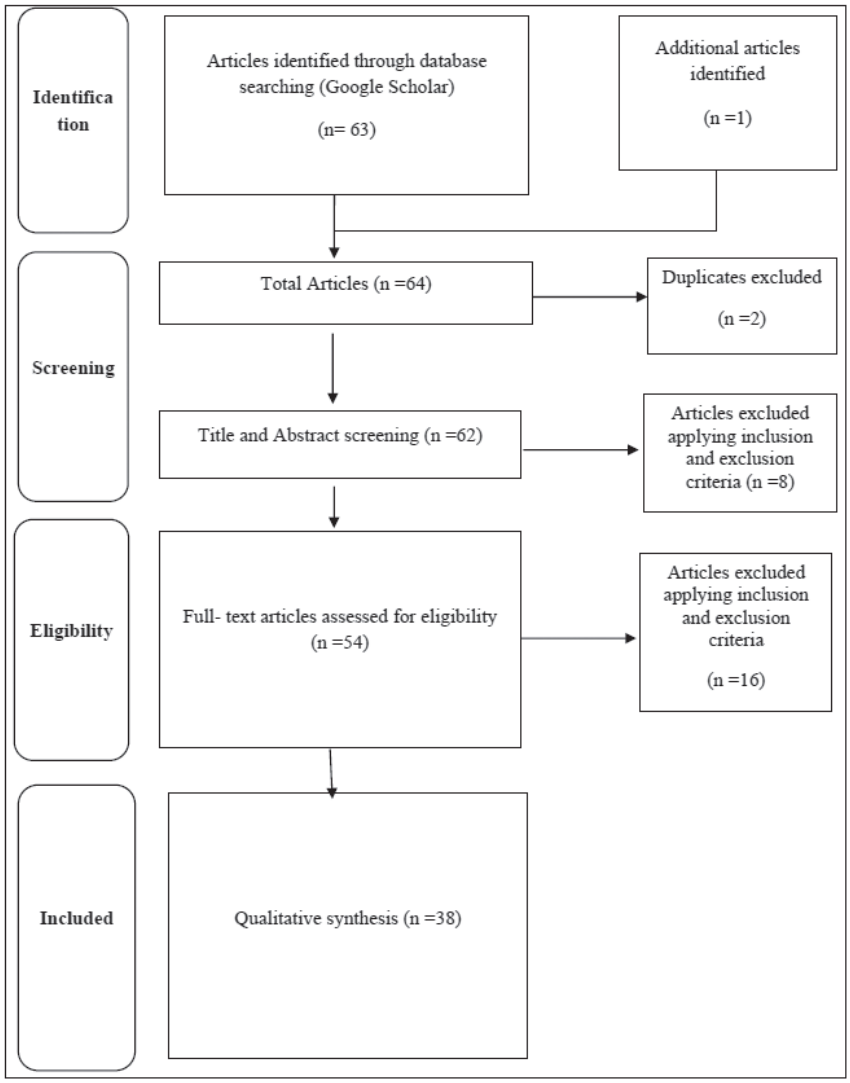

Figure 1 PRISMA flowchart of the analysis of the demand and uptake of agricultural insurance in developing countries

which was identified from the reference list of a selected paper. Two articles were duplicated; removing these let 62 articles remain. We screened these based on their titles and abstracts. Applying the exclusion and inclusion criteria excluded 8 articles. We assessed these 54 articles in full. Applying the exclusion and inclusion criteria excluded 16 articles and reduced the number of articles eligible for qualitative synthesis to 38 (Figure 1).

Results and discussion

Agricultural insurance products available

Farmers have had access to agricultural insurance in various forms since at least the 1920s (Smith and Goodwin 2009). More than 100 nations have implemented crop insurance programmes to reduce the impact of bad weather on farmers' revenue (Table 1) (Mahul and Stutley 2010).

The main types of crop insurance are multi-peril crop insurance, which offers full indemnity and acts as a comprehensive cover, and named peril insurance, which covers only specified dangers (like hail and dew). Most middle-income countries use multi-peril crop insurance.

Index-based insurance pays out depending on the historical underlying index, such as rainfall and area yield (Chatterjee and Oza 2017). Today, tens of millions of farmers worldwide utilize index insurance products (Greatrex et al. 2015).

Agricultural insurance includes livestock insurance, a minor but important component. Mongolians have put their effort into building index-based cattle insurance but they have had mixed outcomes (Chatterjee and Oza 2017).

Factors affecting the demand for agricultural insurance

Demand implies the desire to acquire a commodity and their willingness and ability to pay for it; therefore, demand is the number of consumers willing and able to buy products during a period. Demand is determined by the price of a product/service and of its alternatives, complementary goods, income, consumer expectations of future prices, and taste and preferences (Tsikirayi et al. 2012). The demand for agricultural insurance affects the socio-economic and cultural aspects of life—gender, culture, religion, trust, and access to marital status—that commercial farmers evaluate in their decision to purchase agricultural insurance (Table 2) (Tsikirayi et al. 2012). To understand the importance of insurance for a country's agricultural activities, therefore, it is important to identify the economic and socio-cultural factors of the demand for agricultural insurance (Sihem 2019).

Price is one of the main factors of the demand for agricultural insurance. The farmer pays a monthly or annual premium for a fixed compensation. An adverse selection in the insured pool suggests that manufacturers with different levels of loss risk have different elasticities of demand. The sensitivity of the demand for agricultural insurance to its determinants is the elasticity of demand. When all other conditions are the same, the demand for agricultural insurance is correlated with the premiums that farmers are willing to pay. High premiums and low coverage reduce the demand for certain policies, while low premiums and high coverage increase utilization (Sihem 2019).

Agricultural risk can be managed through alternatives to insurance such as diversification and cooperatives once access, and costs and benefits, are assessed. Income factors include income from agriculture and off-farm activities. The higher the level of agricultural income, the greater the need for agricultural insurance to prevent the loss of income. Off farm income can be seen as a form of diversification and a risk management tool, and it may reduce the demand for agricultural insurance. Some other factors that impact farmers' preferences for agricultural insurance are age, experience, education, landholding size, the insurance company's reputation, and satisfaction with the insurance company (Tsikirayi et al. 2012). In developing countries, the level of farmers' education affects the demand for agricultural insurance.

Index insurance schemes are piloted where potential customers have little experience with insurance, an index product, or an insurance company or its agents. Developing these new markets requires companies to sensitize potential consumers about the concepts of insurance and index insurance products (Jensen and Barret 2016). Because demand is influenced by trust—farmers pay the premium at the beginning of the insurance contract and, therefore, bear the entire risk associated with the performance of the contract—

Table 1 Types of insurance programme

Country	Insurance programme	Reference
Zambia	Inputs like fertilizer may be lucrative only in favourable weather conditions. Smallholder farmers can offset the risk of investing in such inputs by purchasing index insurance as a well-designed index insurance contract can protect against catastrophic crop loss.	Murray and Farrin (2014)
Mali	The cotton area yield index insurance provides three-level payments according to the yield distribution; cotton farmers use index insurance contracts to minimize the basic risk.	Elabed et al. (2013) Stoeffler et al. (2016)
Morocco	The rainfall index for wheat covers the crop loss due to extreme rainfall.	Wairimu et al. (2016)
Kenya, Tanzania, and Rwanda	Farmers protect against crop loss in extreme weather conditions during the cropping season by purchasing index insurance based on weather stations and on satellites. Dairy livestock insurance covers pregnancy loss for calving cows.	Wairimu et al. (2016)
China	The government subsidizes more than 70% of crop insurance premiums. Like the multi-peril crop insurance (MPCI) in the United States (US), crop insurance is the foremost insurance programme, and it improves farmer welfare.	Ke (2015)
Sri Lanka	Agriculture relies on rainfall and irrigation in this tropical country. Index insurance products compensate farmers based on predetermined regulations and thresholds. A pure rainfall index insurance product might cover the risk of farmers who rely on rain-fed or modest irrigation; hence, it reveals the losses of farmers that are caused by adverse weather conditions.	Arandara et al. (2019)
	The government first introduced crop insurance in 1958 as a voluntary scheme. The Agriculture and Agrarian Insurance Board continues to operate and implement this indemnity-based crop insurance scheme, with periodic changes. A private insurance business launched rainfall index insurance for the first time in 2010. The government introduced crop insurance as a mandatory requirement for farmers who received fertilizer subsidies from the government. In 2016, the government initiated loan protection insurance to cover agricultural loans taken by farmers.	Wickramasinghe (2019)
	Climate insurance is a form of crop insurance that covers key climatic risks. One scheme, that was combined with the fertilizer subsidy programme, is required; all the other climate insurance schemes are voluntary.	
India	The government initiated the Comprehensive Crop Insurance Scheme (CCIS) in April 1985. The content and scope of the CCIS was improved and the new National Agricultural Insurance Scheme (NAIS) was made compulsory for loanee farmers. Insurance is available to all farmers regardless of farm size.	Jain (2004)
	The Farm Income Insurance Scheme has been introduced to protect farmers' income by combining the mechanisms for insuring production and market risks.	
	More than 9 million farmers use rainfall insurance as part of a government-mandated programme.	Dercon et al. (2014)
Ghana	The usage of rainfall insurance by farmers in northern Ghana is increasing rapidly.	Karlan et al. (2014)
	Smallholder farmers use crop weather (drought) index insurance (WII). Multi peril crop insurance (MPCI) is aimed at commercial farmers with a minimum farm size of 50 acres/20 hectares as well as other agro–value chain participants.	Ankrah et al. (2021)
	Farmers use multi-peril insurance for poultry indemnity insurance for all types of birds, including exotic and local varieties, that are raised in an intense manner of production.	

Contd...

	The area yield index insurance scheme is undergoing experiments. Initial trials had been conducted in the Jirapa District of Ghana's Upper West Region.	
Zimbabwe	Agricultural insurance usually takes the form of property insurance. The most frequent type, recognized as "named peril" or "hail insurance", is targeted primarily at commercial farmers.	Tsikirayi et al. (2012)
	Tobacco yields a larger revenue than any other farming activity, and tobacco hail insurance takes the first place in the purchase of cover and contributes the greatest proportion to the agricultural insurance portfolio.	
	Property insurance covers farm buildings, farm equipment such as tractors and trailers, and farm machinery such as irrigation equipment.	
Malawi	The relative evapotranspiration index is used to protect maize farmers from drought.	Leblois et al. (2014)
West Africa	The most viable index insurance contract for grain farmers is based on the normalized difference vegetation index (NDVI), a remotely sensed satellite-based measure of vegetation density.	Hill (2010)
Developing countries in Europe and North America	Crop hail insurance is the most popular; private insurance companies transact it on a commercial basis in nations where hail occurs more than 50 days per year.	Jain (2004)

Source Literature survey, 2021

customers should have legal recourse. In developing countries, the government should control crop insurance programmes to reduce the premium burden on smallholders; such assistance and control could help reduce the burden of premium on smallholder farmers (Owusu et al. 2021). Thus, farmers may demand an agency type of crop insurance programme.

Factors affecting the uptake of agricultural insurance

Farmers' acceptance or adoption of agricultural insurance is its uptake. The uptake is determined by forecasts of yield, revenue, and drought, and of their effects; the insurance revenue expected; and the probability of receiving claims (Tsikirayi et al. 2012). The uptake is determined also by farmers' awareness of the insurance products available, type of insurance and access to it, cost of premium, losses experienced by farmers in the past, education, gender, and caste (Table 3) (Aditya et al. 2018).

Insurance helps farmers to cope with the risk of loss; it does not increase their income. If farmers understand that, they may be expected to take less time to decide to insure their crops (or not), but it will not necessarily improve uptake (Heenkenda 2011). The lease negatively impacts adoption: farmers who rent more land are less likely to purchase insurance products (Aditya et al. 2018).

Strengths and limitations of agricultural insurance schemes

Index insurance is a cost-effective alternative to traditional insurance (Hazell et al. 2010). Index insurance helps households to reduce their reliance on unfavourable coping strategies and to increase investments in riskier production (Cai et al. 2015); thus, it helps them to improve their ability to enhance farm revenue (Karlan et al. 2014). In developing countries, index insurance offers rural agricultural households social protection and improves their standard of living (Jensen and Barrett 2016). In regions where poor rural peoples practise rain-fed agriculture and where financial market failures are common, index insurance minimizes vulnerability and enhances productivity growth (Hazell and Hess 2010). However, in the light of multi-cropping, income diversification, and data limitations, designing an index that effectively proxies for the losses of the insured is difficult (Nikolova et al. 2011).

Index insurance is more transparent when considering the compensation, but it cannot be implemented in Sri

Table 2 Factors affecting the demand for agricultural insurance

Factor	Nature of Impact	Reference
Education	The coverage of the Pradhan Mantri Fasal Bima Yojana (PMFBY) is low because farmers in India are not aware of this insurance programme.	Ghosh et al. (2021)
Access	Access is poor—farmers must travel several kilometres to reach the nearest financial institution.	Ghosh et al. (2021)
Culture	Africa Ltd launched a takaful, sharia-compliant indexed livestock insurance product in Kenya that provides drought coverage to expand formal insurance markets to Muslim pastors.	Jensen and Barret (2016)
	An index-based livestock insurance product proposed in northern Kenya was not compatible with sharia law and, therefore, inaccessible to millions of Muslim pastors in the region.	
Farmer's risk aversion	Most farmers in China prefer direct subsidies to China Crop Insurance (CCI) because the effect of CCI is less than that of the direct subsidies in all scenarios of farmer's risk aversion.	Ke (2015)
Gender	More male farmers than female farmers participate in agricultural insurance schemes in Nigeria.	Kolawole and Oluwatusin (2018)
Marital status	More married farmers than single farmers purchase agricultural insurance in Nigeria to reduce their family's vulnerability to risks.	Kolawole and Oluwatusin (2018)
Farming type	Commercial farmers in Nigeria demand agricultural insurance and insured farmers do most of the commercial farming. This may be the reason that insurance schemes induce farmers' confidence in taking risks and adopting new and improved farming technologies.	Kolawole and Oluwatusin (2018)
Price/premium of insurance	The demand for high-premium crop insurance is low among credit-constrained farmers in Ghana in sub-Saharan Africa.	Owusu et al. (2021)
Agency type of crop insurance programme: private/ government	Cocoa farmers in Ghana in sub-Saharan Africa demand the government agency–type of crop insurance programme rather than the private agency–type.	Owusu et al. (2021)
Religion	Christian farmers in Europe, North America, and South America are more likely than Muslim farmers to take agricultural insurance.	Sihem (2019)
Trust	A randomized controlled study finds that when farmers in Ghana observe member withdrawals or insurance payments on their social networks, their demand for insurance increases. In the absence of a formal contract enforcement agency, trustworthy informal institutions have filled most of the demand–supply gap for insurance in developing countries.	Karlan et al. (2014)
	The index insurance utilization rate on the standard marketing channel is only 8% in Ethiopia, but it doubles to 15% when marketing is done through iddir. Executives are usually quite trustworthy in the dissemination of insurance products.	Belissa et al. (2019)
Government assistance and involvement	Government assistance reduces the premium burden on smallholder farmers.	Owusu et al. (2021)
Farmers' collective action	Farmers in the Dominican Republic are willing to purchase group index insurance contracts; 64% of the farmers who provide contracts collectively purchase index insurance while creating new opportunities for insurance providers to construct loans and cover more farmers.	Vasilaky et al. (2020)

Source Literature survey, 2021

Table 3 Factors affecting the uptake of agricultural insurance

Factor	Nature of impact	Reference
Access	Zimbabwe has a limited network of branches of companies that offer agricultural insurance. Most branches are located in Harare, the capital, and in some main cities. Few farmers have access to insurance, therefore, ultimately resulting in lower uptake.	Tsikirayi et al. (2012)
	Most paddy farmers in rural Sri Lanka live far from the offices of insurance companies and are unlikely to purchase agricultural insurance.	Riyath and Geretharan (2016)
Loss experienced by farmers	Farmers who have experienced loss in Zimbabwe mostly purchase agricultural insurance.	Tsikirayi et al. (2012)
Type of insurance	The revenue from farming tobacco is high in Zimbabwe, and farmers are willing to insure their crop against hail, more than livestock, farm implements, and comprehensive farm cover.	Tsikirayi et al. (2012)
Nature of farming enterprise	Farming tobacco in Zimbabwe has higher costs and profits than farming grain, and so tobacco farmers insure more than grain farmers.	Tsikirayi et al. (2012)
Risk management tools adopted by farmers	Farmers in Zimbabwe diversify farm activities and adopt mixed farming to mitigate risk, reducing their uptake of insurance.	Tsikirayi et al. (2012)
Awareness	Fewer than 30% of farmers in India are aware of the concept of insurance or the existence of insurance schemes or they do not meet the prerequisites for buying insurance products.	Aditya et al. (2018)
	Farmers in Sri Lanka exposed to paddy insurance awareness programmes have bought insurance, but few others are aware of paddy insurance.	Riyath and Geretharan (2016)
Education	Educated farmers in India are more likely to buy insurance.	Aditya et al. (2018)
	Educated farmers in Ghana buy insurance faster than uneducated farmers. Farmers in Sri Lanka who have little knowledge of crop insurance buy less of insurance products.	Heenkenda (2011)
Landholding size	Larger the farm size in India, higher the level of marketable securities, increasing the opportunity for farmers to choose a formal source of credit bundled with insurance products.	Aditya et al. (2018)
Caste	Lower-caste farmers in India have a lower probability of choosing insurance.	Aditya et al. (2018)
Tenancy	According to the current schemes, leased land in India can be insured by submitting evidence of the joint use harvest/lease agreement, but such documents are difficult to produce because most crop sharing leases are completed through word of mouth.	Aditya et al. (2018)
	Leasing itself may be a coping mechanism, helping landlords and tenants share the risk, and may affect the uptake of insurance.	
Gender	The uptake of weather index insurance is higher among male farmers in Ghana than among female farmers.	Ankrah et al. (2021)
Availability	Few agricultural insurance products are available in southern Ghana; therefore, even the farmers who are aware of insurance cannot purchase it.	Ankrah et al. (2021)

Source Literature survey, 2021

Lanka because the rainfall data is not available timely (Wickramasinghe 2019). Both the irrigation and rainfall variables have interacted in the crop plantation, but the current index insurance product in Sri Lanka is based solely on rainfall—which presents various complications and increases the basis risk (Arandara et al. 2019)—and neither irrigation nor rainfall could be included within the index. The product relies on a variety of data sources, but the limitations of the data infrastructure constrain the development of a robust product (Arandara et al. 2019). Indemnity insurance requires crop loss to be evaluated, but evaluations are costly and time-consuming (Wickramasinghe 2019).

Crop insurance compensates farmers for major crop loss due to climatic variables, plant disease, and pests (Jain 2004). In most developing countries, crop insurance claims are projected to be around 15% of crop value, and the administration expenditure at 5%; but the premium, 20% of the crop value, is uneconomic. And crop insurance schemes face several constraints: the absence of reliable, long-term data on crop yield and loss, financial and human resources, land tenure records, and professional reinsurance support; and farmers' poverty and poor awareness of agricultural insurance (Jain 2004).

In Sri Lanka, farmers use crop insurance to acquire agricultural loans from traditional financial institutions. The institutions debit the insurance premium from the farmers' loan amount automatically, and the farmers are unaware both of the debit and that they have purchased insurance.

In Zambia, the index insurance scheme does not define the future payoff, and farmers must pay the premium upfront. If the purchase of insurance becomes mandatory, cash-strapped, risk-averse farmers may invest less in productive inputs (Murray and Farrin 2014).

In China, the risk of crop loss is low; therefore, the insured value is low. Their crop insurance programme covers only the cost of physical planting, about 25–40% of crop returns (Ke 2015). In Ghana, some farmers say that the agricultural insurance system is somewhat expensive (Ankrah et al. 2021). In India, comprehensive agronomic practices should be used to develop the weather index insurance scheme (Chatterjee and Oza 2017).

Typically, insurance schemes protect against low-frequency, high-severity risks only; these do not provide a total risk management solution. Multi-peril crop insurance covers a wide range of agricultural risks but it is costly to manage because it requires farm-level underwriting and loss assessment. Named peril insurance covers a small range of risks and is easier and less expensive to administer. Index-based insurance eliminates moral hazard and guarantees minimal claims and administrative expenditure, but the application of basis risk frequently results in payouts that are not in line with real losses, causing farmers to be dissatisfied. Traditional indemnity-based insurance has high administrative costs and is vulnerable to moral hazard, and, therefore, impractical in most circumstances.

Cattle insurance is based on a mutual concept that eliminates moral hazard completely and minimizes administration costs. Cattle insurance programmes are tiny and may take a long time to scale up, but they appear to be working in certain regions (Chatterjee and Oza 2017). Farm insurance is expensive; therefore, most middle-income countries subsidize it substantially. Most governments subsidize the premium; some subsidize the claims or offer indirect reinsurance to keep the rates low. Almost 50% of the gross premium is subsidized globally. The entire cost of farm insurance to governments, including premium subsidies, is nearly 68% of the gross premium (Mahul and Stutley 2010).

The potential of insurance products in Sri Lanka

Agriculture has played an important role in the Sri Lankan economy in the past, but it currently contributes less than 7% to the gross domestic product (GDP). Agriculture is focused on tea, coconut, spices, and rubber for export, and paddy, vegetables, and crops for consumption. But Sri Lanka is among the countries that are most vulnerable to adverse climate impacts, according to the Global Climate Risk index, and its agriculture sector is prone to climate risks, like droughts, floods, and changes in rainfall. Alternating floods and droughts nationwide in the recent past have severely affected many agricultural districts. Also, agriculture is subjected to many production and income risks and uncertainties. Therefore, farmers can use the mechanism of crop insurance to manage risk, and the potential to implement weather-based index insurance

for the crops grown for import and export in Sri Lanka is high (Wickramasinghe 2019). The country already has crop loss insurance for paddy (Nilwala and Jayarathna 2018).

Small-scale farmers in the Ampara district of Sri Lanka have accepted index-based micro-insurance. They use it as a tool to manage the risk of production loss caused by natural disasters. The demand for micro-insurance is high and concentrated in irrigated areas. Farmers prefer higher coverage than offered by the existing traditional insurance schemes. This indicates that index-based micro-insurance schemes can be introduced into the highly irrigated areas in Sri Lanka (Heenkenda 2011).

In rural agricultural areas, the mechanisms for delivery and collecting premiums are difficult to set up. Farmer organizations are popular, familiar, and trusted, and they have improved the efficiency of insurance delivery (Heenkenda 2016). Paddy farmers' organizations can collect premiums from farmers and provide them customer service while companies provide insurance and marketing products.

Designing and starting micro-insurance programmes, especially for index insurance, seems to be a very expensive process for private insurers. The government can engage in research and development (R&D) for the design phase. In the context of public-private partnerships, the metrology division could partner with insurance companies or companies that provide index base coverage. The metrology division obtains a wide range of meteorological data, which insurers can purchase to develop and implement index micro insurance schemes.

In Sri Lanka, the postal department is a public institution and its network is widespread in rural areas. Insurance and service companies can offer micro insurance programmes through the post office network (Heenkenda 2016). Micro insurance providers have to compromise between the low ends of the poor sector while maintaining full cost recovery. Special subsidy schemes can be financed through Samurdhi, the government's comprehensive poverty reduction scheme that extends over most of the country, and used to incentivize the poorest farmers to purchase crop insurance (Heenkenda 2016); the subsidy can be reduced as the farmers move up the income ladder.

Conclusion

Farmers in developing countries use a variety of agricultural insurance products. The demand for agricultural insurance is affected by controllable factors (access, farmer's risk aversion, farming type, insurance price or premium, agency type of crop insurance programme [private / government], and farmers' collective action) and by uncontrollable factors (education, religion, culture, gender, trust, and marital status).

Of the controllable factors, education, trust, access, and insurance premium affect demand the most, and these should be focused on to raise the demand for insurance. Most of the uncontrollable factors determine demand in developing countries such as India, Africa, Kenya, and Nigeria.

The factors of uptake are some demand factors, such as education, access, and gender; and loss previously experienced by farmers, insurance type, nature of the farming enterprise, the risk management tool farmers adopt, awareness, landholding size, caste, tenancy, and the availability of insurance.

The uptake has been far below expectations; it can be improved by enhancing farmers' awareness and education, ensuring that insurance is available and farmers can access it, and providing satisfactory compensation for the previous damage. Caste and gender negatively affect uptake, especially in India.

Insurance is a cost-effective means for farmers to cope with unexpected risks, minimize vulnerability, and enhance productivity and farm revenue, but some limitations prevail: the data required is not available, the coverage of insurance is limited, and the premium is too high for the poor farmers. Some insurance products, such as cattle insurance, are limited to certain regions. In Sri Lanka, the index insurance product is based solely on rainfall, despite the interrelation of the variables. Companies must enhance the strengths of the existing insurance products and mitigate their limitations to facilitate uptake.

Risks and uncertainties are inherent in agricultural production and income, and Sri Lanka must institute and implement programmes to withstand these and uplift the farmers' standard of living. The type of crops cultivated in an area and its climate should determine

the type of the new agricultural insurance product formulated and introduced. The government can use farmer organizations and Samurdhi to incentivize low-income farmers to participate in crop insurance programmes.

The findings of this study will help the Sri Lankan government and other authorities to fill the demand–uptake gap in the existing agriculture insurance products and develop effective products. But the results of this study are limited by its focus on developing countries; the insurance products in developed countries should be evaluated in future research.

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Received 8 February 2022 Accepted 29 May 2022