Making crop insurance work for small-scale farmers

A review of recent evidence

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Around the world, small-scale farmers face greater vulnerability to shocks such as extreme weather events and financial crises. Building their resilience is vital for their livelihoods and the stability of supply chains. While small-scale farmers already use various strategies to manage risk, insurance — especially index crop insurance — is gaining attention as a solution. This paper highlights best practices for designing and implementing effective crop insurance for small-scale farmers. However, insurance is not 'one size fits all' and must be context specific without crowding out traditional risk-coping mechanisms. Future research should explore how insurance affects farmers' long-term resilience and investigate challenges in scaling insurance solutions.

Contents

Abbreviations

ACRE Africa	Agriculture and Climate Risk Enterprise in Africa
ICT	Information and communication technologies
GPS	Global Positioning System
NGO	Nongovernmental organisation
R4 Initiative	R4 Rural Resilience Initiative in Senegal and Ethiopia
SMS	Short message service
SNIID	Social Network for Index Insurance Design
ZFU	Zimbabwe Farmers' Union

Summary

Building the resilience of small-scale farmers — their ability to cope with and mitigate the effects of shocks — is essential not just to ensure their livelihoods, but also to secure the reliability of the supply chains of which they are a part. Small-scale farmers are often more vulnerable to shocks, such as extreme weather events and financial crises, compared to other groups. Farmers take many on- and off-farm measures to manage risk, but recently, insurance — especially index crop insurance — has been promoted as a key coping mechanism. However, globally, insurance coverage of small-scale farmers is limited.

The barriers to insurance for small-scale farmers include unaffordability of premiums, low awareness of insurance schemes, negative perceptions of quality or reliability of insurance products, low trust in the ability of insurance to deliver on its promise, and attitudes to risk. There are also specific technical and logistical challenges associated with delivering insurance products to small-scale farmers. Many conventional insurance providers see small-scale farmers as too risky to make 'business sense'. Women small-scale farmers also face particular gendered challenges in accessing insurance and other financial services.

This paper explores good practice in designing and implementing crop insurance for and with small-scale farmers, drawing on analysis of existing academic and grey literature. It is part of a broader piece of research carried out by IIED in partnership with Primark, All India Disaster Mitigation Institute and KM Dastur on the current and potential use of insurance to help small-scale farmers cope with climate and other shocks, in two cotton-producing districts in India.[1] This paper is not an exhaustive or systematic literature review, but rather aims to illustrate some of the challenges and possible solutions to manage climate-related risk for small-scale farmers. We have summarised the key findings here.

A key takeaway from our review of the evidence is that insurance is not 'one size fits all'. To be effective for small-scale farmers, insurance needs to be relevant to the context and only used to transfer risk that cannot be reduced in any other way. Insurance can have unintended consequences for small-scale farmers, for example, by crowding out traditional risk-coping mechanisms or making farmers more vulnerable in the medium to long term if they choose riskier agricultural production options.

Looking to the future, it will be important to continue to document and understand the role that insurance can play in managing risk for small-scale farmers, within the context of other risk-management strategies, including informal ones. Further research could help to understand the positive, as well as adverse, impacts of insurance for small-scale farmers. Do farmers end up making decisions that are detrimental to their long-term resilience and how is this related to the design and delivery of the insurance product? Scaling remains a major challenge to delivering crop insurance for small-scale farmers; documenting and analysing pilot schemes that have successfully scaled — and understanding the enablers and constraints to scaling — will be important next steps.

1 See: Guarín, A, Blackmore, E, Pathak, V, Nicolini, G, Morell-Ducós, J and Kelly, L (2024) Building resilience for cotton farmers in India: evidence from Gujarat and Maharashtra. IIED, London.

Key actions for insurers and their partners for improving crop insurance for small-scale farmers

Improve demand and awareness of insurance

- **Invest in raising farmer awareness**, sensitisation and outreach
- Include farmers in the **co-design of insurance schemes** through a combination of information gathering to understand farmers' realities and education/awareness raising with and for farmers, and
- Invest in **trust building** and use **existing distribution channels known to small-scale farmers**.

Enhance affordability and uptake of insurance products

- **Co-finance or subsidise premiums** to reduce the costs of insurance for small-scale farmers
- Offer **pre-financing options** for insurance premiums and flexible payment methods
- **Reduce transaction costs** of subscriptions, claims assessment/verifications and payments, and
- **Bundle products** to reduce costs of delivery, support productivity gains and ensure mutual gain across the services being provided.

Enhance reach and benefits for women

- **Adapt and simplify registration** and other processes
- Use structures **already used and trusted** by women for outreach, and
- **Build gender responsiveness** into insurance products.

Enhance effectiveness (in payouts and to reduce transaction costs)

- Improve the **accuracy of assessments** of damage for payouts, and
- **Improve the speed** at which payouts are made to farmers.

1 Introduction

Improving the resilience of small-scale farmers — their capacity to absorb, adapt to and/or recover from shocks and stressors — is not just important for their own livelihoods, but essential for the sustainability of the supply chains they are part of (USAID, 2018). Small-scale farmers and their systems of production are particularly vulnerable to risk, including climate and environmental risk, crop and animal disease, and financial or market shocks (Morton, 2007). Like all farmers, they are exposed to market and price fluctuations, but small-scale farmers tend to lack savings, have limited access to credit, and rely on inefficient money transfer mechanisms and insurance markets to cushion them against shocks (Raithatha and Priebe, 2020; Moore et al., 2019). Farmers manage risks and improve their resilience using a variety of strategies, with different degrees of external support and differing impacts on building resilience (Ranganathan et al., 2016).

The risk-management strategies farmers use include (from McDonnell and Kapur, 2020):

Agricultural strategies: Crop management (such as staggering planting, crop diversification, planting across different fields); using pest-, disease- or drought-resistant varieties; and keeping livestock as a means of diversifying farm income.

Financial strategies: Saving money, whether individually or as part of community savings schemes; reducing investment in the farm or elsewhere; reducing household consumption; buying insurance; borrowing money or seeking assistance from friends and relatives; taking loans from banks or money lenders; and selling household assets.

Livelihood and other strategies: Migrating or moving to cities, or seeking off-farm employment.

In recent years, insurance — and particularly index-based weather insurance (Box 1) — has been promoted as a key tool to improve the resilience of small-scale farmers, particularly in the face of climate-related risks (ISF Advisors, 2018; Jensen and Barrett, 2017). Effective insurance products can stabilise farm income, reduce poverty and ensure a safety net exists for food producers when they are affected by adverse weather or other unforeseen events (Vyas et al., 2021). Crop insurance can be used to manage different risks such as drought and temperature changes, extreme precipitation, pests and diseases, and price volatility. Insurance payouts can support achievement of, and progress towards, many of the Sustainable Development Goals, for example to 'End hunger' (Vyas et al., 2021).

While the use of agricultural insurance is common in high-income countries where large-scale agriculture prevails, globally less than 20% of small-scale farmers are covered by insurance (Raithatha and Priebe, 2020). The uninsured include 97% of small-scale farmers in sub-Saharan Africa, almost 80% of those in Asia, and two thirds of those in Latin America (Raithatha and Priebe, 2020).

BOX 1. INDEX-BASED WEATHER INSURANCE

Index (or parametric) insurance is a type of insurance in which a payout is triggered not as a result of verified losses — as is the case with traditional indemnity-based insurance — but when a particular condition is met. For example, index-based weather insurance may be based on a predefined number of days without rain, or when specific temperatures are reached for a certain time period. If these conditions are met, a payout is triggered without a claims assessment.

There are many reasons for this insurance protection gap. From the demand side, affordability of premiums is a major obstacle. Other barriers include low awareness of insurance products, negative perceptions of quality or reliability of insurance products, lack of trust in the ability of insurance to deliver on its promise, and cultural and behavioural factors such as attitudes towards risk (Schanz, 2018). From a supply perspective, the provisioning of insurance and financial services to small-scale farmers — often geographically dispersed and/or living in remote or poorly connected regions — must overcome technical and logistical challenges (Jensen and Barrett, 2017). Moreover, for insurance providers, small-scale farmers are perceived as risky (Hazell et al., 2021).

There is also a gender gap in insurance protection. Women account for nearly half of the world's small-scale farmers (ACRE Africa, 2024), but are typically unsupported by formal financial and non-financial services that could help to manage climate risk, including insurance (Dalberg Advisors, 2022). Women face gendered barriers to accessing insurance. For example, unequal land and property rights might prevent women from accessing insurance or financial services that require land as collateral, when land can only be titled to men (Fletschner and Kenney, 2014; Singh and Dusanj-Lenz, 2019). Women may also face greater barriers to education and financial literacy, affecting their access to and use of insurance schemes. In Ghana, for example, there was low uptake of an index-based weather insurance scheme among women, because they lacked confidence and exposure to the formal language used in insurance contracts, or did not fully understand the product being offered (Akter et al., 2016).

Many insurance schemes also fail to account for differences between men's and women's agricultural activities or assets. For example, women often grow, sell or control income from different crops or livestock compared with men (Fletschner and Kenney, 2014). However, even when agricultural insurance benefits women, it has its limits: unless underlying gender relations within a household or community are also addressed, insurance can only do so much to increase women's agency and their ability to make choices (Timu and Kramer, 2023).

While crop insurance has received much attention recently as a tool to increase small-scale producers' climate resilience, it is important to highlight some of its limitations. First, it is only one among other risk-management tools (Vyas et al., 2021) and ideally should form part of a holistic approach to risk management (Greatrex et al., 2015). Insurance is not 'one size fits all' and to be effective it needs to be relevant to its context — the farming, environmental and market systems in which farmers are situated — and only used to transfer risk that cannot be reduced in any other way (Greatrex et al., 2015). Moreover, the assumption that there is a latent or explicit need for insurance products has been challenged: low uptake could simply mean that there is no 'intense need' (da Costa, 2013). Improving risk management and livelihoods — not insurance uptake — should be the real goal (Greatrex et al., 2015).

Second, there have been challenges to developing a functioning marketplace where insurance products are scaled (Jensen and Barrett, 2017). A major obstacle to the development of an insurance market for small-scale farmers is the unaffordability of premiums, which until now have had to be largely subsidised. A 2017 report estimated that insurance premiums were subsidised by governments to the tune of US$20 billion per year, but that figure is likely to be much higher today (Hazell et al., 2017). As long as poverty is widespread, the coverage gap is unlikely to be closed in a sustainable way.

Finally, the effects of introducing formal insurance do not always have positive environmental or social impacts (Müller et al., 2017). Farmers using insurance may become more vulnerable to drought as they may make more risky production decisions, such as opting for crops that are less drought-resistant or reducing water-saving techniques. Formal insurance can also crowd out traditional risk-coping mechanisms such as group savings or community self-help networks. For example, index insurance introduced to pastoralist communities in northern Kenya has had an uneasy relationship with informal insurance practices used by communities for generations (Johnson et al., 2023). While insurance can help build resilience in the short term, it is important to think about possible unintended consequences as maladaptive outcomes could manifest themselves in the longer term.

2

Objectives and scope of this review

In this paper, we review recent evidence about 'best practices' to make crop insurance more accessible and effective for small-scale farmers. Our review starts from the assumption that crop insurance can make a positive contribution to building farmers' resilience. This is based on some of the sources cited above, as well as on our own primary research with cotton farmers in India (Guarín et al., 2024). But we also take into account some of the limitations and criticisms of insurance that we describe in the previous section. Rather than idealise insurance as a fix-all tool, we aim to show under what conditions, and with what configuration of actors, insurance seems to be making a positive difference and what can be learnt from these experiences.

Our review focuses on four dimensions of crop insurance that are both important for small-scale farmers and where evidence of progress is emerging:

- Improving demand and awareness
- Enhancing the affordability and uptake of insurance products
- Enhancing the reach and benefits of insurance for women, and
- Improving the effectiveness (accuracy, speed and coverage) of insurance for small-scale farmers.

We present our findings as a 'how to' guide, summarising the types of actions and approaches that have demonstrated progress across these dimensions in Section 4. Even though we have tried to keep them separate analytically, the boundaries between these different dimensions are porous, and progress in one is often closely linked with progress in the other.

For each dimension, we have synthesised information from specific case studies, aiming to ground the insights in concrete experiences and examples, as opposed to generalising from the literature. We reviewed 41 academic papers, reports, evaluations and other documents published between 2007 and 2023, with an emphasis on more recent publications. In searching for and selecting examples, we have aimed to cover different agricultural value chains and geographies, with a focus on low- and middle-income countries. The insights presented here are not meant to be systematic or representative, but rather illustrative of what progress in delivering crop insurance to small-scale farmers looks like.

3

Ensuring accessibility and effectiveness of crop insurance for small-scale farmers

3.1 Improving demand and awareness of insurance products

Uptake of crop insurance by small-scale farmers is constrained by several factors, including **low awareness** of the existence of suitable insurance products, a **lack of understanding** of the benefits of insurance as a risk-management tool, and **low trust** in the insurance provider to deliver payouts (Carter et al., 2014 in Akter et al., 2016; Giné et al., 2008 in Akter et al., 2016). Affordability is also a key constraint (see for example Raithatha and Priebe, 2020; UNDP, 2007), as we discuss in Section 3.2. Through our evidence review, we identified three key actions for improving demand and awareness of insurance products: investing in awareness raising, co-designing insurance schemes with farmers, and building trust.

Investing in raising farmer awareness

Investing in training and education for farmers has been shown to increase uptake of crop insurance. For example, an index insurance scheme implemented by PepsiCo for potato farmers in India emphasised client education to demonstrate the benefits of index versus conventional insurance (IFAD, 2010). In Kenya, the success of a pilot insurance scheme with Pula[2] supported by the International Fund for Agricultural Development (IFAD) relied on awareness and outreach efforts involving extension agents and farmers' organisations (IFAD, 2022). Another example of a scheme that invested in farmer outreach is the Agriculture and Climate Risk Enterprise in Africa (ACRE Africa), a service provider that works with local insurers and other stakeholders in the agricultural insurance value chain. ACRE itself emerged from the Kilimo Salama project, a crop and livestock index-based insurance scheme that uses digital technologies (ACRE Africa, no date). Up to 40% of this project's budget was spent on training, a telephone helpline and radio broadcasts, all aimed at informing farmers about insurance (Rosenberg, 2011).

Investing time in understanding farmers' risk appetite can lead to improved design of insurance schemes. The R4 Rural Resilience Initiative in Ethiopia and Senegal (R4 Initiative) is a rural resilience initiative combining four risk-management elements to support small-scale farmers: risk retention, risk transfer, risk management and risk reduction (the four Rs).[3] The R4 Initiative organised training on

2 Pula designs and delivers innovative agricultural insurance and digital products for smallholder farmers in Africa. For more information, see: www.pula-advisors.com

3 For more information, see: https://innovation.wfp.org/project/r4-rural-resilience-initiative

finance and other educational activities to improve understanding of topics relevant to insurance. This included opportunities to work with farmers to improve understanding of 'basis risk' — the chance that farmers with insurance will suffer losses but not receive any compensation — and work through community-based basis-risk strategies. The latter might look like members of the community sitting down together to discuss their risk appetite for basis risk as compared to tail risk (the likelihood of extreme events causing significant losses) to inform the design of an insurance programme (Bernhardt et al., 2021: p.27).

Including farmers in the co-design of insurance schemes

Involving farmers in the co-design of insurance products has been shown to improve uptake of crop insurance. Co-designing insurance with farmers facilitates a better match between farmers' needs and capacities, and the insurance offer. For co-designing to be successful, appropriate processes that prioritise the meaningful participation of farmers are necessary. For example, in the R4 Initiative, a farmer-led process was adopted to design a hybrid index-based insurance product that combined rainfall estimates and vegetation indices (to address the challenge of 'recurrent basis risk' in some areas, such as when farmers receive a payout despite no loss or do not receive payout despite loss) (Greatrex et al., 2015). This farmer-led process used a technique for co-design called the Social Network for Index Insurance Design (SNIID), which combines information gathering and education/awareness with and for farmers. SNIID has been described as a "participatory approach to design a product that integrates local farmers' and experts' knowledge and expertise" (Greatrex et al., 2015). The process involves having discussions with farmers about what needs insuring and at what time, and also uses games — such as economic risk simulations — to identify farmer preferences regarding insurance design (such as coverage and payout frequency), which would be reflected in an insurance contract (Greatrex et al., 2015).

Farmers are demanding and seeing the value of their inclusion in design processes for insurance. In India, an impact review (Zevenbergen, 2014) demonstrated that farmers' most requested improvement in the National Agricultural Insurance Scheme was to become more involved in the design process. Uptake in a community-designed trial project in the region was very high, in part because it provided formal avenues for feedback and validation. Insurers and brokers can engage farmers in insurance design by working with them to understand the risks they face, the perils they want to have covered, and also the implementation process. This should be done at a community level, using community leaders and progressive farmers to engage farmers and mobilise them for discussion (Zevenbergen, 2014).

As part of co-design processes, efforts should be made to consider the gendered dimensions of insurance. In the R4 Initiative, efforts were also made to understand how gender and sex intersects with insurance to affect its reach and benefits — as well as how 'gender strategies' can be included in activities beyond insurance, including risk-reduction strategies such as asset creation (Greatrex et al., 2015). Fletschner and Kenney (2014) argue that, in general, financial products are designed with male heads of household as the presumed beneficiary — ignoring the specific and diverse financial needs of women as economic agents in their own right. Timu and Kramer (2023) also highlight the need to employ gender-inclusive insurance education and extension mechanisms. The gendered dimensions of insurance for small-scale farmers are explored in more detail in Section 3.3.

Building in feedback loops and offering customer support for small-scale farmers can enable insurance schemes to adapt quickly to farmers' realities. Few companies 'control the market end-to-end' by developing a product and also distributing it (ISF Advisors, 2022). Some examples of companies that are working on index-based product development and distribution include Pula, OKO Finance[4] and ACRE Africa, who are also actively building distribution models that offer customer support. This model is expensive and requires extensive on-the-ground operations. Nevertheless, it offers closer links to, and feedback loops with, farmers. These provide insights and lessons into operational realities, which allow for the product to be adapted and improved quickly in response to feedback (ISF Advisors, 2022).

Building trust and using existing distribution channels known to small-scale farmers

Building trust is a key requirement for successfully delivering insurance to small-scale farmers. One way to build trust is to increase farmers' perception of the scheme as fair, such as by improving their understanding of when they will receive payouts when threshold conditions are met. For example, in the Index-based Livestock Insurance (IBLI) scheme, led by the International Livestock Research Institute (ILRI), there was a significant dropout of farmers from the scheme when the threshold for payouts was not crossed but farmers perceived that it should have been (Greatrex et al., 2015). Brands can also convey

4 OKO Finance in Mali creates index-based insurance products for farmers and distributes them via mobiles to unbanked farmers. For more information, see: https://oko.finance/about

trust. For example, mobile network operators often have brand strength (as well as the technology) to drive growth of index-based insurance due to trust, access to information, registration and payout services (Raithatha and Priebe, 2020).

Building on existing distribution channels and organisations already known to and trusted by small-scale farmers has been identified as an important element of success in the distribution of index-based insurance services. Examples include agrodealers, extension agencies and nongovernmental organisations (NGOs) (Raithatha and Priebe, 2020). For example, in the case of input cover insurance, ACRE Africa have used agrovets — supply stores for farmers that deal in seed, fertiliser, animal feed, veterinary supplies and more — who already work with small-scale farmers. The R4 Initiative has strong partnerships at its core, to which it attributes its relative success in building trust with farmers and in enabling scaling. These include partnerships with farmer groups, governments, banks, microfinance institutions, local insurers, research institutions and international reinsurers (Greatrex et al., 2015). The PepsiCo case for potato farmers in India shows that trust of small-scale farmers in the corporation, processor, insurer and local representatives was a key driver of farmers purchasing index insurance (IFAD, 2010).

3.2 Enhancing affordability and uptake of insurance products and schemes

Agricultural insurance for small-scale farmers can be expensive for several reasons. One is the perceived high risk associated with agriculture. Another is the administration and transaction costs associated with distribution and registration of large numbers of small and often geographically dispersed farms. Small-scale farmers are price sensitive, so bringing the price down for farmers is a key tool for increasing uptake (Raithatha and Priebe, 2020). Our review suggests that four factors are important to improve affordability: cofinancing and subsidisation of premiums, offering pre-finance and flexible payment, using technology to reduce transaction costs, and bundling insurance with other services.

Co-financing and subsidising premiums to reduce costs for farmers

Co-financing — sharing the costs of insurance premiums between farmers and other private actors such as buyers or input providers — can help to reduce the amount paid by farmers. Subsidisation refers to cofinancing provided by the state. In a cofinancing scheme supported by ACRE Africa, an agribusiness sponsor pays half of the premium price, leaving the farmers to pay the remaining half, on top of the cost of the inputs they are purchasing. Input companies have an incentive to co-finance premiums because farmers use insurance payouts to buy new seeds if the first batch fails due to delayed rains, and to buy inputs to fertilise them. This, in turn, leads to more input sales for the company. Insured farmers can "buy certified seeds and invest in fertiliser instead of planting relief seed and forgoing investing in soil nutrients" (Syngenta Foundation for Sustainable Agriculture, no date).

State subsidies offer another pathway to reducing insurance premiums for farmers. Premium subsidisation can help improve the sustainability of insurance schemes by supporting the creation of a market for insurance (Raithatha and Priebe, 2020). For example, government subsidisation of premiums in India through the National Agricultural Insurance Scheme, the Modified National Agricultural Insurance Scheme and the Weather Based Crop Insurance Scheme has been critical for the increased adoption of crop insurance by small-scale farmers in that country (Gulati et al., 2018).

Working with governments via subsidisation can also be challenging. The long-term sustainability of these public investments, as well as the wider assessment of their economic benefits against their costs, are subject to debate (Hazell et al., 2017). Governments may have limited financial capacity, and their willingness or ability to support subsidisation in the long term are not guaranteed, since they may have shifting priorities. For customers, working with government bureaucracy can be time consuming (Mahul et al., 2012). Moreover, some experts have raised questions about the financial and ethical implications of the massive transfer of public funds to private insurance companies in the form of subsidy premiums (da Costa, 2013). Government subsidisation of premiums can lead to significant fiscal exposure for the government. It can also mean that farmers face delays in payouts (up to 9–12 months) because of administrative and budgetary processes that need to be followed to find financial resources to cover the losses (Mahul et al., 2012).

Offering pre-financing and flexible payment methods to farmers

Agribusinesses can support the accessibility and affordability of insurance by pre-financing (loaning the premium amount against future profits). This can alleviate cashflow challenges faced by small-scale farmers, which can be particularly severe at certain times of the year. For example, Green Delta Insurance in Bangladesh provides index insurance services to agribusinesses who subsidise the cost of insurance for farmers in their value chains, deducting premiums from the proceeds of crop sales at the end of a season (Raithatha and Priebe, 2020).

Giving farmers different ways to pay premiums can also improve their ability to pay. The R4 Initiative allowed farmers to pay premiums in cash or through insurance-for-work programmes, or a combination of the two (Greatrex et al., 2015).

Using technology to reduce transaction costs for farmers

Mobile phone and digital technologies are playing an important role in reducing the costs of insurance including costs for subscriptions, claims assessments and verification, and payments. These technologies can help simplify the assessment of claims, reduce the time and burden for farmers to apply or make claims, and make payments easier and faster. ACRE Africa is well known for its technology-based partnerships, particularly with M-PESA (Safaricom's mobile money product in Kenya), allowing it to make quick and cost-effective payouts to farmers. This partnership has allowed ACRE Africa to reach thousands of farmers while keeping transaction and delivery costs low, though coverage of farmers is confined to mobile-phone owners where there is mobile signal (Greatrex et al., 2015). The only transaction costs incurred are the cost of an SMS text message for farmer registration (Syngenta Foundation for Sustainable Agriculture, no date). Similarly, Pula and OKO use mobile technologies to register and communicate with their customers.

Technology can also reduce the costs associated with in-person loss assessments of crops. For example, digital records of historical yields and area-yield data can contribute to assessments of crop losses (Raithatha and Priebe, 2020). Crop cutting — the process by which yields for a specific location are experimentally determined with personnel on the ground — leads to additional transaction costs, which have to be built into the cost of premiums. Insurance companies are also using mobile technology, remote sensing and machine learning for area-yield index insurance to allocate farmers to areas with similar agroclimatic conditions rather than using administrative borders (Raithatha and Priebe, 2020). Location-based services on mobile devices can help insurance providers to triangulate farmers' locations.

Bundling to enhance delivery of insurance to small-scale farmers

Bundling involves combining complementary services with insurance, reducing overall transaction costs in service provision. Several insurers argue that bundling is a central solution to the challenge of delivering insurance to small-scale farmers (FinDev, 2019). Services can include agronomic advice, input supply, credit or loans. Ninety per cent of all index-insurance services are bundled or offered together with credit, inputs or agronomic advice (Raithatha and Priebe, 2020). This can help drive uptake by offering an immediate or demonstrable benefit, such as productivity gains (Greatrex et al., 2015). Bundling can decrease reliance on donors and premium subsidies, providing a path to financial sustainability — but it can also expose farmers to other vulnerabilities such as price volatility (Müller et al., 2017).

Index insurance can be offered to small-scale farmers as part of a contract farming package of bundled services. In the PepsiCo scheme in India, an index insurance product is offered to its contract farmers, which is sold through ICICI Lombard General Insurance Company and managed by Weather Risk Management Services (IFAD, 2010). Agricultural credit and insurance can be bundled or linked. For example, the loan provider prepays the insurance premium on the behalf of small-scale farmers. This is paid back after harvest. If there is an insured loss, the amount to be repaid is reduced. It has been argued by some providers that this will help grow the market for agricultural insurance (Syngenta Foundation for Sustainable Agriculture, 2015). Evidence from early pilots of index insurance bundled with credit show that lending institutions can recover more loans from insured farmers, potentially allowing them to offer lower interest rates on loans bundled with insurance (Raithatha and Priebe, 2020).

Existing technology platforms that are already being used by farmers can be used to offer new services, including insurance. DigiFarm, Safaricom's centralised, mobile-based hub for small-scale farmers in Kenya, provides a range of agricultural services, such as inputs, access to credit, agronomic advice, access to markets, and mandatory insurance for farmers taking out loans. The insurance aspect is operated by existing insurance providers, ACRE Africa and Pula. DigiFarm has over a million registered users and is trusted by farmers. It integrates mobile money services — which are already widely used in Kenya — to collect registration fees and to make payouts (Raithatha and Priebe, 2020). In the DigiFarm scheme, insurance is compulsory for those taking out an input loan. DigiFarm uses an algorithm based on a farmer's historical yield data, agroclimatic data and historical mobile money use to approve loan applications. Using existing digital platforms can help to reduce the transaction costs associated with providing insurance to large numbers of small-scale farmers.

Input supply can also be bundled with insurance, typically in the form of microinsurance. In these cases, the insurance provider/broker/scheme owner partners with agrodealers and seed companies to provide farmers with replacement seeds if theirs fail to germinate. In the ACRE Africa model in Kenya,

farmers can buy Bima Pima agricultural insurance via a mobile platform when they buy a bag of seeds at the beginning of the growing season. The location of the farmer, provided by the mobile geolocation, is then used to assess the behaviour of weather and other data, as well as an eventual payout — which is sent directly to farmers via their mobile banking services (World Bank, 2022). Agronomic advice is also bundled into this insurance and input purchasing product: extension messages are sent, using local weather information from nearby weather stations (Syngenta Foundation for Sustainable Agriculture, no date). While the majority of farmers have never accessed insurance services before, most can afford Bima Pima's insurance. A premium of 50 Kenyan shillings (less than US$0.30), for instance, has a potential payout of 10%, which is equivalent to 500 Kenyan shillings and would be enough to buy a bag of seedlings. Bima Pima has also managed to be profitable (World Bank, 2022), showing some of the benefits of bundling for providers.

Bundling can also happen with other types of insurance cover, reducing costs overall. For example, health insurance can offer farmers greater coverage for multiple risks and can allow insurance providers to cross-subsidise (Raithatha and Priebe, 2020). This makes small-scale farmers a more attractive customer. Econet's ZFU EcoFarmer services — for members of the Zimbabwe Farmers' Union (ZFU) — has funeral insurance, agronomic advice and index-based weather insurance for US$1 a month, sold and paid for via Econet's mobile money service EcoCash. It was initially offered as a standalone index-based weather insurance service, but the combined offer was created to drive uptake and offer a comprehensive bundle of useful services to farmers. It allows for cross-subsidisation across other services in the bundle. As of 2019, around 30,000 farmers were actively using the service (Raithatha and Priebe, 2020). EcoFarmer also provides farmers with free agronomic advice, market prices (for maize) and weather forecasts via SMS. Raithatha and Priebe (2020) explain that "cross-selling index insurance with other types of insurance, such as health insurance, offers farmers greater cover for their risks and can often allow insurance providers to cross-subsidise the cost of index insurance services".

3.3 Enhancing reach and benefits of insurance for women

Insurance may have a disproportionately high impact on women. For example, an evaluation of the R4 Initiative found that female-headed households, who were a particular target group of the programme, appeared to be benefiting more than male-headed households who also took out insurance. Female-headed households who owned land but sharecropped it started cultivating more of their own land, increasing their spending on inputs and taking out more loans than insured male-headed households (Madajewicz et al., 2013). The provision of information targeted specifically at female-headed households, as well as resources to support women's risk-reduction activities (such as vegetable cultivation), may have contributed to these outcomes (Madajewicz et al., 2013). In the following sections, we describe three concrete steps that can be taken to enhance the reach and benefits of crop insurance for women: adapting and simplifying processes, building on social structures already used by women, and tailoring insurance products to the needs of women.

Adapting and simplifying registration and other processes

Simplified application and claim processes, suited to women's levels of literacy and numeracy in the target area, are key to reducing entry barriers for rural women. For instance, an index-based weather insurance provider in Bangladesh allowed the registration requirement of a land title deed to be flexibly applied where farmers were landless. With support from a local microfinance institution, farmers were able to obtain a photocopy of their respective landlord's title deed. The insurance policy could then be registered in the tenant's name (Dalberg Advisors, 2022).

Involving social structures used by women for outreach

Insurance companies wanting to be more inclusive of women can build on the networks or associations women are already part of. Women in rural settings are often part of organised groups, providing a context in which sharing new ideas is encouraged, and a ready opportunity for insurance schemes to reach women (ACRE Africa, 2024). For example, Basix, a large microfinance institution in India, provides weather insurance to women's self-help group members in drought-prone areas (Fletschner and Kenney, 2014). Similarly, ACRE Africa has used village champions (local lead farmers) to reach farmers and has made sure 60% of these village champions are women. ACRE Africa uses existing social structures such as *chamas* (microsavings groups typically made up of friends, family or colleagues), churches and markets to reach women.

Group insurance programmes could contribute to increased collective agency. For example, by making group membership more attractive, insurance could become more affordable or accessible, and provide a space for women to learn about finance and insurance together.

Tailoring insurance to women's needs

Crop insurance is more gender-responsive when products are tailored to the different risks faced by men and women farmers, while avoiding negative impacts for women or men (Timu and Kramer, 2023). Tools to achieve this include offering farmers 'a menu of options' that target different risks (rather than one specific risk which may not be relevant for women), using group-level insurance that builds on women's collective agency and bargaining power, and conducting gender-based assessments of insurance needs and impacts to understand how the benefits of insurance are being distributed. For example, the Gender-sensitive Agricultural Index-based Insurance scheme in Kenya, has assessed the needs of women farmers and insurance providers, including the social and gender norms affecting access to and use of satellite-based index insurance products. It has also codeveloped gender-sensitive quality metrics for index insurance products with both farmers and insurance companies (Nesoba, 2022).

Offering insurance for crops cultivated by women can make sure that an insurance product is responsive to their needs. OKO and the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) piloted a gender-focused crop insurance solution in Mali, developing a new insurance product for crops grown mainly by women, with positive outcomes for women's uptake (Innovasjon Norge, 2022).

3.4 Improving effectiveness: accuracy, speed and coverage

We define effectiveness in terms of an insurance scheme's ability to:

- Accurately assess and make payments that reflect actual loss for small-scale farmers
- Make payouts in a timely manner to meet farmers' needs, and
- Cover sufficient numbers of farmers to keep transaction costs, and therefore premiums, as low as possible.

There are many challenges involved in designing and delivering effective insurance for small-scale farmers. As insurance customers, farmers can bring high transaction costs in registration, claims assessments and payouts, all of which have contributed to historically high premiums or unviable schemes from the perspective of the insurer. This has rendered insurance inaccurate and slow, and has led to limited coverage. In this section, we focus on using technology to reduce transaction costs and increase coverage, and to increase cost-effectiveness.

Reducing transaction costs and accuracy by using technology

Technologies to assess and use weather-based indices can improve the speed at which payouts are made and alleviate the need for farmers to make claims themselves. The ACRE Africa scheme, for example, uses a weather-based index based on rainfall. When rainfall falls below a certain level (or above), payments are automatically paid to farmers. This information on rainfall levels relies on solar-powered local weather-monitoring stations. There has been replication of this model in India (led by Syngenta Foundation for Sustainable Agriculture) for corn seed in Rajasthan.

Satellite data is helping to build historical weather data and allowing for better rainfall monitoring, helping to overcome the challenge of historical and current weather data availability, especially in low- and middle-income countries (Raithatha and Priebe, 2020). Index-based flooding insurance — where high-tech modelling and satellite imagery is combined with other data to predetermine flood thresholds — can trigger speedy compensation payouts (IWMI, no date). Nevertheless, many of these schemes still require government support (such as area-yield index insurance) to ensure effective distribution (Raithatha and Priebe, 2020).

Global Positioning System (GPS) and other technology can improve insurance coverage of small-scale farmers. In Bangladesh, Green Delta Insurance has an index-based weather insurance scheme that covers any crop, in any season, in any area. As of 2018, it had covered 10,000 farmers. Those farmers are protected against low or high temperatures and excess rainfall. Features of the scheme that have enabled its large coverage of farmers include: the use of GPS-based technology to specify the location of farmers; automation of claims settlement processes (no farmer visits, no assessor visits) through a transparent process; coverage area monitored through a 10km-radius-based interpolated data station; and unique web-based software that allows for monitoring of weather data on a regular basis, providing scope for faster settlement of claims (Green Delta Insurance, no date).

Using new technologies to improve the cost-effectiveness of loss assessments and settlement speeds

Experiments are happening with new technologies for more accurate assessments of individual damage, for example using pictures to track crop growth and document crop failures (IFPRI, no date). In the case of ACRE Africa, data sourced from satellites is "supported by information from

vegetation remote sensing, farmer interviews, on-site validation and tools such as weather generators and crop simulation models" (Greatrex et al., 2015), allowing for triangulation of data and enhanced accuracy. Other information and communication technologies (ICTs), such as digitising land records and linking them to farmers' bank accounts, has also allowed for faster assessments/settlements of crop insurance claims (Gulati et al., 2018).

Using hybrid schemes to maximise the advantages of different insurance types

Hybrid index insurance is a combination of weather index insurance and area-yield index insurance. It offers comprehensive coverage for farmers as it maximises the advantages of both insurance products. The weather index insurance results in quick and easy payouts in the case of bad weather, while the area-yield index provides more accurate payouts covering a larger number of perils and involving the assessment of actual loss of crop production at the end of the growing season.

Pula has combined its area-yield index insurance with weather index insurance. As of 2020, it had covered 3.4 million farmers in Ethiopia, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania, Uganda and Zambia (Raithatha and Priebe, 2020). Under Pula's area-yield index insurance (multiperil: covering all factors affecting yields) a country is divided into agroecological zones based on factors such as historical rainfall, temperatures and prior yields. Average historical yield data is determined for each zone based on past data. At the end of the season, trained enumerators measure yield levels for each agroecological zone and make a payout in cases when yields fall below a determined threshold (Pula, no date). Using its weather index insurance as a complementary scheme, farmers receive quick payouts in the case of bad weather. These payouts can be used for replanting or other urgent household needs (Pula, no date).

4

Conclusions and implications for action

Improving the resilience of small-scale farmers is important not only to protect their livelihoods and increase their wellbeing, but also to ensure the sustainability of the agricultural supply chains they sell into. Small-scale farmers and their systems of production are particularly vulnerable to climate risk. Crop insurance is one potential tool to manage this risk, alongside other informal and formal tools and strategies. However, as we have discussed, insurance coverage of small-scale farmers around the world is limited.

This review has identified a number of barriers to accessing insurance. Some of these may be specific to small-scale farmers, for example, negative perceptions of the quality or reliability of insurance products and a lack of trust in the ability of insurance providers to deliver on their promises. Other barriers may be more widespread, especially in rural areas, for example, the unaffordability of premiums, low awareness of insurance products, and cultural attitudes towards risk. We have also discussed the particular gendered barriers to insurance faced by women small-scale farmers. However, while the barriers to accessing insurance may not always be specific to small-scale farmers, solutions need to be tailored to them.

What emerges clearly from our review is that insurance is not 'one-size-fits-all', and to be effective for small-scale farmers, it needs to be relevant to their context. Insurance should only be used to transfer risk that cannot be reduced in any other way. From the perspective of insurance providers, small-scale farmers can be seen as 'too risky' to work with. Our review identified several solutions that can help to overcome the specific technical and logistical challenges that insurers face in designing products that work for small-scale farmers — and still make 'business sense' — such as bundling.

In Table 1, we have summarised key actions to address common challenges, illustrating these with practical examples. We hope this can serve as guidance for those working in, or supporting, insurance provision and delivery in small-scale agriculture.

The scope of this review has been limited, but future research could further document and explore the role that insurance does, and could, play in managing risk for small-scale farmers, within the context of other risk-management strategies, including informal ones. We have found that scaling remains a major challenge to delivering crop insurance for small-scale farmers. Future research could analyse pilot schemes that have successfully scaled, and the enablers and constraints to achieving this. Finally, while our own review has focused on identifying success stories and best practices, research also has a central role to play in understanding the potential adverse impacts and unintended consequences of insurance for small-scale farmers. Does increased insurance uptake by small-scale farmers undermine long-term resilience? Under what conditions? And how is this related to the design and delivery of specific insurance schemes? These are all questions that future research could explore, ideally in partnership with both insurance providers and small-scale farmers themselves.

Table 1. Key actions for designing and implementing crop insurance for small-scale farmers

HOW TO…	ACTIONS	EXAMPLES
Improve customer demand and awareness of insurance	Invest in raising farmer awareness, sensitisation and outreach	Investments by ACRE Africa in farmer education, training, telephone helpline, radio broadcast. PepsiCo's index insurance for potato farmers in India, which emphasises client education.
	Include farmers in the co-design of insurance schemes through a combination of information gathering to understand farmers' realities, and education/awareness raising with and for farmers	The Social Network for Index Insurance Design (SNIID) process (used by the R4 Initiative). SNIID uses a participatory approach to design a product that integrates local farmers' and experts' knowledge and expertise. The process involves having discussions with farmers about what needs insuring, at what time, and also uses games — such as economic risk simulations — to help understand farmer preferences around how the insurance should be designed.
	Invest in trust building and use existing distribution channels known to small-scale farmers	Existing schemes have been used by familiar extension agents, agrodealers and NGOs, for example and — increasingly in some contexts — by mobile network operators. In the case of input cover insurance, ACRE Africa has used agrovets that are already being used by small-scale farmers to source inputs.
Enhance affordability and uptake of insurance products	Co-finance or subsidise premiums to reduce costs of insurance for small-scale farmers	The private sector can offer financing by identifying mutual benefits (for example, input suppliers who offer subsidisation of premiums for input insurance, which allows farmers to buy more inputs should the rains fail, such as in the ACRE Africa scheme). Government or donor subsidies are very common in delivering insurance schemes to small-scale farmers (see all of the national schemes in India).
	Offer pre-financing options for insurance premiums and allow flexible payment methods	Agribusinesses can support pre-financing for farmers supplying to them (for example, through contract farming). Green Delta Insurance in Bangladesh provides index insurance services to agribusinesses who subsidise the cost of insurance for farmers in their value chains. Opportunities can exist for alternative ways of paying premiums (for example, insurance-for-work schemes, or by cash for those who lack access to banking services). The R4 Initiative allows farmers to pay premiums in cash or through insurance-for-work programmes, as well as a combination of the two.
	Use digital technologies to reduce the costs of farmer subscriptions, claims assessments and verification, and payouts	Weather- or vegetation-related indexes can be used to assess damage and provide automatic payouts to avoid the need to make claims. Mobile technology can be used to register farmers and make payouts.

HOW TO…	ACTIONS	EXAMPLES
Enhance affordability and uptake of insurance products	Bundle products to reduce costs of delivery, support productivity gains and ensure mutual gains across the services being provided	Index insurance can be offered as part of a contract farming package of bundled services, as exemplified by the PepsiCo scheme in India. DigiFarm is Safaricom's (Kenya) centralised, mobile-based hub for small-scale farmers. It provides a range of agricultural services, such as inputs, access to credit, agronomic advice, access to markets and mandatory insurance for farmers taking out loans. The insurance aspect is operated by existing insurance providers, ACRE Africa and Pula. Econet's ZFU EcoFarmer services — for members of the Zimbabwe Farmers' Union (ZFU) — has funeral insurance, agronomic advice and index-based weather insurance for US$1 a month, sold and paid for via Econet's mobile money service, EcoCash.
Enhance reach and benefits of insurance for women	Simplify registration and other processes	An index-based weather insurance provider in Bangladesh allows the registration requirement of a land title deed to be flexibly applied where farmers are landless. With support from a local microfinance institution, farmers are able to obtain a photocopy of their respective landlord's title deed. The insurance policy can then be registered in the tenant's name. This is particularly relevant to women who may lack land tenure.
	Use structures already used and trusted by women	ACRE Africa has used village champions (local lead farmers) to reach farmers and has made sure 60% of these village champions are women. ACRE Africa uses existing social structures (such as *chamas*, churches and markets) to reach women for outreach.
	Build gender-responsiveness into insurance products	Offer farmers 'a menu of options' that target different risks, rather than one specific risk which may not be relevant for women. Use group-level insurance as a mechanism for strengthening groups, their bargaining power and functioning. Conduct gender-based needs assessments and assessments of the impacts of insurance within households to understand how the benefits of insurance are being distributed.
	Raise the bar: design insurance in a way that empowers women	Tangible examples do not yet exist of empowerment through insurance, but if insurance contributes to increased yields and productivity, this could lead to greater incomes for women, and enhance their decision making and agency. If women can open a bank account when accessing insurance, this could enhance their financial independence from men; and group insurance programmes could contribute to increased collective agency.

HOW TO…	ACTIONS	EXAMPLES
Improving effectiveness: accuracy, speed and coverage	Consider index-based insurance to reduce transaction costs and increase coverage of small-scale farmers	A number of schemes use a weather-based index based on rainfall, increasing effectiveness in assessment and timely payouts. This weather can be monitored via local weather stations (which can be solar powered), or can use satellite data. One example is Green Delta's agricultural insurance in Bangladesh.
	Use new technologies to improve the cost-effectiveness of loss assessments, conventional insurance schemes and the speed of claims settlement	Experiments are happening with new technologies for more accurate assessment of individual damage, for example using pictures to track crop growth and document crop failures. Other use of ICTs, such as digitising land records and linking them to farmers bank accounts, has also allowed for faster assessment/settlement of crop insurance claims.
	Consider hybrid schemes to maximise the advantages of different insurance types	Hybrid schemes combining yield and weather-based indices improve accuracy. Pula's yield-index insurance is one example that pays out to farmers in the case of bad weather while also covering multiple perils through assessment of yield at the end of the season.

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Around the world, small-scale farmers face greater vulnerability to shocks such as extreme weather events and financial crises. Building their resilience is vital for their livelihoods and the stability of supply chains. While small-scale farmers already use various strategies to manage risk, insurance — especially index crop insurance — is gaining attention as a solution. This paper highlights best practices for designing and implementing effective crop insurance for small-scale farmers. However, insurance is not 'one size fits all' and must be context specific without crowding out traditional risk-coping mechanisms. Future research should explore how insurance affects farmers' long-term resilience and investigate challenges in scaling insurance solutions.

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