

Climate and disaster risk insurance in low income countries: Reflections on the importance of indicators and frameworks for monitoring the performance and impact of CDRI

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Climate and disaster risk insurance in low income countries: Reflections on the importance of indicators and frameworks for monitoring the performance and impact of CDRI

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Abstract

The use of climate and disaster risk insurance (CDRI) in low income countries has received significant interest over the last decade, as its ability to enable faster and more reliable access to funds is seen as an important mechanism to help strengthen the resilience of poor and vulnerable communities. This has led to national and international commitments and efforts to increase CDRI coverage to the poor and vulnerable. What remains unclear is the monitoring and evaluation of these instruments, with a lack of consensus on what indicators to use and what information to collect. A particular challenge is how to measure performance and impact. This paper categorizes the use of CDRI across four major policy domains (disaster aid, social protection, climate adaptation and loss and damage to climate change) and explores the meaning of success from different stakeholder perspectives. We review how CDRI is currently evaluated, what assessment frameworks exist, which indicators are used and what evidence is emerging from our survey based local level data. We review 7 global/regional and 3 national level CDRI schemes and support the analysis with 41 key informant interviews (KIIs) and 17 focus group discussions (FGDs) in India and across insurance experts in Africa. We highlight the diversity of success criteria at the project and actor level when contrasted with user data from the ground. While a multitude of indicators, frameworks and methodologies are being used to define success of CDRI, our findings indicate a need for transparent monitoring and evaluation frameworks applied across insurance domains to enable greater scrutiny and to assist those funding, demanding or supplying insurance instruments.

Keywords: Resilience, Disaster Risk Insurance, Climate Change, Monitoring and Evaluation, India

JEL Codes: G22, Q54, Q50, Q56

1. Introduction

Adverse humanitarian and financial impacts triggered by extreme weather and a changing climate have caused severe social and economic disruptions, with particularly long-lasting impacts for the poor and vulnerable (Hallegatte et al, 2017; UNISDR, 2018). Cumulative costs from climate change have led to an increased emphasis on restructuring the current disaster risk finance and financial protection strategies (Poole et al, 2020; World Bank 2018). Although useful, traditional financial instruments for disaster recovery such as humanitarian aid, support from multilateral organizations and self-financing from budgetary resources rarely provide financial resources quickly enough to aid rapid recovery (GCA, 2019; World Bank, 2017; Clarke and Dercon, 2016). A growing number of national and international institutions are therefore looking beyond post-disaster financing instruments towards pre-arranged risk financing including insurance mechanisms, which can offer more timely and effective protection than post-disaster aid and help to increase risk planning and risk understanding (Hallegatte, 2014).

At the global level this has been recognized through paragraph 30b of the UN's Sendai Framework for Disaster Risk Reduction 2015-2030, which promotes "mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas" (UN, 2015) and through Article 8 of the Paris Climate Agreement which emphasizes the importance of insurance instruments in minimizing the financial damages arising from climate change (UNFCCC, 2015). This has been underpinned by a range of innovative insurance applications aimed at increase usage of this instrument in low-income countries, including for example micro-level programmes for small-holders or farmers, meso-schemes for co-operatives, national level subsidized crop schemes and regional macro-level schemes to protect government budgets (Cebotari and Youssef, 2020; Surminski et al., 2019; Surminski, 2016). These efforts come amidst persistent low insurance penetration levels in low-income countries (Swiss Re, 2019; Climate Wise, 2016; Panda, et al., 2020; Jarzabkowski et al., 2019), with cover often either not available or not taken up, even when subsidized (Surminski et.al., 2019).

In spite of growing investment of insurance interventions and the belief that it can be a useful risk management tool for low-and middle-income countries, the empirical evidence on

insurance interventions' impact on poor and vulnerable populations is still inadequate. Overall there is a clear gap between efforts to increase the scale of CRDI and empirical evidence of success and failures on the ground (Surminski et al., 2019). This arises partly because measuring and tracking input, output, outcome and impact is complex, and in most cases context specific. Another key challenge is the lack of transparent reporting and data collection in connection to the insurance schemes.

This paper offers reflections on the current experience with monitoring and evaluating CDRI based on literature review and primary data, and propose three steps to assist the improvement of the evidence base for CDRI

- Clarify the underlying aims and objectives by establishing the policy domain of CDRI
- Recognize that success criteria vary across stakeholders
- Select tools and indicators that allow insights on input, output, outcome and impact

This perspective piece relies on multiple sources of information and evidence: (1) Analysis of web-based grey and peer-reviewed literature on disaster risk insurance, climate change and monitoring and evaluation. We conducted literature searches with Web of Science combining a few key words (i.e. “disaster insurance + climate change”, “disaster insurance + monitoring and evaluation”). We found a substantial amount of literature on analysis of individual insurance schemes in various countries. However, available literature on monitoring and evaluation of disaster insurance schemes is scarce and further limited in the case of evaluating global and regional CDRI schemes and their impacts on poor and vulnerable populations. (2) Analysis of the existing evaluation criteria used by 7 major global and 3 national initiatives on CDRI based on the GRI Insurance Database and enhanced by further document analysis and expert discussions. (3) Qualitative content analysis of evidence at the local level from two exemplar contexts: agriculture insurance in India through 17 FGDs among farmers and 11 KIIs with stakeholders in India, and the industry perspective captured by a survey conducted in 2019 among 30 stakeholders consisting of representatives from the African insurance and reinsurance industry, development organizations, and academia during a UNEP-FI African Market event in Lagos, Nigeria.

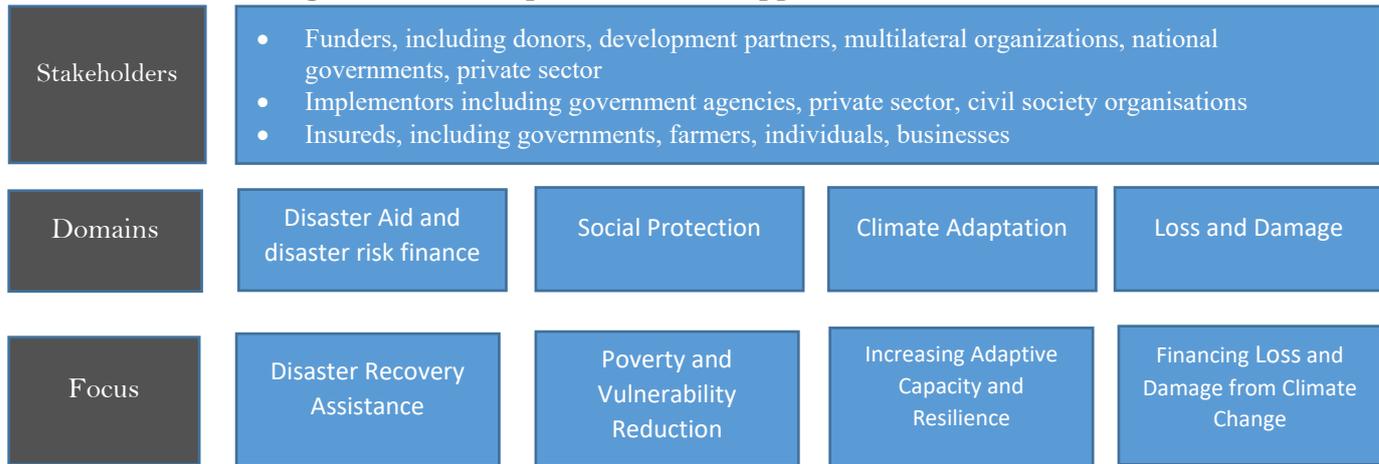
2. Application of climate and disaster risk insurance across policy domains

In order to establish a strong monitoring and evaluation approach for CDRI it is important to recognize the diversity of aims and ambitions that drive design and implementation of different instruments. The efforts to increase use of insurance for climate and disaster risk finance in low-income countries span four major policy domains: disaster aid and risk finance; social protection; climate adaptation; and loss and damage to climate change. Such a categorization is not without challenges. All four domains are cross-cutting and complement each other, while some of their underlying principles and aims are somewhat distinct. However, we argue that distinguishing between these policy domains can help clarify the aims, objectives and success criteria of different types of CDRI programmes. Additionally, this distinction helps to highlight commonalities and differences among key stakeholders with regards to the aims and objectives attached to the implementation of insurance tools. Indeed, we argue that some of the confusion about what insurance can and can't do can be traced back to lack of understanding of the specific domain in which insurance schemes are developed and implemented.

From a public policy point of view, the main attraction of insurance is economic, with certainty and speed of pay-outs considered key factors in reducing negative impacts of adverse events (Weingartner et al., 2017). Additionally, private sector engagement, improved risk discipline, risk knowledge and the possibility of incentivizing risk reduction behaviour are commonly noted as advantages that insurance can facilitate (Surminski, 2014). Trade-offs include costs attached to insurance, such as the obvious premium payments, capitalization requirements and opportunity costs, and costs arising from unintended consequences. These include inefficiencies due to basis risk and mal-adaptation triggered by over-reliance on insurance in face of climate risks. As such it is important to recognize the different domains of engagement at the local, national and international levels and the variety of stakeholders who are involved in CDRI when monitoring and evaluating impact.

Figure 1 depicts the current landscape of insurance applications across the four domains identified. Stakeholders involved in providing or facilitating insurance solutions for climate risks range from multilateral organizations to private players across the domains, as briefly discussed below.

Figure 1: Landscape of insurance application across different domains



Source: Authors

2.1 Disaster Aid and Risk Finance

Until now the humanitarian disaster risk financing system has largely focussed on reconstruction and rehabilitation, without much investment in early action and risk reduction measures (Broberg and Hovani, 2019; Clarke and Dercon, 2016; Watson et al., 2015). Currently, for every USD \$10 spent on humanitarian response only USD \$1 is spent on reducing and managing risks (Montier et al., 2019). However, investing in preparedness rather than relief is recognized as increasingly important (Bene et al., 2018; Mahul et al., 2017; Raschky, and Schwindt, 2016). The relevance of insurance mechanisms for disaster risk financing is illustrated by the development of sovereign climate and disaster risk pooling initiatives such as the Africa Risk Capacity (ARC) and Caribbean Catastrophe Risk Insurance Facility (CCRIF). Moreover, recent pilots such as ARC Replica have also been developed, providing insurance products to humanitarian partners to expand the reach of climate risk insurance and to improve the effectiveness of emergency humanitarian response (WFP, 2018).

2.2 Social Protection

For around 5.2 billion people in low-income countries who are not protected or only partially protected under social protection schemes (ILO, 2019), climate change is considered an additional challenge (Costella and Ivaschecenko, 2015; Kuriakose et al., 2013; Panda, 2013). With most social protection measures currently financed through limited government funding in low-income countries, evidence suggests that if climate shocks become too frequent and/or intense, social protection programs such as safety nets are likely to become less effective

(Carter and Janzen et al., 2015; Hallegatte et al., 2016). Thus, there is an increasing recognition that CDRI and its role in anticipation and prevention can strengthen climate resilience (MCII, 2019). One prominent example is the World Food Programme's (WFP) R4 Rural Resilience Initiative, where insurance is integrated into either existing government social safety nets or WFP's Food Assistance for Assets programs (Oxfam, 2018) to promote resilience by reducing farmers' vulnerability to shocks. Other examples include Kenya hunger safety net programme which provides regular cash transfers to the poorest households in Northern Kenya and a livelihood protection policy under the Caribbean Catastrophe Risk Insurance Facility (CCRIF), which targets the most vulnerable by providing microinsurance products (MCII, 2019).

2.3 Climate Adaptation

Insurance has been widely recognised as an important tool for climate change adaptation. While the costs of adaptation in developing countries could range from USD \$140 billion to USD \$300 billion per year by 2030 (UNEP, 2016), every USD \$1 invested in adaptation could result in USD \$2–\$10 in net economic benefits (GCA, 2019). While traditional climate adaptation financing mechanisms will not be able to cover these adaptation costs (Micale et al 2018), insurance might help by providing financial security against disasters through risk pooling and transfer. In this context, the use of insurance is regarded as private adaptation financing (Jarzabkowski et al., 2019; GCA, 2019; Weingärtner et al., 2018; Surminski and Hudson, 2017; UNEP, 2016). With increasing evidence that countries with widespread market-based insurance coverage recover faster from the financial impacts of extreme events (Golnarghi 2018), governments are increasingly recognizing the role of market-based insurance for adaptation. One important example is the growing number of disaster insurance schemes in developing countries as a climate risk management tool. According to a recent study, the number of schemes in developing countries of Asia jumped from 35 to 53 during 2012 to 2018. (Surmiski et al., 2019).

2.4 Loss and Damage

Insurance gained acceptance within the debate on loss and damage to climate change as a result of the Warsaw International Mechanism (WIM), and was further supported by the Paris Agreement in 2015 (Surminski, 2019; Vanhale and Hestbaek, 2016; Linnerooth-Bayer et.al., 2019). The emerging narrative stresses that insurance instruments can serve the two-fold purpose of insuring the damages caused by climate change-related disasters and reducing the number of future losses by inducing risk reduction behaviour among communities and nations.

However, there has been almost no practical evidence of designing insurance interventions specifically to deal with loss and damage. Rather, it has been recognized as an integral component of the whole comprehensive risk management approach to deal with climate change impacts as a part of broader development support. It is important to note that insurance cannot provide financial protection against all types of loss and damages, including permanent loss of biodiversity and flora and fauna (Bower, 2018; Hoffmaister and Stabinsky, 2012).

3. The concept of success of CDRI

‘Success’ is a complex concept, and simply asking whether or not a CDRI scheme is successful or not will not lead to insightful information. First, there is no clarity on what “success” looks like: is it the amount paid out, is it the speed of payment and recovery, is it the insurance penetration and coverage, is it poverty reduction or insurance market development, the longevity of a scheme or the amount being invested by funders? As shown above the term ‘insurance’ does not only capture a wide variety of CDRI schemes, it is also used to fulfil different aims and objectives across the four domains, which influences the understanding of what success of an insurance scheme means and for whom. Figure 2 illustrates this for a set of key stakeholders.

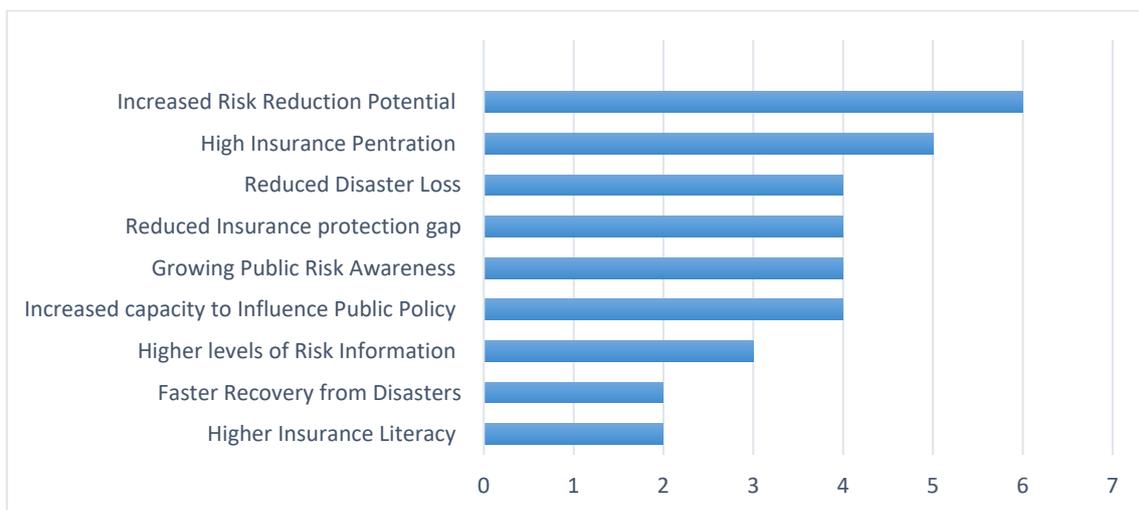
Figure 2: Possible Success Criteria by stakeholder

Possible Success Criteria with Potential for Sub-Indicators Development				
<p>Private Sector</p> <ul style="list-style-type: none"> • Insurance Penetration • Geographic Coverage • Amount of Premium collected • Product Innovation 	<p>Multilateral Organizations</p> <ul style="list-style-type: none"> • Greater geographical scope and coverage • Financial sustainability • Strong and continued membership • Enhanced climate resilience • Reduced Poverty 	<p>Development Partners</p> <ul style="list-style-type: none"> • Number of people protected through insurance • Number of Countries with disaster risk strategies in place • Increased Resilience • Gender Inclusive 	<p>Individual Beneficiaries</p> <ul style="list-style-type: none"> • Adequate amount of pay-out • Right timing of pay-out • Coverage of multiple risks. • Reduced risks and increased adaptive capacity. 	<p>Sovereign Governments</p> <ul style="list-style-type: none"> • Low Premium • Cost-Effectiveness compared to other options. • Technical support and capacity building. • Efficient functioning

Source: Authors

This diversity of meaning and interpretation of the success of CDRI at the scheme or project level is further illustrated by findings from two distinct investigations. The first investigation involved a survey conducted during the UNEP-FI African market event in Nigeria in 2019 among 30 stakeholders consisting of representatives from the insurance and reinsurance industries, development organizations and academia. We asked what success criteria the participants in the survey would suggest for the use of CDRI insurance in Africa as depicted in Figure 3.

Figure 3: Most mentioned success criteria among participants in the UNEP-FI Africa market event in Nigeria



The findings suggest that most of the stakeholders have different ideas of what success looks like in the context of CDRI, ranging from insurance literacy, penetration to risk reduction potential.

The second example is based on field work conducted in the State of Maharashtra in Western India. The data is based on qualitative interviews derived from 17 focus group discussions among male and female farmers groups in 2019 and 11 key-informant interviews with different stakeholders involved in implementing crop insurance scheme in India. These stakeholders included banks, agricultural officials, insurance companies and university researchers on insurance. We used qualitative content analysis (QCA) (Kuckartz, 2014, 2019; Mayring, 2015) by using a data-driven approach to code the qualitative contents of the texts, arriving at categories of criteria for success of CDRI.

Figure 4 describes ideas of what success looks like in the context of CDRI from the perspective of our key informants. Figure 5 describes the same from the perspectives of male and female farmers.

Figure 4: Most mentioned Success criteria among industry and government stakeholders in India

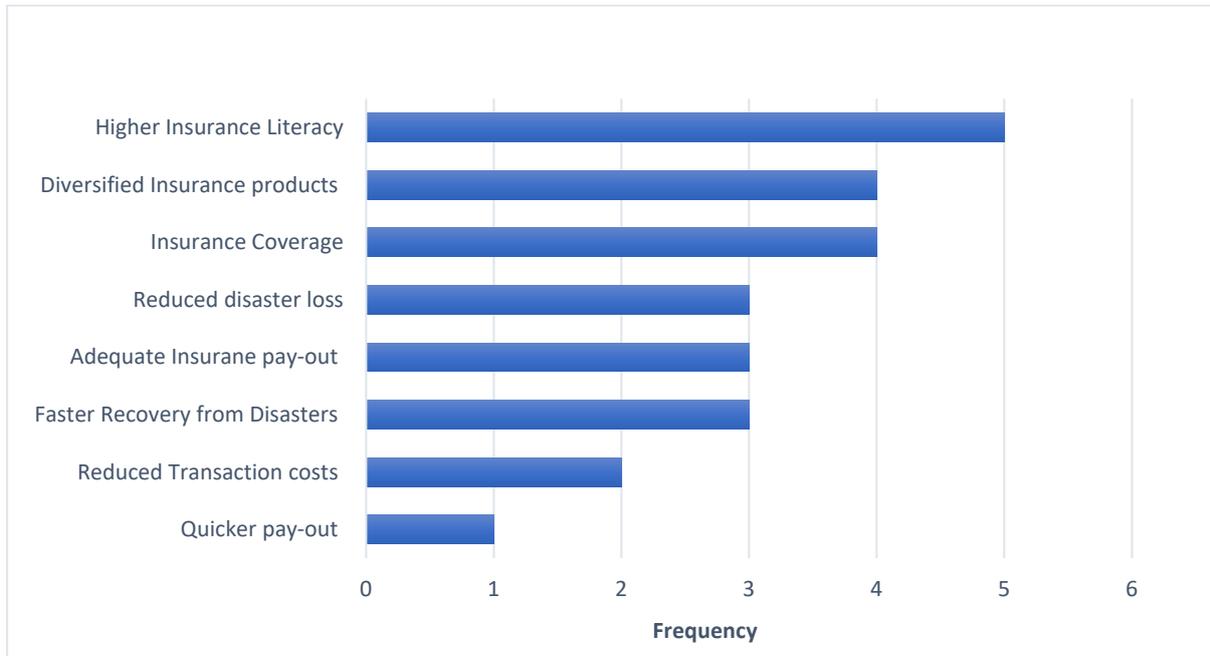
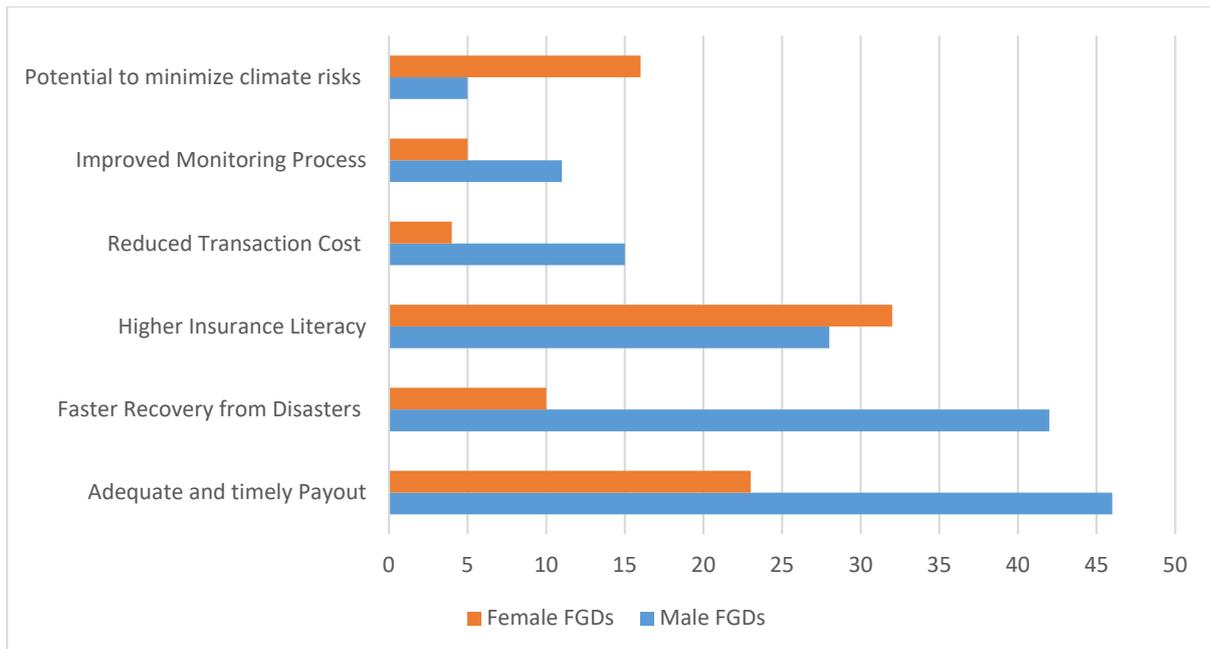


Figure 5: Most mentioned Success criteria among farmer groups in India



Our findings reveal that stakeholders and farmers have different ideas of what success looks like in the context of CDRI. For stakeholders, product diversity and insurance coverage were the most mentioned success criteria. For the farmers, adequate and timely payout from insurance and faster recovery from disasters were the most mentioned success criteria. Male farmers indicated adequate and timely payout as the important success criteria, and insurance literacy was mentioned as the most successful criteria among the female farmers.

4. Reflections on Indicators for Monitoring and Evaluation of CDRI

With increased mobilization of funding for innovative solutions to close the insurance protection and access gap and greater focus on monitoring and evaluation (M&E) approaches, indicators and principles can ensure that positive impacts are improved. Although there are various existing principles that can inform designing M&E frameworks such as pro-poor, cost-effectiveness, risk-reduction potential and early financing, depending on varied settings, evidence on the impacts of these principles remains scarce (see Clarke et al., 2014; 2017 on Sovereign Disaster risk financing).

Current monitoring and evaluation of CDRI is highly diverse, with numerous initiatives and programs at local, national and global levels. Earlier studies have highlighted the lack of a monitoring and evaluation framework as a challenge to in-depth analysis of insurance programs (Oxfam, 2018; World Bank, 2012; Ranger and Surminski, 2013; Hinds, 2013). Analysis by Clarke et al. (2017) on sovereign disaster risk financing and insurance (SDRFI) suggests a framework for ex-ante impact evaluation methodology to achieve financially efficient strategies to fund disaster losses. Further, a recent evaluation of the ARC investigates the impacts of the project through a mix of qualitative and quantitative impacts and concludes that it is too early to assess how well it is meeting its aims (OMP, 2017). It stresses the need to collect more evidence over several years to be able to robustly point to the contribution that ARC has made towards its desired outcomes and impact. More recently, recognising the need for M&E, the Insu-resilience initiative supported the aspirational pro-poor principles as guiding indicators for its M&E framework (InsuResilience, 2019).

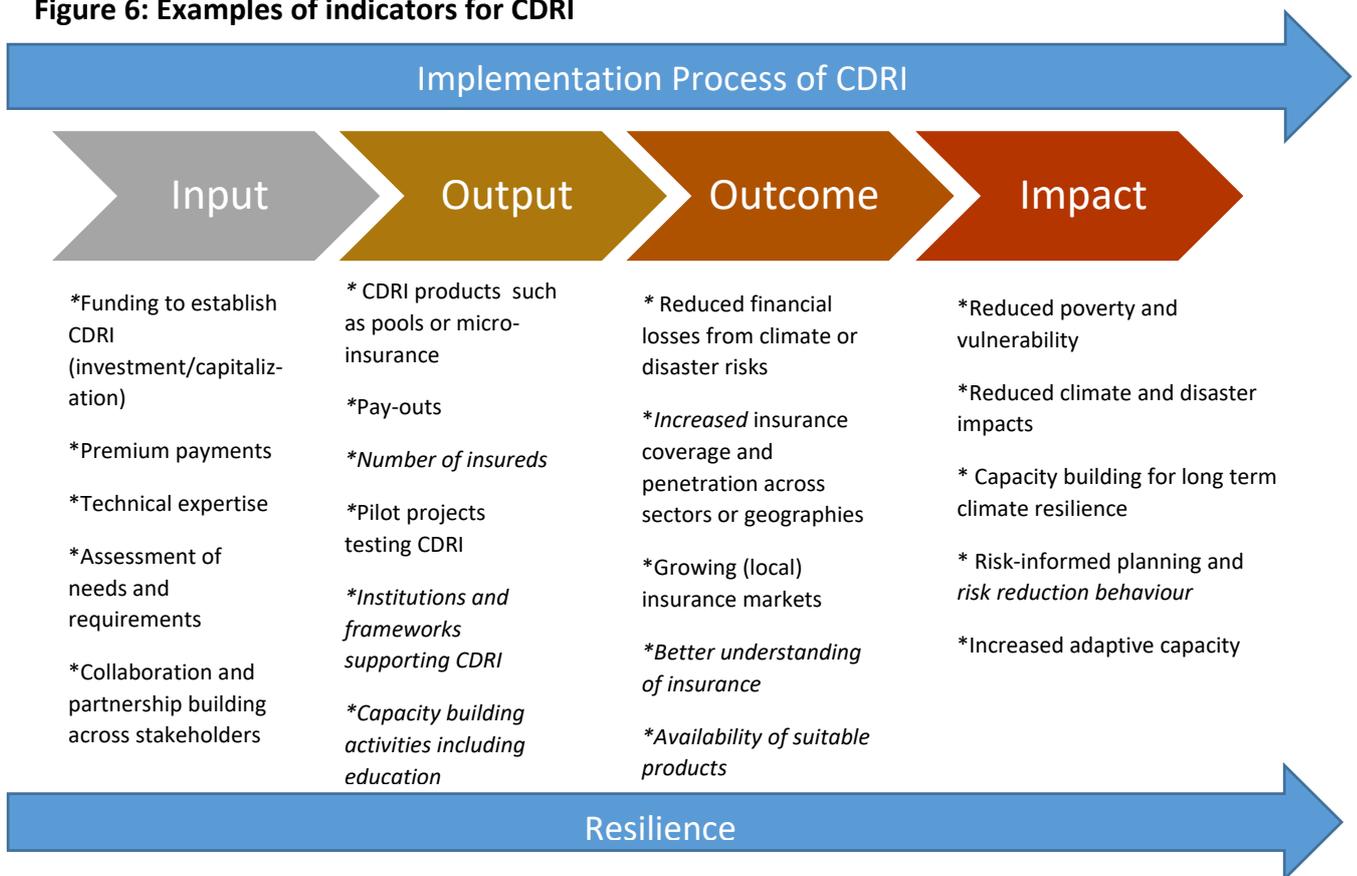
4.1 Types of Indicators

Our analysis shows that the current evidence on the impacts of insurance as a climate risk management tool gives limited insight into the success and failures of CDRI. Evaluating the success of CDRI calls for performance and results-based monitoring and evaluation of the

schemes to track progress and to demonstrate the impact and outcomes of a given disaster insurance project, program, or policy.

Figure 6 below illustrates how currently available broad types of indicators are measured to analyse the success of CDRI. While input and output include the supply side of CDRI, outcome aspects include the demand of CDRI. The impact section includes the impact indicators to examine the resilience impacts of CDRI. Among the key aspects, improving social, physical and financial resilience has become an important overarching goal in the context of CDRI (Surminski et al., 2016; World Bank, 2018; Weingärtner et al., 2017) and has emerged as a key development priority mentioned in global agreements such as United Nation's Paris Agreement (UN, 2015a) and Agenda for sustainable development 2030 (UN, 2015b). While evaluating the success of CRDI is context specific and depends on stakeholders and their objectives, for this paper we define evaluating the success of CDRI as moving from the traditional emphasis on output and outcome indicators as criteria for measuring success to a greater focus on outcome¹ and impact² indicators for short- and long-term resilience building.

Figure 6: Examples of indicators for CDRI



¹ Outcomes are the impacts that project's outputs will have on the beneficiary, institution, or system in terms of changed behavior or improved performance.

² Impact refers to evidence on whether outcomes are changing beneficiary behavior or longer-term conditions of interest

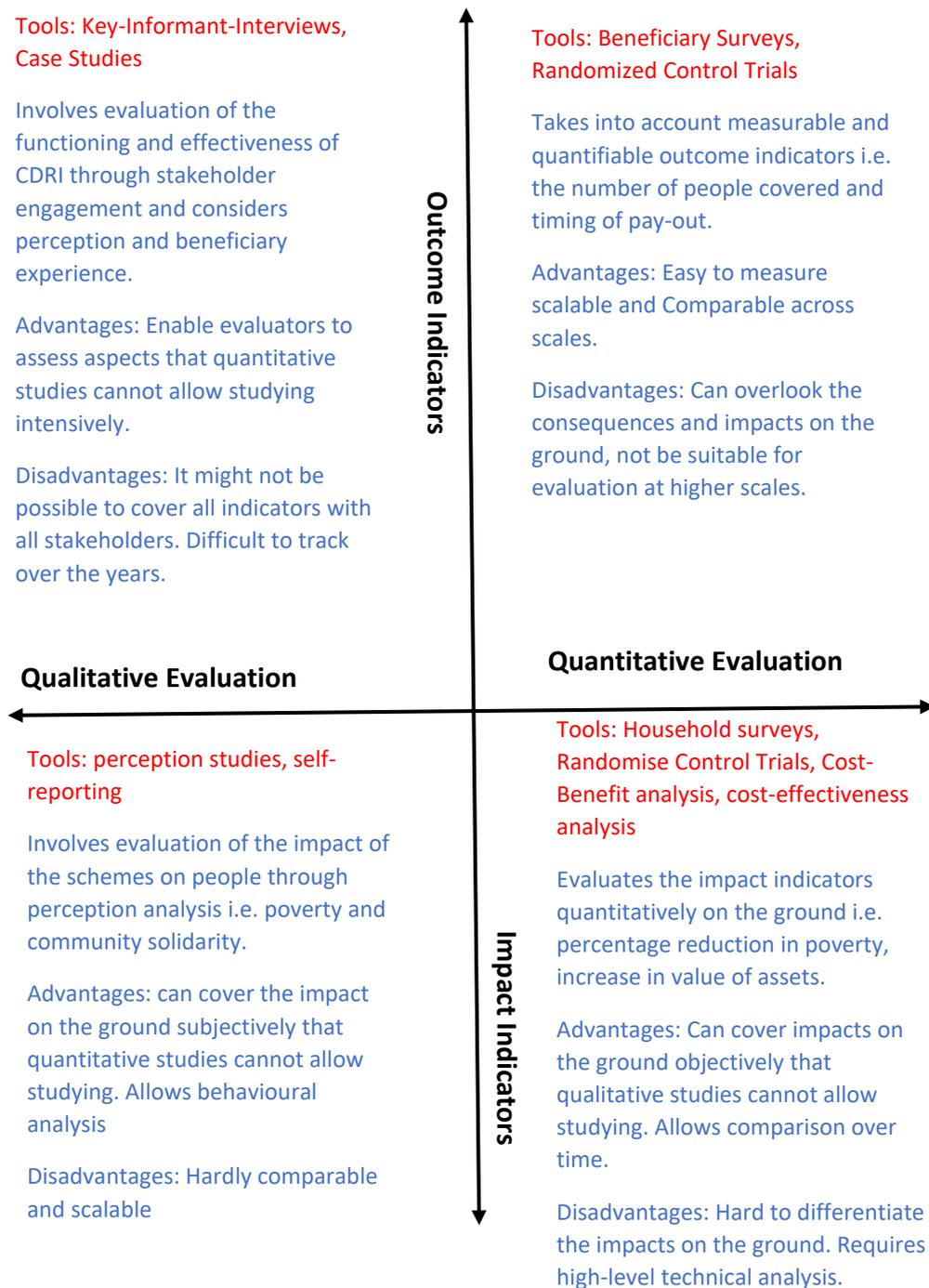
Source: Authors

A review of indicators and evaluation criteria a selection of global, regional and national level CDRI demonstrates the variability in the types of criteria used across domains of application (See Table 1 in the appendix). It shows that the most commonly used approach to evaluate success has been the use of project-level indicators such as number of schemes managed, percentage insurance penetration rate, and number of countries covered. Whilst this is useful to demonstrate the geographical and financial scope of these insurance schemes, it does not provide information about the impacts of CDRI in the context of its policy-area specific objectives.

4.2 Methods and tools used for evaluation

Different evaluation criteria are used to measure success in each of the four domains using CDRI. Figure 8 draws from current literature on monitoring and evaluation of CDRI at the global level (Oxfam, 2016; OMP, 2017; APN, 2017) and other peer-reviewed reports and research (The T, 2015; Hinds, 2013; Ranger and Surminski, 2013; Schaefer and Waters, 2016; Paudel, 2012; Clarke and Hill, 2013; Fisher et al., 2018; Price, 2018; Savage, 2015). It consists of four quadrants based on types of indicators and evaluation methods used to measure the success of disaster risk insurance evaluation.

Figure 8: Categorization of methods of evaluation of CDRI



Source: Authors, based on current literature analysis

These evaluation methods can be divided into qualitative and quantitative studies, which can be combined. For example, the R4 evaluation in Senegal (Oxfam, 2016) uses both quantitative and qualitative indicators to evaluate the outcome of insurance schemes. Second, evaluation methods can use outcome indicators, impact indicators, or a mix of both. Outcome indicators such as the number of people covered, and the number of countries/farmers covered have been widely used to measure the success of the schemes. However, there has been a lack of focus on impact indicators such as impacts of CDRI on poverty, equity, inclusiveness, welfare, vulnerability, resilience, etc. which require more technical expertise and data to monitor and evaluate. Further, only a few of the evaluations have used qualitative indicators. Oxfam (2016), for example, uses perception of poverty and community resilience to evaluate the impacts of insurance initiatives. However, most of the impact indicators focusing on poverty reduction and welfare impact are specific to projects and regions and not comparable across contexts.

4.3 The resilience dimension

In times of a changing climate, rising exposure and vulnerability it is essential to consider what role insurance schemes can play in increasing current and future resilience of beneficiaries and to ensure that schemes can continue to be viable in the future. Over the last few years, resilience has been applied across the four domains and has provided a useful grand operational framework for analysing the impact of effective risk management tool such as insurance (World Bank 2019; Schaefer and Waters 2016). For example, the World Bank released the adaptation and resilience action plan to track global progress on adaptation and resilience and has proposed a new rating system for measuring resilience (World Bank,2019). And there are a range of resilience indicators that could be used, particularly when comparing how communities or countries cope with shocks and events. However, there is still little clarity on how to monitor and measure the climate resilience impact of CDRI (Surminski, Panda and Lambert 2019). Scale and temporal dimensions are important for this:

Currently, CDRI as a way to build resilience is applied at various scales ranging from micro programmes at household levels to regional pools at multi country level. However, measuring the success differs at different spatial scales i.e. while receiving a timely pay-out is a success for a poor and vulnerable household it might not be successful from a development partner's perspective if the pay-out was used for immediate consumption that did not help in reducing the household risks and build longer-term resilience. Importantly, most of the insurance interventions are designed to deal with risks over a short time scale and not to help reduce risk

or build capacity over a long period of time considering the future impacts of climate change. (Surminski, Panda and Lambert 2019).

MCII's proposed methodology consider the resilience impact along the four categories of 'anticipate', 'absorb', 'adapt' and 'transform' (Schaefer and Walters 2016), while a recent study (Linnerooth-Bayer et al. 2019) argues that the preventive role of current CDRI is not well established and insurance might lead to disincentives or a false sense of security.

There is growing recognition that people have a strong understanding of their resilience capacities and abilities, qualitative and subjective resilience measures are increasingly being included in climate resilience measurement guidelines (Béné et al., 2016; Maxwell et al., 2015; Carletto et al., 2015; WFP, 2014) and resilience studies (Jones and Tanner, 2017; Bene, Al-Hassan et al., 2016; Nguyen and James, 2013). We argue that this should also be considered when measuring resilience impacts of CDRI: considering subjective resilience experiences of beneficiaries and incorporating their perceptions and beliefs on resilience (Jones, 2019; Clare et al., 2017) can offer important insights on the impact of insurance. This is particularly important when considering resilience not as a static phenomenon but as a dynamic process: longitudinal surveys and FGDs can capture if and how subjective resilience can change over time, and how CDRI and other aspects influence this, as our work in India reveals. (Panda and Surminski 2020, forthcoming).

5. Discussion and Conclusion

Measuring 'success' and 'impact' are inherently difficult, not just in the CDRI context. It requires clarity on aims, objectives, an understanding on different concepts of 'success' that stakeholders may have, and a collection of robust data and long-term tracking and monitoring success. Effective monitoring and evaluation are cost-and time intense, and very context specific. It is therefore not surprising that existing efforts to trace individual schemes and investment flows have focused on input and output, and to some extent on outcome, but rarely on impact. What is however surprising is the lack of clear data collection requirements and reporting frameworks for CDRI: there is little transparency in terms of performance data from insurance schemes at the global, national or local level, with little insights beyond occasional reporting on number insureds or coverage levels. This makes tracking trends in CDRI application difficult (Surminski, Panda and Lambert 2019). Improving the evidence base is of particular importance for several reasons:

-Insurance is new for many communities, countries and even those who invest and fund these instruments. Transparency about the performance of schemes is important to build trust, avoid misunderstandings and help improve design.

-Most insurance schemes receive some funding and support from development partners, donors or multilateral organizations. Monitoring and evaluating the implementation is important to understand how insurance supports the wider development objectives.

-Climate change is adding to the pressures that many communities, businesses or countries are facing and make sustainable solutions for climate and disaster risk more urgent. Information about how insurance supports current and future resilience is important to avoid unintended consequences and short-lived solutions.

The lack of data on impacts of the schemes underpins the need for developing a monitoring and evaluation frameworks for monitoring progress on resilience either through global platforms or initiatives. In addition, clear conceptual/methodological frameworks are needed to first understand how to monitor progress on resilience. To date, efforts to track resilience have been to a large extent outcome data driven. New data and approaches are required to achieve the goal of monitoring the progress on resilience through these initiatives. Unfortunately, assessment of resilience is fraught with complexity and methodologies used to measure it are heavily contested. Most concentrate on 'objective' indicators by identifying key socio-economic variables. In this paper, we call for the tracking and measurement of subjective resilience at the household/national and global levels. We propose that there are at least three important ways to analyse the success of CDRI in the context of climate change:

- The demand-side dimensions include questions on the analysis of access and affordability of CDRI.
- The supply-side dimensions include analysis of availability and scope of CRDI.
- Resilience impacts dimensions include analysis of whether CDRI is leading to short- and long-term resilience of people insured.

Efforts to measure resilience should take into account people's perceptions of their capabilities and capacities, either in combination with, or separate from, objective forms of resilience measurements. New methods to systematically collate progress on resilience in different domains and sectors will be crucial to advance monitoring and evaluation. An important aspect is thus the quality of the instruments rather than the quantity. Particularly given the challenges

that most low-income countries are already facing in terms of sustainable development and climate risks, it is essential to put greater emphasis on how CDRI supports adaptation to climate change. CDRI and broader risk financing does not automatically reduce risk, but it can help to finance and manage it, thus reducing vulnerability to climate change impacts. However, CDRI is only sustainable in the mid-term and long run if it is underpinned by strong disaster risk reduction and adaptation action. Regardless of the policy domain that CDRI is considered in, this is an essential quality of instruments that need to be considered at design stage and monitored and evaluated transparently alongside other criteria.

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Appendix 1

Table 1: Examples of Initiatives and indicators from global, regional and national schemes.

Major Initiatives/ Facilities	Aims and objectives	Input Indicators	Output Indicators	Outcome Indicators	Impact Indicators
Insu-Resilience Global Partnership and supporting partners.	<ol style="list-style-type: none"> Promote adoption of disaster risk financing and insurance approaches. Develop new climate and disaster risk finance and insurance solutions Develop an open and inclusive global multi-stakeholder community of countries, experts and practitioners 	<ol style="list-style-type: none"> Funding through multiple donor countries and organizations. Technical support 	<ol style="list-style-type: none"> Number of projects funded Insurance uptake Pro-poor support made through schemes. Goal of providing financial protection against climate and disaster risk for up to 500 million additional people by 2025. 	<ol style="list-style-type: none"> The partnership reached 76 countries with 25 solutions. Approximately 3% of total asset losses in low and low-middle income countries were insured from 2000 to 2015. In 2019, 89.4 million poor and vulnerable people protected. 	<ol style="list-style-type: none"> Pro-poor principle: making the needs of poor and vulnerable people the focus of Climate and Disaster Risk Finance and Insurance. Insurance supporting Ecosystem based adaptation Insurance promoting Gender responsive strategies. Provision of shock responsive Social protection through insurance. <p>Source:(Insu-Resilience, 2018;2019, Beck, W.M et al ,2019)</p>
Africa Risk Capacity (ARC)	<ol style="list-style-type: none"> Help African governments to better prepare for extreme weather and natural disasters. 	<ol style="list-style-type: none"> Customized early warning system. Contingency planning Providing insurance services. 	<ol style="list-style-type: none"> Number of countries in the risk pool. Number of countries or regions provided with pre- 	<ol style="list-style-type: none"> Paid to over four risk pools. Since 2014, \$58 million as pay-out to countries 	<ol style="list-style-type: none"> Shortening time gap between event and response due to early financing. Higher Impact of ARC on food security during drought as

	<p>2. Strengthening access to rapid and predictable financing for disasters.</p> <p>3. Member States with capacity building services and access to state-of-the-art early warning technology, contingency planning, and risk pooling and transfer facilities.</p>	<p>4. Risk pooling and risk transfer mechanisms.</p>	<p>disaster financial early warning.</p> <p>3. Number of countries provided with predictable finance for disasters.</p> <p>4. Building climate resilience.</p>	<p>affected by drought.</p> <p>3. Over 3556416 Farmers covered.</p> <p>4. Over \$61,000,000 in pay-out for early responses to disasters.</p> <p>5. 2,100,000 vulnerable population assisted</p>	<p>compared to another financing mechanism.</p> <p>3. ARC protecting asset depletion at the household level.</p> <p>Source:(OPM,2017, ARC, https://www.africanriskcapacity.org/)</p>
<p>Caribbean Catastrophe Risk Insurance Facility (CCRIF)</p>	<p>1. Providing innovative and responsive parametric insurance products for disaster risk management.</p> <p>2. Enhance capacity for climate change adaptation and resilience.</p> <p>3. Providing financial protection to countries vulnerable to tropical cyclones, earthquakes and excess rainfall.</p>	<p>1. Financing through Multi Donor Trust Fund (MDTF)</p> <p>2. Parametric insurance products for the governments.</p>	<p>1. Amount of pay out to member countries.</p> <p>2. Number of member governments renewing parametric insurance.</p> <p>3. Use of pay-out by different purposes.</p> <p>4. Number of people with access to direct or indirect climate risk insurance coverage.</p>	<p>1. Since 2007, the facility has made 41 pay-outs to 13 member countries of US\$152 million.</p> <p>2. 62% of total pay-out have been used for immediate post-disaster activities.</p> <p>3. Over 2.5 million individuals in the Caribbean and central America have been benefited directly or indirectly from these payouts.</p>	<p>1. Quicker pay-out after disasters enabling governments to have sufficient capital for emergency relief.</p> <p>2. Associated with CCRIF, Climate Risk Adaptation and Insurance in the Caribbean (CRAIC) project, through microinsurance is providing livelihood protection to most vulnerable persons in 5 member countries.</p>

			<p>5. Number of individuals covered with insurance products as a part of CRAIC project.</p> <p>6. Number of projects supported for local disaster risk management.</p> <p>7. Capacity building by supporting education.</p>	<p>4. Since 2015 CCRIF has allocated US\$ 513,365 to small projects on climate change adaptation.</p> <p>5. Through Livelihood protection policy, individuals have received pay-outs.</p>	<p>Source: (www.ccrif.org, Väänänen, E. et al 2019),</p>
<p>Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) Phase I and II</p>	<p>1. Strengthening early warning and preparedness in the Pacific.</p> <p>2. Providing Pacific Island countries with insurance coverage against tropical cyclones and earthquakes</p> <p>3. Increasing fiscal resilience of countries to meet post disaster funding needs.</p>	<p>1. Initial financial support from the government of Japan, GFDRR, and the EU.</p> <p>2. Second phase financing through Multi Donor Trust Funds.</p> <p>3. Technical support from development organizations.</p>	<p>1. Number of pay-outs to governments.</p> <p>2. Increased capacity of Pacific Catastrophe Risk Insurance Company (PCRIC) to provide rapid financing for disaster relief.</p> <p>3. Development of disaster risk insurance products.</p>	<p>1. Expanded Insurance benefits to more than 640,000 citizens in five Pacific countries.</p> <p>1. \$6.7m Cumulative pay-outs to governments since its inception.</p> <p>2. In 2013 \$24m Capitalization funds provided to PCRIC from the donor.</p> <p>3. 19% increase in PCRIC's insurance capacity to offer government financing.</p>	<p>1. Increase the financial resilience of Pacific Island Countries (PICs) against natural hazards.</p> <p>2. Increased capacity to meet post-disaster funding needs.</p> <p>3. Strengthen institutional capacity on climate and disaster risk finance at three levels of engagement: national, regional and PCRIC.</p> <p>Source: PCRAFI (2018)</p>

<p>World Bank Group's Finance, Competitiveness, and Innovation Global Practice.</p>	<ol style="list-style-type: none"> 1. Increasing financial response capacity of governments through sovereign disaster risk finance. 2. Enabling private market development for financial resilience. 3. Supporting stakeholders for building financial resilience. 4. facilitates access to finance for smallholder farmers, micro-entrepreneurs, and microfinance institutions through the provisions of catastrophic risk transfer solutions and index-based insurance in developing countries. 	<ol style="list-style-type: none"> 1. Funded by the European Union/ACP, the governments of Germany, Japan, and the Netherlands. 2. Managed by the World Bank Group 3. Providing index insurance facilities 	<ol style="list-style-type: none"> 1. Global Index Insurance Facilities (GIIF). 2. Index Insurance Forum 4. Developed weather, area yield, and livestock index insurance products. 	<ol style="list-style-type: none"> 1. GIIF's regional partners have facilitated more than 5.5 million contracts. 2. Covering over 27 million beneficiaries, with \$855 million in sums insured. 3. Projects: Sub Saharan Africa:5 4. East Asia and Pacific: Pilots and Development of earthquake and typhoon index and feasibility studies 5. South Asia: Development of new products and improve the effectiveness of projects 6. LAC: Feasibility studies and capacity building 	<ol style="list-style-type: none"> 1. Capacity building at national and local level through index insurance solutions 2. Creating an enabling legal and regulatory environment for index insurance <p>Source: GIIF (2020) DRFI (2020)</p>
<p>R4 Rural Resilience initiative by World Food Programme (WFP) and Oxfam America.</p>	<ol style="list-style-type: none"> 1. Enabling vulnerable rural families to increase their food and income security by managing climate-related risks. 2. enabling the poorest farmers to access crop 	<ol style="list-style-type: none"> 1. Funding support from each partner and their sponsors. 2. Insurance products to farmers. 	<ol style="list-style-type: none"> 1. improved resource management through asset creation 2. Providing Insurance 	<ol style="list-style-type: none"> 1. R4 reached over 87,000 farmers as of 2019. 2. US\$ 2.4 million distributed in pay-outs to R4 participants in 	<ol style="list-style-type: none"> 1. Increased food security 2. Increased investment in agriculture 3. Gender empowerment 4. Reduced poverty 5. Awareness

	insurance by participating in risk reduction activities. 3. Promote resilience of farmers.	3. Building community mobilization for increasing assets and savings. 4. Managing stakeholders.	3. Providing livelihoods diversification and microcredit 3. Savings creation	Ethiopia, Kenya, Malawi, Senegal and Zambia since 2011 as compensation for weather-related losses. 3. US\$ 10.3 million provided in micro-insurance protection to R4 participants till 2019.	6. Increased Savings and access to loans. 7. Creation of Rural Financial Markets. Source: WFP (2016;1019)
International Livestock Research Organization (ILRI) and partners	1. Designing, developing and implementing market mediated index-based insurance to protect livestock keepers from drought related asset losses, particularly those in the drought prone Arid and Semi-Arid Lands (ASALs). 2. Learn and document the effectiveness of index-based livestock insurance as a tool for managing weather related perils	1. Funding support from multilateral organizations and donors. 2. Technical and implementation support from universities, private, public organizations and NGOs. 3. Developing and providing index-based insurance.	1. Index-based livestock insurance products. (IBLI) 2. Kenya Livestock Insurance Program (KLIP)	1. KLIP plans to reach out to 65,000 vulnerable pastoralists by 2020. 2. As of 2016, 14,000 pastoralists were insured under KLIP.	1. Impacts on subjective, economic and health-related indicators of well-being. 2. Cost-effectiveness 3. Productive use of pay-outs at the household level. Source: (IBLI,2020)

<p>Agriculture and Climate Risk Enterprise (ACRE)</p>	<ol style="list-style-type: none"> 1. Risk assessment, product development and monitoring to facilitate access to crop and livestock insurance products for smallholders. 2. Providing service to local insurers in the agricultural insurance value chain. 	<ol style="list-style-type: none"> 1. Initial funding by Syngenta Foundation and GIIF 2. Insurance service provider 	<ol style="list-style-type: none"> 1. People covered under Weather, area and satellite-based agricultural Insurance. 2 	<ol style="list-style-type: none"> 1. By 2018, over 1,700,000 farmers in Kenya, Tanzania and Rwanda insured. 3. Over \$181 million insured against weather risks. 4. increased the capacity of local markets through trainings to stakeholder organizations 	<ol style="list-style-type: none"> 1. Increased investment capacity and earning of farmers. 2. Increased access to finance. 3. Increased awareness of index insurance 4. Better risk management 5. Use of mobile phone technology 6. Increased number of companies offering the product. <p>Source: ACRE (acreafrica.com) IFC (2011)</p>
<p>Southeast Asia Disaster Risk Insurance Facility (SEADRIF)</p>	<ol style="list-style-type: none"> 1. Platform for ASEAN countries to access disaster risk financing solutions and increase financial resilience to climate and disaster risks. 2. Providing advisory and financial services for post disaster rapid financing to reduce their impact on people and their livelihoods. 	<ol style="list-style-type: none"> 1. ASEAN+3 and World Bank support. 2. Technical assistance from the World Bank 3. Participating countries will pay contributing for insurance coverage. 4. SEADRIF trust and SEADRIF Insurance company 	<ol style="list-style-type: none"> 1. Rapid and predictable rapid funding 3. Access to international reinsurance 	<ol style="list-style-type: none"> 1. First Pool on flood risk from Lao PDR, Myanmar, and Cambodia 	<ol style="list-style-type: none"> 1. First regional risk financing facility in Asia 2. Acts as a forum for sharing knowledge and good practices. <p>Source: SEADRIF (2018)</p>

African and Asian Resilience in Disaster Insurance Scheme (ARDIS)	1. Increased access to finance and post disaster recovery lending to rural families and smallholder farmers who live below the poverty line.	1. Support from Vision Fund International 5. \$10m contingent disaster finance credit line from the Insu-Resilience Investment Fund	Post-disaster recovery lending through Micro-Insurance Network	1. Up to four million beneficiaries anticipated. 2. The scheme will be available in six countries in Africa and Asia.	1. Increase access to finance for poor and vulnerable people 2. Fast disaster recovery lending for farmers. 3. Can Effectively meet one percent of the G7 goal to increase access for up to 400 million uninsured people in developing countries. Source:(Vision Fund, 2018)
National Crop Insurance Scheme of India	1. To provide insurance coverage and financial support to the farmers against natural calamities, pests and diseases to crops. 2. To ensure flow of credit to agricultural sector.	1. Premium Subsidy by the government. 2. Administrative support by the government. 3. Re-Insurance Facility 4. Capacity building	1. Area based Agricultural Crop Insurance 2. Weather Index-based crop Insurance	1. Around 475 million farmers covered between 2000-2018 2. Around 615 million hectares covered between 2000 and 2018	1. Inclusion of small and marginal/women/weaker sections of the society 2. Scope for reduced indebtedness of small and marginal farmers Source: (CAG, 2017, IIM, 2019)
Nigerian Agricultural Insurance	1. Providing innovative insurance services towards sustained National Agricultural and Economic Development.	1. Owned by federal government of Nigeria 2. Premium subsidy by the government on selected crops and livestock. 3. Provision of extension services to insured.	1. Subsidized crop and livestock insurance 2. Commercial crop and livestock insurance 3. Multi-peril insurance 4, Since 2019 GIIF providing technical assistance for	1. NAIC covered 35,000 farmers as of 2010, representing 1% of the total farm population, and underwrote USD 5.6 millions of Premiums. 2. Private insurance companies were	1. Current focus on developing mechanism for establishing weather-index based schemes. 2. Developing insurance market.

			development of index insurance market.	allowed to provide agricultural insurance since 2013. They provided coverage to 15,000 farmers in the June 2017 season.	Source: (Mahul and Stutley, 2010, GIIF (2019))
Philippines Crop Insurance Scheme	<ol style="list-style-type: none"> 1. Provide insurance protection to farmers against losses arising from natural calamities, plant diseases and pest infestations. 2. Provides protection against damage to/loss of non-crop agricultural assets. 	<ol style="list-style-type: none"> 1. Premium Subsidy 5. Re-Insurance facility 6. Administrative and technical support by the government. 	<ol style="list-style-type: none"> 1. Crop Insurance scheme 2. Livestock insurance scheme 1. Weather index bases insurance 	<ol style="list-style-type: none"> 1. 1.5 million Farmers and fisherfolks covered (2017) 2. Amount of insurance cover reached ₱58.465 Billion. (2017) 3. 1,326,618 hectares covered (2017) 	<ol style="list-style-type: none"> 1. Inclusion of small and marginal farmers and fisherfolks with agricultural insurance. 2. Improved Stakeholders satisfaction <p>Source: (PCIC, 2020)</p>

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