

Climate Risk Insurance for Resilience: A Systematic Review

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Abstract— *This study developed and conducted a systematic mixed-methods grey literature methodology to characterise and identify climate risk insurance initiative in building resilience in developing countries. The study found that climate risk insurance can help developing countries build resilience against extreme weather events. However, there are barriers to the initiative. This is because of the issue of lack of climate data instruments. The collaboration between the public and private sectors is one way to overcome the challenges of implementing climate risk insurance. This systematic review methodology presents crucial insights on the state-of-the-art knowledge on climate risk insurance and resilience in developing countries.*

Keywords— *Climate Change, Climate Risk Insurance, Developing countries, Systematic Review.*

I. INTRODUCTION

According to the Munich Re's NaCatService, climate change impacts have quadrupled since 1992 (Schaefer & Waters, 2016). Climate change, harsh conditions like weather-related disasters, as well as slow-onset change like rising sea levels, undermine sustainable development and resilience, hinder socio-economic development and fortify cycles of poverty across the world (GIZ & BMZ, 2015).

Going by the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the risks associated with harsh weather conditions will further increase with rising temperatures (Schaefer & Waters, 2016). This will lead to increasing poverty, especially in developing countries where they have a weak adaptive capacity and most of their citizens are engaged in commercial and subsistence farming for their livelihoods (Barrett et al., 2007).

The poorest in the world, especially the women bear a disproportionate burden of climate stress, despite the fact that they contribute less to the harming of the environment (Schaefer & Waters, 2016). Harsh weather conditions are reinforcing poverty cycles and the immediate-future predictions affirm that climate change will extremely increase the number of poverty-stricken people in developing countries (Hallegatte et al., 2016). As a result, there is growing need to support the most vulnerable people and poor countries in establishing effective strategies to manage risks and unexpected shocks and build resilience to climate change impacts (Schaefer & Waters, 2016). One feasible strategy to support the poor is through the climate risk insurance initiative (Lashley, 2012). Climate risk insurance is an instrument that provides security against loss of assets, livelihoods and lives arising from harsh weather conditions by providing effective and expeditious post-disaster relief on individuals, communities, national and regional levels (Schaefer & Waters, 2016).

To understand the connection between climate risk insurance and resilience, four key questions were asked: 1) Can climate risk insurance help developing countries reduce climate risk today? 2) What are the multiple factors driving climate risk insurance initiative? 3) What are the impacts? 4) What constitute barriers to climate risk insurance? To answer these research questions, a systematic review of grey literature was undertaken. Certainly new in climate change research, systematic reviews present encouraging method to identify, analyse and synthesise a huge volume of literature (Porter et al., 2014). Contrary to conventional literature reviews, where search or selection criteria are often ambiguous and hardly favored, systematic reviews are more clear, understandable and reproducible (Porter et al., 2014).

The aim of this paper is to frame major issues and summarize the current state of knowledge about climate risk insurance as it relates to helping the poor to manage risks and unexpected shocks and build resilience to climate change impacts. The remainder of this paper is structured as follows: Section 2 demonstrates the methodology employs. Section 3 presents the results. Section 4 discusses the results and section 5 presents the conclusions.

II. MATERIALS AND METHODS

2.1. Systematic reviews

This paper adopts a systematic review methodology to examine climate risk insurance in building resilience in developing countries vis a vis helping the poor to adapt and cope against immediate and future climate shocks. A systematic review is an analysis and assessment of the state of knowledge on given research question, designed to rigorously summarize existing understanding (Ford, Berrang-Ford, & Paterson, 2011). Systematic reviews differ from conventional literature reviews in

three major ways(Ford & Pearce, 2010).First, they embody reviewing documents according to vividly developed questions (Ford & Pearce, 2010). Second, they embody full reporting of search and criteria for inclusion and exclusion of research articles separated in the analysis along with those included (Ford & Pearce, 2010). Finally, systematic selection of publishing materials allows the use of mixed-methods review of trends in the literature (Ford & Pearce, 2010).

2.2. Literature search and review

The literature search for the review embodies selection, coding and content analysis of the literature source. The literature search was done via an electronic search for peer-reviewed journals and grey literature in the disciplines of climate risk insurance, poverty and resilience. However, only grey literature was added to the selection criteria because most of the adaptation projects in developing countries are undertaken by international organizations that provide funds and evaluation research on the impact of climate risk insurance in helping the poor to cope and adapt to immediate and future climate shocks. And most of their climate publications are published on their websites as reports, policy briefs and documents.

The grey literature had to meet certain inclusion and exclusion criteria for this review. The inclusion basic terms were “climate risk insurance” and “resilience” “poverty.” The exclusion criterion was the narrowing the outcomes of the search to developing countries and excluding developed countries because developing countries have poor adaptive responses to climate change and climate change affects mostly the agricultural sector that employs a lot of people.

In all, 9 reviewed documents met the criteria of the study and an identifier number (#1-9) was assigned to each of the selected documents and is used to assign to each one individually. The summary of the literature reviewed is listed in Table 1. The 9 reviewed documents composed of 6 qualitative and 3 mixed-method approaches. Their thematic focus areas include climate change, vulnerability and climate risk insurance.

The selected documents were systematically analysed to ascertain: 1) if climate risk insurance can help developing countries reduce climate risk today; 2) what factors are driving climate risk insurance initiative; 3) if there are impacts;4) whether they are barriers to the implementation. The selected documents that met the criteria were analysed using content analysis technique.

TABLE 1
SUMMARY SYSTEMATIC REVIEWED ARTICLES ON CLIMATE RISK INSURANCE ON RESILIENCE

Identifier	Study	Type of study	Method	Thematic focus	Data Source
1	GIZ (2017)	Factsheet	-	Climate risk insurance, climate risk management	Grey literature
2	GIZ and GMZ (2015)	Background paper	Mixed	Climate change, climate- insurance	Grey literature
3	Hermann et al. (2016)	Working paper	Qualitative	Climate risk insurance	Grey literature
4	Ogden et al. (2015)	Analysis	Qualitative	Climate risk insurance	Grey literature
5	RESULTS UK (2016)	Policy	Qualitative	Climate risk insurance, pro- poor principles	Grey literature
6	Schaefer & Waters (2016)	Research paper	Mixed	Climate risk insurance, vulnerability, impact studies	Others
7	Warner et al. (2009)	Analysis	Qualitative	Adaptation, climate change, disaster risk reduction, insurance	Grey literature
8	Warner et al. (2013)	Working paper	Mixed	Climate risk insurance, climate risk management	Grey literature
9	Yuzva et al. (2014)	Project	Qualitative	Climate risk insurance, climate risk management	Grey literature

III. RESULTS

3.1 Can climate risk insurance help developing countries reduce climate risk today?

Climate risk insurance was explicitly expressed (Table 2) in 9 (100%) of the publications that were reviewed that it can help the poor and poor developing countries in building resilience due to climate change *vis à vis* risks associated with extreme weather events. For instance, climate risk insurance can help the poor, vulnerable communities and poor countries in

providing security against loss of lives and means of livelihoods in the aftermath of disaster period; establishing reliable and dignified aftermath disaster relief, setting incentives for prevention; providing certainty for climate-affected public and private investments, and mitigating disaster-related poverty and stimulating economic development (#2).

TABLE 2
CAN CLIMATE RISK INSURANCE HELP DEVELOPING COUNTRIES REDUCE CLIMATE RISK TODAY?

Source	Reviewed articles supporting the climate risk insurance and resilience hypothesis
GIZ (2017)	It provides protection against risks arising from extreme weather events
GIZ and GMZ (2015)	It can provide security against the loss of assets, livelihoods and lives in the post-disaster period
Hermann et al. (2016)	It might play a substantial role in protecting vulnerable countries from climate change
Ogden et al. (2015)	It can play a key role in reducing the risks of climate change in developing countries
RESULTS UK (2016)	It can also contribute to resilience building or adaptation
Schaefer & Waters (2016)	It can play a role in increasing the resilience of the poor and vulnerable people
Warner et al. (2009)	Could help smooth household incomes when shocks occur
Warner et al. (2013)	It can reduce immediate and long-term financial impact associated with extreme weather events
Yuzva et al. (2014)	It can reduce immediate and long-term repercussions from extreme weather events

3.2 What are the multiple factors driving climate risk insurance initiative?

Climate change is reported in all the 9 reviewed articles as the primary motivating factor for climate risk insurance. However, there are secondary motivating factors. For instance, six of the reviewed articles (#1, 2, 3, 5, 6, 7) think of *poverty* associated with climate change. Also, all reviewed articles want appropriate authorities to use climate risk insurance to support the most *vulnerable*. Six other articles (#1, 3, 5, 6, 7, 8) mentioned the need to help the *poor* when extreme climate events occur. Two reviewed articles (#3, 6) assert that extreme weather events will impair *socioeconomic development*. For this reason, (#2) claims that climate risk insurance should be introduced to spur *economic development* after math of weather-related disasters.

3.3 What are the impacts?

Seven out of the nine reviewed articles gave various forms of climate risk insurance impacting their beneficiaries. Table 3 lists the various impacts emanating from the systematically reviewed articles.

TABLE 3
WHAT ARE THE IMPACTS OF CLIMATE RISK INSURANCE?

Source	Evidence of climate risk insurance impacting their beneficiaries
Hermann et al. (2016:9)	“The initiative provides insurance, among others, to poor farmers and other food insecure households, who are given access to insurance by paying into Insurance-for-Assets (IfA) with their own labour. When a drought hits, as indicated by a specified weather index, policyholders receive compensation”
Ogden et al. (2015)	Insurance was quickly expanded from 200 households in one village in 2009 to 13,000 households in 43 villages in 2011, yielding significant benefits
RESULTS UK (2016:2)	“Since I started taking insurance, I now have peace of mind and feel more confident when investing in my farm”
Schaefer & Waters (2016:64)	“Although insurance does not cover all the losses that farmers face when the rains fail, it still limits the financial losses and helps them not to resort to negative coping strategies” (Belay, Sophia. Email Interview. 15 April 2016).
Warner et al. (2009)	It enables participating farmers to increase their farm productivity
Warner et al. (2013)	It leads to significantly larger agricultural investment as well as to risk production choices to farmers
Yuzva et al. (2014:14)	“A market study in India found that rice farmers offered formal index insurance in the Andhra Pradesh region of India diversified their risks by planting higher-yield varieties of rice than those without index insurance”

3.4 What are the barriers to climate risk insurance?

The barriers to climate risk insurance initiative are presented in the majority of the articles reviewed here. Climate data challenges are widely noted, while it is considered that most developing countries lack adequate data collection instruments, there is also the issue of accurate climate data collection. Six out of the nine reviewed articles (#1, 4, 5, 6, 7, 9) mentioned climate data issues as barriers to implementing a climate risk insurance initiative in developing countries. For instance, (#1) claims “historical and up-to-date weather data is a precondition for climate risk insurances. However, data availability is still inadequate in many countries around the world” (GIZ, 2017, p. 2). On the other hand, two other reviewed articles (#8, 9) consider high start-up costs as a barrier to climate risk insurance in poor communities.

IV. DISCUSSION

The systematic review of this study shows that climate risk insurance has gained prominence more in grey literature than peer-reviewed literature. This can be attributed to the dominance of climate risk insurance for resilience by development organizations. In all the grey literature that was reviewed on climate risk insurance on resilience in developing countries, four major findings emanated.

Climate risk insurance is considered as a prerequisite for immediate and future impacts of climate change, especially in developing countries where most of the population that are vulnerable to climate change are poor. The poor adaptive capacity of poor developing countries when extreme weather events occur put poor people and communities in precarious situations. The climate risk insurance initiative from the findings of this study indicate that it can allow individuals, communities and poor countries build resilience when extreme weather events occur. However, the initiative not been embraced popularly in most developing countries from the reviewed articles. This can be owing to the notion that insurance is an investment that is usually undertaken by private investors, unlike cash transfers that are introduced by the governments in developing countries to assist the poor. Building public-private partnership approaches in conjunction with international support are exceptionally important for poor developing countries where pure market-based solutions are generally not achievable due to high start-up costs, lack of data and limited access or low demand for standard insurance products from the poor part of the society (Warner et al., 2013).

The impacts of climate change on poor communities put the inhabitants of these vulnerable communities in precarious conditions because of their inability to cope or adapt when extreme weather events occur. The Munich Climate Insurance Initiative (MCII) was initiated to address the poor situations of vulnerable communities because there are in disadvantaged position, as commended in the UN Framework Convention on Climate Change (MCII, 2017). Findings from the study revealed that climate change, the vulnerable position of the poor and the impacts of climate change on local economies have been identified as the major drivers for climate risk insurance. It helps to provide prompt and stable finance to cover parts of the economic losses, especially compared to ad hoc post-disaster financing alternatives such as aid, loans and family assistance (GIZ, 2017). This accedes for accelerated emergency assistance and reconstruction, helping to save lives, safeguard livelihoods and assets and protect development again (GIZ, 2017).

While some developing countries have implemented climate risk insurance with the support of stakeholders, evidence has shown that some of the beneficiaries have been impacted by the initiative. Findings from this study revealed that most of the beneficiaries are farmers who need to protect their farms as well as their means of livelihoods against extreme weather events. Various forms of climate risk insurance are being operated in many developing countries. The Climate Adaptation Development Program (CADP) was established in 2007 by Swizz Re in order to safeguard village clusters in Ethiopia, Kenya and Malawi against extreme drought (UNFCCC, 2008). Similarly, in India, considerable numbers of disaster micro insurance schemes are in place, covering the loss of life or assets, among others, caused by natural disasters (Hermann et al., 2016). Well-packaged insurance products assist to decrease the economic impact of and expedite quick recovery after natural disasters (Warner et al., 2013). In consonance with insurance theory, insurance works by restoring “uncertain prospect of losses with a certainty of making small, regular payments (Warner et al., 2013). In turn, it can help safeguard livelihoods and risk prevention measures, risk transfer can help to strengthen resilience to climate change (Warner et al., 2013).

Finally, the study findings showed that barriers to climate risk insurance in developing countries were risk specific. For instance, inadequate climate data is considered as a major barrier to the implementation of climate risk insurance in developing countries coupled with the high start-up costs.

V. CONCLUSIONS

Systematic review formed the methodology of this study which examines the current state of knowledge of climate risk insurance in building resilience in developing countries. The study focused on grey literature for data collection because most studies on climate risk insurance were reports, documents and projects of organizations that are stakeholders in the climate risk insurance initiative.

The findings from the systematic reviewed showed that climate risk insurance can help individuals, communities and poor countries build resilience against extreme weather events. In addition, climate risk insurance is motivated by the impacts of climate change and evidence from this study has shown that some farmers have benefited from the initiative. Despite the importance of climate risk insurance, there are still barriers to the initiative in some developing countries.

If developing countries need to embrace the climate risk insurance initiative, the governments should be fully involved because no one is immune when extreme weather events occur. Building public-private partnership will go a long way in making climate risk insurance a successful apparatus for resilience in developing countries.

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