

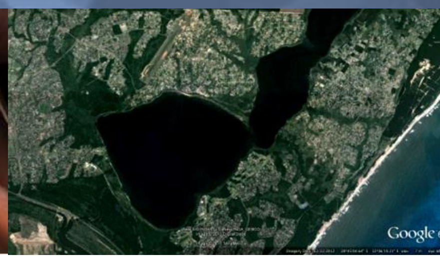


Investigating the complementarity between risk pooling schemes and microinsurance products in extending coverage to the most vulnerable

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FINAL REPORT

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Investigating the complementarity between risk pooling schemes and microinsurance products in extending coverage to the most vulnerable

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Abstract

Despite the well-noted success of sovereign risk pools in providing coverage against climate hazards, complementary products such as microinsurance may be required to extend coverage to the poor. Currently, payouts from risk pools have been used to address post-disaster losses of critical infrastructure and emergency services; maintaining economic stability; and, price stabilization, with the proceeds seldom reaching the last mile. The coverage of low-income households and communities in the Western Cape is of extreme importance given the exposure of these groups and the significant flood risk that exists in the region. This paper aims to investigate how complementary microinsurance products could be designed within risk pooling frameworks noting the financial policies required and the structural considerations of the product. Specific insight into payout use, premium financing and solvency issues were elaborated upon by the use of a dynamic financial analysis (DFA). Noting issues of affordability, microinsurance products would need some form of premium subsidization. From the DFA undertaken, 3 – 6 % of the risk pooling premiums allocated to microinsurance premium subsidization will ensure that stability of the risk pool is maintained under a moderate climate scenario. There is uncertainty in the modelling process owing to the difficulty in projecting future costs of flooding events in the Western Cape as losses will not be linear. In conclusion, microinsurance and risk pools may be viable in the same adaptation finance framework. Both instruments can be seen as transitionary adaptation finance instruments as floods are projected to be uninsurable from 2045. Therefore, risk pools and microinsurance must strengthen the risk reduction and flood prevention incentives to ensure that risk transfer instruments are delivering climate adaptation benefits while managing residual risks.

1. Introduction

There is a growing demand for insurance products by municipalities as these products can assist municipalities in reducing their financial risk and exposure in response to floods. Risk pooling is a type of insurance scheme that can be used for this purpose. Despite providing risk pooling participants with funds when a disaster occurs, the payout process can be time-consuming and slow. As is the case with internal municipal budgets and payouts from risk pools, finance received after a disaster is mostly used for critical infrastructure reconstruction (e.g. road, bridge and ICT rebuild), payment of salaries and debt management of the municipality. Therefore, there is often less financial assistance available for low-income individuals that are severely affected by flooding events.

To ensure that vulnerable communities are considered, an additional microinsurance scheme could be integrated within risk pools. Microinsurance is similar to traditional insurance, however, the products are targeted at low-income individuals who have less savings. Therefore, premium costs are usually lower, and coverage is provided for basic assets. Despite lower costs of microinsurance premiums, costs may still be too exorbitant for poorer individuals. A joint scheme may allow for risk pooling premiums paid by the municipality to subsidize the cost of microinsurance premiums. However, this may also place the solvency of the risk pool.

2. Project Context

The research conducted under the Adaptation Finance Fellowship Programme (AFFP) builds on the Municipal Risk Pooling (MURP) project which is an IDRC-funded project which aims to test the feasibility of developing sub-national risk pools which manage climate risks. A municipal risk pooling (MURP) facility would avoid issues experienced within sovereign risk pools, such as compromised decision making and issues of using public budget to benefit other countries. The MURP project is the first of its kind and seeks to build on the learnings of sovereign risk pools while creating new knowledge in the field of adaptation finance. It is the hope of the project that risk pools at the sub-national level, if viable, become mainstreamed in disaster risk financing approaches thereby enhancing comprehensive climate risk management. The project is situated in Western Cape province in South Africa as the province faces significant exposure to flood and drought risk. The viability of a municipal risk pooling facility is framed in the context of flooding events at the district municipal level and is broken down into four specific components including: (1) flood hazard assessments; (2) climate vulnerability and coping studies; (3) dynamic financial analysis; and (4) the development of a municipal risk pooling framework. The Lead Organisation of the MURP project is the University of KwaZulu-Natal with endorsement from the Western Cape Government. Partner organisations includes Munich Climate Insurance Initiative (Germany); Center for International Climate and Environmental Research-Oslo (Norway); Germanwatch e.V. (Germany); and, SouthSouthNorth Africa Projects.

3. Literature Review

3.1. Flooding Hazards across the Western Cape, South Africa

South Africa lies between latitudes 22° and 35° South and longitudes 16° and 33° E; the country possesses a semi-arid climate and a total area of 1.2 million km^2. The Western Cape province lies to the south-west of the country with the province experiencing a Mediterranean climate with winter rainfall as compared to the rest of the country which experiences summer rainfall. According to the Intergovernmental Panel on Climate Change (IPCC), Southern Africa is one of the most vulnerable regions to impacts of climate change owing to a lack of adaptive capacity (Lal, 2012). Historically, floods have been the most common climate hazard within South Africa, with 77 flood events having occurred between 1980 and 2010 (Zuma, 2012). The absolute average annual loss from flood events in South Africa is approximately US $ 910 million (Preventionweb, 2014).

The socio-economic impacts of flooding events have been particularly severe in the Western Cape of South Africa (Abiodum *et al.*, 2015). Flooding often results in losses of human life, damages to infrastructure, erosion of fertile soils which affect agricultural lands, and the displacement of communities. The province is characterized by winter storms and heavy flooding almost every year. According to the World Resources Institute (2017), the annual expected urban damage from floods in the Western Cape is estimated to be US $ 66.0 million while approximately 19 000 people are affected annually as a result of floods. From 2003 to 2014, 14 cut-off low systems occurred in the Western Cape; these systems were the drivers for extreme weather events in the region including floods. Flooding has occurred almost annually with extensive and recurrent financial losses. From 2003-2014, R 4.9 billion in flood-related damage was reported by government departments and municipalities. Of this, R 2.3 billion was due to agricultural costs (Pharoah *et al.*, 2016). Between 2011 and 2014, the Western Cape was severely affected by five high impact weather events that led to four provincially gazetted flood disasters.

Climate change is expected to increase the frequency and magnitude of flooding in the Western Cape. Some studies have been undertaken which investigate how climate change will affect the prevalence of extreme weather events. Between 1931 and 1990, there were significant increases in the intensity of extreme rainfall events in 70% of South Africa (Abiodum *et al.*, 2015). Easterling et al. (2000) found a statistically significant trend of extreme weather events in the future over the Western Cape. Engelbrecht *et al.* (2012) also showed the increase of synoptic features such as cut off lows which produce extreme rainfall events.

3.2. Disaster Risk Financing in South Africa

Disaster risk management in South Africa is primarily a public-sector function within each sphere of government (national, provincial and local) with accompanying support from the private sector, civil society, non-governmental organisations (NGOs), community-based organisations among others (Van Niekerk, 2012). According to the Disaster Management Framework of South Africa (2005), all phases of the disaster risk management cycle are funded through risk retaining financial instruments. This may be a combination of revenue from national, provincial and local governments, conditional transfers from one level of government to another, and contingency funds at the national and provincial level.

There are severe deficiencies of disaster management at the local government level. As of 2011, 50% of local municipalities in South Africa lacked the disaster management structures, while disaster management advisory forums were absent in 68% of local and 25% of district municipalities (Zuma, 2012). International aid may be a possible avenue to cover financial shortfalls from deficiencies in DRM financing within government structures however aid amounts can be inadequate to meet post-disaster needs and be slow in reaching the worst affected households (Gurenko 2007).

South Africa's economic stability has recently been in a state of flux. In June 2017, the South African economy officially entered recession as Gross Domestic Product (GDP) growth contracted for two consecutive quarters (Rossouw, 2017). The World Bank expects the South African economy to grow by 0.6% in 2017, cutting its January projection by 0.5 percentage points (Le Roux, 2017). The economic growth outlook has led to downgrade of South Africa's debt by the three major rating agencies (Standard and Poor's, Fitch and Moody's); the National Treasury will be required to make budget cuts to offset the tax shortfall (Gernon and Mabuza, 2017). Given these trends, the management of hazards of greater frequency and magnitude will possibly place further strain on the budget.

The South Africa's Disaster Risk Management (DRM) strategy which is focused solely on risk retaining mechanisms may not as resilient in managing a future with hazards of greater frequency and magnitude. Risk-transfer instruments allow for risk to be transferred to a third party. Examples of risk transfer instruments include traditional insurance, risk pooling, micro-insurance, catastrophe bonds and weather derivatives (Arnold 2008). Such instruments are well placed to manage large catastrophes, when risk-retention strategies are insufficient to deal with the magnitude of economic losses. Furthermore, certain risk transfer may be able to: incentivise proactive adaptation initiatives; attract a new suite of institutional investors from the financial markets; and facilitate timely payouts to affected entities.

3.3. The Case for Risk Pooling

Despite catastrophe bonds ('cat bonds') and catastrophe swaps ('cat swaps') being innovative financing solutions with possibly lower transaction costs, **insurance products are still the most commonly used risk-transfer instruments in climate risk management (Wilcox 2016).** According to Wilcox (2016), this is owing to insurance being a better-established instrument as compared to cat-bonds or cat swaps. Additionally, a review of insurance industry practices by Mills (2009) suggests that there is a large number of initiatives currently being explored (643 specific activities in 244 insurance entities) related to climate change.

Insurance may not be a suitable approach to deal with all losses and damages associated with the physical risks of climate change. It can support adaptation measures in some cases, but cost-benefit analysis must be conducted in order to compare other adaptation strategies and must be complimented with other risk-transfer tools. Insurance can address hazards that may be exacerbated by climate change, such as floods and drought; however, for hazards such as ocean acidification and sea-level rise, too little information is known regarding the geographic distribution, economic consequences and the severity of the impacts (UNFCCC 2008). Insurance can also be a costly solution: premiums are usually inflated above the expected losses to guard against the payment of claims in the event of large or multiple disasters. Moreover, insurance, based on non-parametric policies, requires economic loss assessments, post disaster, which can delay the mobilisation of relief funds and their distribution to households in need.

Risk pooling is a possible solution to address the pitfalls of traditional insurance. Risk pooling that incorporates sufficient technical expertise can provide cost-efficient solutions to participating countries. Most risk-pooling facilities currently in operation are based upon parametric insurance policies. This allows for risk pooling to provide timely payments to affected entities, as payouts are based on environmental triggers (e.g. wind-speed thresholds) and thresholds rather than post-disaster loss assessments. Furthermore, administrative and transaction costs are also reduced. The use of index-based insurance reduces moral hazard,[i] as it is not influenced by individual behaviour. Considering the low insurance penetration rates (less than 5 percent of low-income households, globally), sovereign risk pooling at a national level can extend insurance coverage to uncovered poorer households to cope with the effects of climate hazards, if funds are able to filter to affected households in a timely manner (Organisation for Economic Co-operation and Development [OECD] 2015). Risk pooling allows member countries to gain better access to reinsurance facilities to attain catastrophe reserves on better terms with lower premium costs, owing to well-diversified risk portfolio (Global Facility for Disaster Risk Reduction [GFDRR] 2011).

There are certain barriers to risk pooling, such as member states being reluctant to divert public finance towards premiums – particularly as international aid is expected post disaster (UN Economic and Social Commission for Asia and the Pacific [UNESCAP] 2015). This reluctance may be compounded by a lack of understanding of how insurance works, the subsequent benefits of insurance and how to effectively engage with the insurance sector to gain the best value. Risk pooling based on parametric insurance policies may require large amounts of data to create loss and hazard probabilistic models (Kalra 2016). This may be difficult in certain states if there is a lack of public asset registers, as this makes it difficult to estimate the economic value of entities at risk from a climate hazard (Lucas 2015), or good records on environmental parameters (e.g. historic rainfall or future rainfall forecasts).

The use of risk pooling in conjunction with other risk-transfer tools (catastrophe bonds, micro-insurance and catastrophe swaps) and risk-retention instruments (contingent credit and catastrophe reserves) can ensure that responses to most hazards, varying in probability and severity, are financed (Ammann 2016). Risk pooling is a useful instrument in addressing low-frequency, high-severity events: this is important, as small states have limited financial capacity to deal with these hazards. According to Lewis and Murdock (1996), for optimal risk diversification, both securities and insurance should be used since neither in isolation is ever sufficient. Consequently, risk pooling provides a useful framework to investigate how risk-financing tools may be work in combination with each other.

4. Aims and Objectives

The primary aim of this research was to outline how microinsurance could be used within risk pool structures to extend coverage to the most vulnerable individuals affected by flooding events in the Western Cape, South Africa.

The specific objectives assessed include:

(1.) To determine whether there is a need for risk pooling to possess microinsurance schemes.
(2.) To evaluate how vulnerable groups support themselves financially, post-disaster.
(3.) To determine how the functionality of a risk pool is changed when complementary microinsurance schemes are implemented that is an understanding of how the solvency and financial stability of the risk pool changes if a microinsurance scheme is included.

5. Methodology

5.1. Financing Resilience at the Community Level

A literature review, detailed interviews with disaster risk managers within the Western Cape as well as a stakeholder engagement workshop were used to answer two primary questions: how do communities, which are most at risk from flood hazards, manage the post-disaster impacts from a financial perspective and what are other complementary climate risk financing schemes offered by the Western Cape government, private sector financial institutions, NGOs and community based organisations.

The objective of the stakeholder workshop specifically was to assess the current benefits and challenges of integrating risk transfer financial instruments such as risk pooling into climate and disaster risk management strategies. The participants of the workshop included government officials and planners from various levels of government that are involved in the different portfolios such as climate change adaptation and disaster risk management. The workshop identified the avenue within which municipal risk pooling could be used in disaster risk management practices of the Western Cape Government.

A stakeholder engagement was held on the 23rd and 24th of October 2019 where the following stakeholders were interviewed:

- Eden (Garden Route) Municipality;
- Provincial Disaster Management Centre (PDMC);
- National Disaster Management Centre (NDMC);
- Cape Winelands District Municipality;
- Stellenbosch Local Municipality; and,
- Mossel Bay Local Municipality.

5.2. Dynamic Financial Analysis

To test the financial solvency of a risk pool with a microinsurance scheme, the financial model developed within the municipal risk pooling (MURP) programme will be used. Risk pools whether operating at the sovereign (national), provincial or municipal have the similar financial structures and policies. The findings can therefore be applicable to risk pools operating at any level which are willing to initiate complementary microinsurance schemes. Since the financial model has already been built for the MURP project, this study will be investigated in the context of a Municipal Risk Pool which covers flood risk in Western Cape municipalities.

A dynamic financial analysis can be described as a simulation approach which incorporates statistical and mathematical methods to analyse risks on an individual basis. The dynamic financial analysis is a methodology which is seeking to assess risks simultaneously and understand the solvency of an insurance facility over time. Within this methodology, economic losses and premiums are inputs into the model together with the coverage needs of municipalities, and the investments made by the retained reserves to understand the financial sustainability of the risk pool over time. For a municipal risk pooling facility, aspects of reinsurance, asset allocation, profitability and solvency were investigated within underwriting, economic and jurisdictional cycles. The project team has acquired risk modelling software packages (Ultimate Risk Solutions and @Risk) which are used by actuarial firms for DFA. Figure 1 outlines the structure of the risk pool and the elements which are investigated within the DFA.

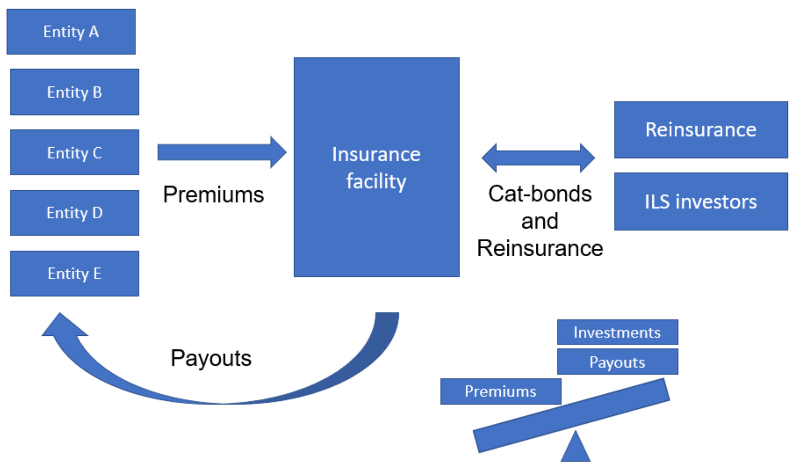


Figure 1: The structure of the municipal risk pool and the dynamic financial analysis to be undertaken

6. Results and Discussion

Complementary microinsurance policies may add place additional pressure on the solvency of a risk pool if premiums are partially subsidized by the financial reserves of the risk pools. Considering that microinsurance policies are taken out in larger numbers since they are offered to individuals rather than government entities, multiple payouts may be triggered at the same time, which may erode financial reserves.

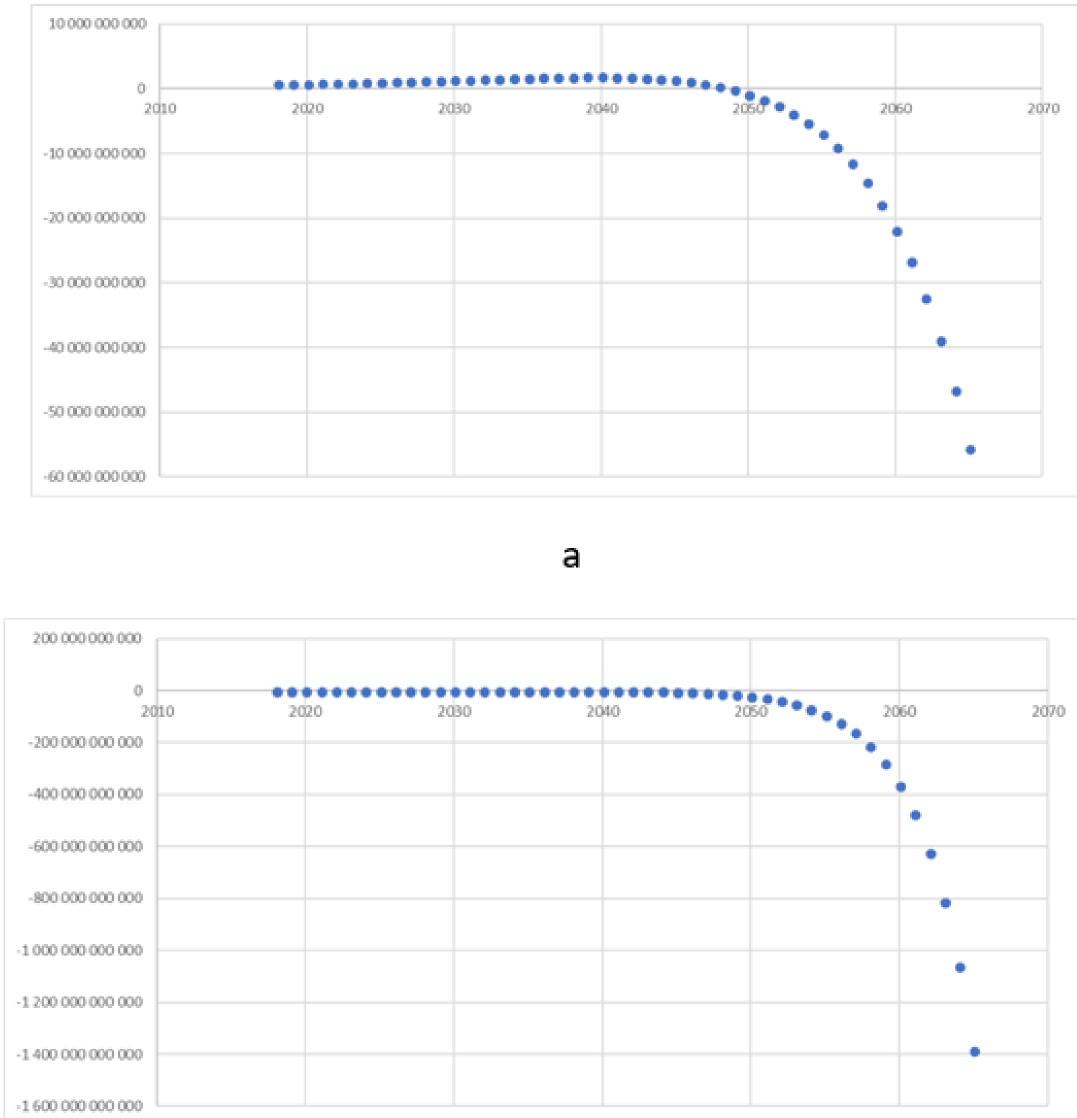
According to the DFA outputs illustrated in Figure 2, under the high climate change scenarios (RCP 8.5), without significant increases in the cost of insurance, future flood costs result in the risk pool being insolvent in 2042 (losses exceed growth of the risk pool). While under a medium climate change scenario, this extends to 2054. If up-pricing of insurance premiums also include an increase for “climate risk” then the solvency of the risk pool is maintained for an additional 6 years.

Increasing prices in premiums need to be met by the willingness to pay (WtP) of municipalities. Should the WtP not increase over time, the solvency under medium and high scenarios will also be compromised. From the analysis conducted, should entities not be willing to pay the projected price increases in premiums as a result of up-pricing and inflation, the financing gap from 2030 – 2050 would exist from between 5.3 – 10.6 %. Therefore, it would be necessary to attain some form of donor subsidization of premiums, particularly for smaller municipalities which do not have sufficient financial capacity.

According to the premium analysis, depending on the climate scenario, premiums will on average be 5 – 10% more expensive (Figure 3). 3 – 6 % of the risk pooling premiums allocated to microinsurance premium subsidization will ensure that stability of the risk pool is maintained under a moderate climate scenario. There is uncertainty in the modelling process owing to the difficulty in projecting future costs of flooding events in the Western Cape as losses will not be linear.

Based on the analysis, the most critical factor that determines the solvency projections and premium costs in the long term is the future costs of flooding events. It is expected that the higher economic growth in combination with medium climate change, would allow for the risk pool to be stable for the longest – In reality, this is perhaps the most unlikely scenario.

In conclusion, microinsurance and risk pools may be viable in the same adaptation finance framework. Both instruments can be seen as transitionary adaptation finance instruments as floods are projected to be uninsurable from 2045. Therefore, risk pools and microinsurance must strengthen the risk reduction and flood prevention incentives to ensure that risk transfer instruments are delivering climate adaptation benefits while managing residual risks.



a

b

Figure 2: Solvency projections with (a) microinsurance portions included and (b.) microinsurance subsidized premiums excluded.

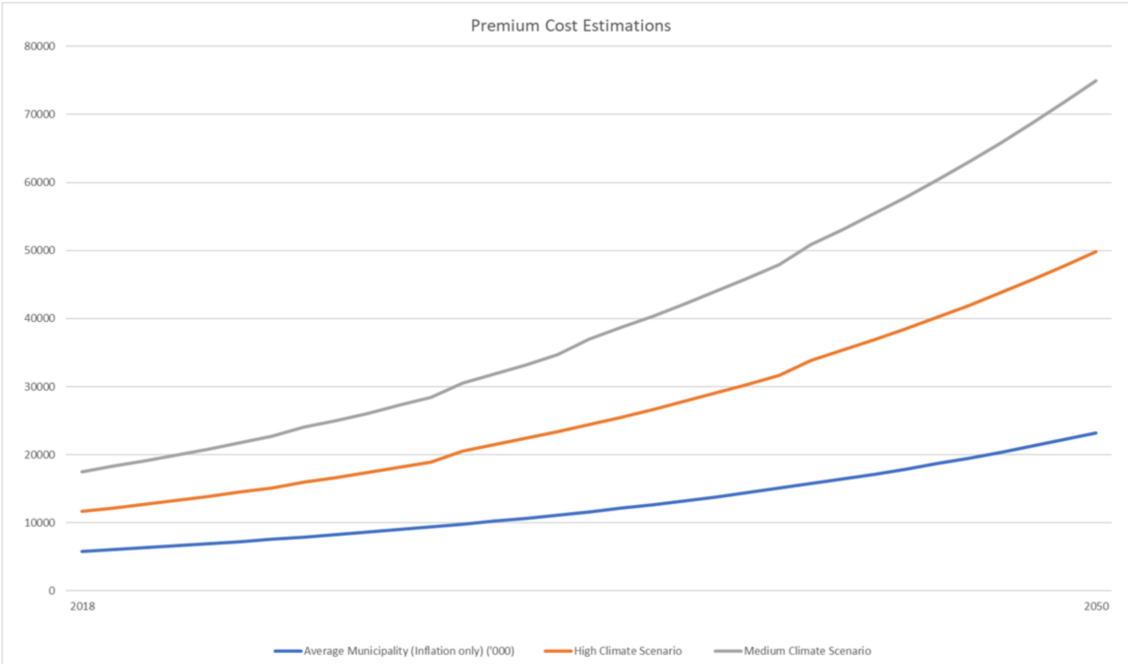
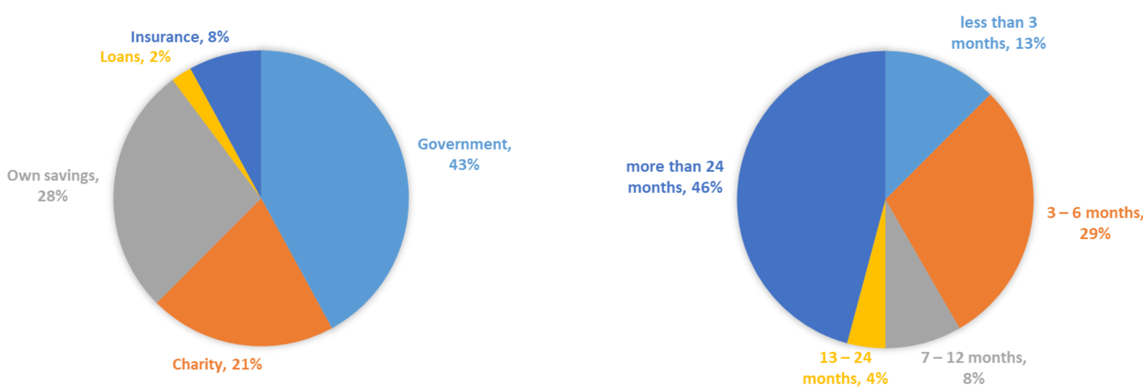


Figure 3: Premium cost estimations under different climate scenarios until 2050.

Based on the survey conducted with individuals in flood risk prone communities and disaster risk managers and officials at the stakeholder engagement, the development of a risk pool was addressing a distinct financing gap and was needed in comparison to other disaster risk financing strategies. Key stakeholders including vulnerable communities were critical to ensure that theoretical aspects of risk pools were reflective of reality. Some of the key findings demonstrate the government is still responsible for the payment of damages which makes a self-insurance risk pool viable (Figure 4 (a)). Furthermore, 46% of individuals have not recovered from financial losses incurred 24 months after a disaster (Figure 4(b.)).



a *b*

Figure 1: (a.) Financial sources of resilience finance used post-disaster; and, (b.) recovery timelines for individuals affected by flooding after relief aid has been delivered (n = 1200).

7. Policy Recommendations

There are several policy implications and recommendations that were identified from the research conducted with the findings being especially useful to public entities interested in developing risk pooling facilities, insurance and reinsurance companies and disaster risk practitioners.

1.) Poorer communities are less financially buffered to the impacts of floods. Therefore, insurance targeted at low-income individuals is necessary to extend coverage to the most vulnerable.
2.) Microinsurance products can be integrated into risk pooling schemes; however, a high degree of subsidization is required, particularly in the developing country context. Total subsidization may be necessary in a South African context as most vulnerable communities have no financial resources to pay for microinsurance premiums.
3.) Microinsurance contract holders must be spatially independent across risk pooling municipalities. If a flood occurs in a risk pooling municipality where all microinsurance policy holders are based, multiple policies would be triggered at the same time. This could impact the solvency of the risk pool resulting the financial reserves being eroded.
4.) Risk pools and microinsurance products will not be viable indefinitely into the future as the risk pool will not be financially stable when flooding events become too frequent and costly. Therefore, these products need to be adopted with proactive climate adaptation and risk reduction.

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[i] 'Moral hazard' refers to the prospect that a party insulated from risk may act in a manner adverse to the interests of a party bearing the risk, such as by acting carelessly or negligently.