

# Mapping the Micro-Lending Landscape for Lumkani Protection



**LUMKANI**  
PROTECTING AGAINST FIRES



**WPI**



# Mapping the Micro-Lending Landscape for Lumkani Protection

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# Abstract and Executive Summary

## Abstract

Growth of low-income housing around the world has resulted in overcrowded informal settlements at high risk of fire. The social enterprise, Lumkani, has developed a networked heat detector that alerts community members in the event of a fire. In an effort to expand distribution, Lumkani has partnered with Hollard Group Insurance and is seeking partnerships with micro-lending organizations globally. This project assessed the micro-lending landscape and developed an estimated monetary value model to quantify the expense of fire related defaults to lenders to identify viable partner organizations. We concluded that non-government organizations are the most viable global partners, while housing lenders servicing residents in high-risk communities are the most promising domestic partners.

## Executive Summary

In 2007, one billion people lived in areas referred to as informal settlements or slums; this number is expected to reach 1.4 billion by 2020 (Lumkani Indiegogo, 2015). In these poor urban areas, the prevalence of high population density creates an environment in which fire thrives and spreads rapidly among the homes of residents.

Various attempts have been made to address fires in informal housing, including fire resistant housing materials and safer stoves. After three fires in the Khayelitsha and Thembeni townships of South Africa displaced over 4,000 people and killed five, a company called Lumkani was formed. Lumkani developed a heat sensing device to prevent the spread of shack fires in South Africa and around the world. The use of open flames for heating, lighting, and cooking prevents the effective implementation of smoke detectors; therefore, the device detects the rate of rise of heat instead of smoke. Lumkani's detectors are linked together allowing them to communicate in a network and alert surrounding homes of a fire. This creates a community wide response to shack fires. Through crowdfunding, Lumkani was able to raise 96,000 USD to install over 3000 detectors in homes across South Africa. While the fundraising campaign was highly successful, Lumkani is looking for more sustainable marketing models.

In 2016, Lumkani partnered with Hollard Group to offer household insurance for fires that comes bundled with its device. The device reduces the risk of fire, lowering the insurance cost. Lumkani has begun selling this bundle directly to residents in Johannesburg, but is interested in alternative distribution methods. Our project investigated possible micro-lending partners that could help distribute Lumkani's product to residents of informal settlements. Micro-lenders are organizations that offer credit or loans to low-income individuals. Lenders have a financial stake in residents because fires can destroy borrowers' assets, crippling their ability to repay loans. Lumkani's detector and insurance bundle eliminates that risk. We explored the micro-lending landscape in South Africa and around the world by identifying key players, talking to potential partners, and modeling the financial feasibility of partnerships.

On a global scale, there are several organizations that work to address the plethora of struggles that low-income residents face. The organizations that we focused on throughout our research were those that participate in micro-lending. Many of these organizations have the reach and resources to help Lumkani grow their business using a micro-lending model. However, each organization has unique position within the landscape, making some better partners than others. As Lumkani continues to uncover more data about the severity of this problem, they will be able to appeal to these large organizations both from a social standpoint, as well as an economic standpoint.

# Abstract and Executive Summary

In South Africa, there are many organizations that offer credit to residents of low-income areas. Our research was centered on finding potential micro-lending partnerships amongst three main types of organizations: retailers, home improvement organizations, and finance institutions. South African retailers often offer credit through hire purchase agreements, which allow low-income customers to pay for products over a longer period of time. Home improvement organizations offer loans to individuals attempting to build or modify their homes, and are often funded by the South African government through the country's Rural Housing Loan Fund (RHLF). We also looked into banks and specialized loan providers that offer credit options to residents of low-income areas. The size of these banks could make product distribution a quick and easy process. We believed that these three types of organizations would be the best potential partners for Lumkani in South Africa.

As part of our research we reached out to the major corporations and organizations in the micro-lending field within South Africa. The goal of these interviews was to learn about the impact fire has on each organization's ability to lend to low-income customers. We were able to contact representatives from JD Group, Norufin Housing, and Barclay's Africa Group Limited. From our interview with JD Group, a major furniture retailer, we discovered that fire did not affect JD Group's credit offerings and the corporation was moving away from the micro-credit field to recover from recent losses (Moshoeshoe, 2016). Our interview with Barclays Africa Group Limited proved to be relatively similar. Barclay's requires proof of formal employment in order to receive credit which could potentially exclude residents of informal settlements (Vaidya, 2016). However, our interview with Norufin Housing proved much more promising. Norufin's CEO was interested in Lumkani's product because informal settlements are prevalent in regions the company hopes to expand into (Rakhudu, 2016).

To demonstrate the benefits of Lumkani's product we developed an economic model that uses the Expected Monetary Value (EMV) to quantify the expense of fire related defaults to organizations. The model takes into account the estimated losses due to fire and the cost of the insurance to determine the financial benefit of partnering with Lumkani. While creating this model, we discovered a lack of data on the risk of fires. Since this was the largest uncertainty, we made risk an independent variable in our calculations. Our model shows the savings for a partner in terms of the fire risk percentage.

We believe that a micro-lending partnership could work extremely well with organizations currently working in areas with high fire risks. Our conversation with Norufin Housing showed that there is interest in Lumkani's product within the Housing Micro-Lending field, which is large in South Africa, but not globally. We also believe that Micro-lending NGOs would make great partners because Lumkani's device might help their lending operations and further their philanthropic initiatives. This type of partnership would significantly expand the distribution of Lumkani's product if saving money is not the only focus of the organization's partnership. However, if the potential partner is only interested in economic growth, then the product would have to be distributed only to settlements that have a very high risk of fire. Additionally, many of the micro-lending NGOs have a large global reach that would place Lumkani's product in the homes of thousands that need it.

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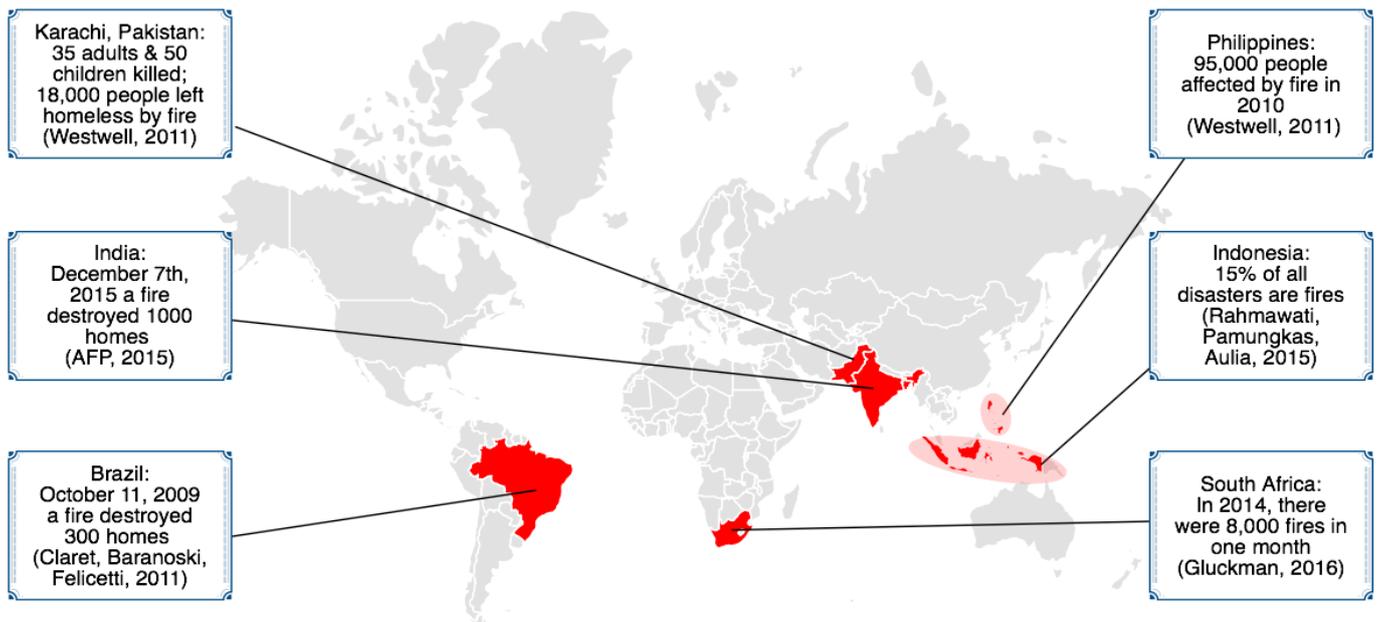
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# Introduction

In 2007, one billion people lived in poor urban areas known as informal settlement or slums (Lumkani Indiegogo, 2015). This is expected to increase to 1.4 billion by 2020 (Lumkani Indiegogo, 2015). Poverty, poor sanitation, lack of water, and limited electricity are already major hardships for residents of these communities (Davis, 2006). Therefore, purchasing strong and durable building materials may not be affordable, especially after addressing the other priorities these residents have. As a result, informal homes are often constructed from flimsy and flammable materials (Lumkani

Indiegogo, 2015). Families living in these communities rely upon fuel and open flames for cooking, heating, and lighting in their homes (Pelling & Wisner, 2009). The small size of these shacks, necessary for structural stability, create an environment in which heat becomes trapped and increases rapidly in any fire situation. The prevalence of open flame combined with high population densities compounds the risk of large and powerful fires (Lumkani Indiegogo, 2015). Figure 1 depicts the devastation fire has caused residents around the world. Fires are a reality for millions of families globally.

Figure 1: Global Impact of Fires



## The Problem: Informal Settlement Fires

Even as the largest economy in Africa, South Africa is still home to a many informal settlements (Davies, 2016). As of 2011, 13.5 percent of the population lives in low-income townships and informal settlements (Statistics South Africa). **On New Year's Day 2013, three fires spread throughout the townships of Khayelitsha and Thembeni, killing five people and leaving 4,000 homeless (News24, 2013).** The devastation caused by fires like these is something that most residents of developed countries will never see. However, the destruction that a fire can cause is made

worse by the frequency at which fires of any size occur. According to Ian Schnetler, chief fire officer in Cape Town, emergency services respond to a fire in these settlements every day, with the exception of four or five days a year (Walls & Zweig, 2016). If this is the case, it is not hard to imagine that there are multiple settlement fires on some days. If fire services are addressing one fire, it reduces their ability to respond to another. Something has to be done to allow the residents themselves to identify and extinguish fires before they get too large to handle.

# Introduction

Figure 2: Siyahhlala-la Fire in KwaZulu-Natal, South Africa 2014



“The inhabitants will return home to find everything they own as ashes, burnt to the ground” (Cowan, 2014)

## Response to Settlement Fires

Multiple companies have proposed solutions to the issue of shack fires around the world. They have proposed using fire resistant building materials or paints (Sergeevaa, 2013), re-blocking homes (Wallace & Wallace, 2011), and various other solutions to help reduce fires. One South African based company, Lumkani, was founded with the goal of preventing small fires from becoming catastrophic. They successfully created a heat-sensing device that alerts an entire community to the threat of fire, allowing residents to extinguish fires before they spread. Originally, Lumkani relied on external funding to distribute devices because residents could not afford them. Recently, Lumkani partnered with an insurance company to sell insurance that covers fires, bundled with its detector, directly to residents. Through these funding methods, Lumkani has installed its devices in thousands of homes in South Africa. This is just the first step to addressing the issue in South Africa and globally. Lumkani is looking for new distribution methods to reach the millions of at-risk homes worldwide.

Lumkani is interested in partnering with players in the micro-lending field to reduce their risk of loan loss and help distribute its own devices. Organizations with financial stakes in informal settlements are impacted by fire and have an interest in preventing future fires. Micro-lending is the process of providing credit or loans to low-income individuals. Micro-lending is a risky field because the loan recipient may have an unstable income. Loan providers lose money from people who are unable to repay or default on their loans. In 2013, Bankseta published a detailed report on the current state of micro-finance in South Africa and identified multiple key players, such as banks and retailers, and discussed their current micro-finance offerings and challenges with high default rates (Bankseta, 2013).

# Introduction

## Micro-Lending Distribution Method

While Bankseta's report reveals significant details about current credit offerings, connections to the fire protection industry are missing. **Lumkani wants to understand how fire risks affect credit offerings and if mitigating this risk will make lending to low-income consumers more appealing.** While the micro-lending distribution model that Lumkani is interested in has not yet been used in the fire protection industry, the benefits of such a model have been seen through case studies involving two partnerships: First Energy working with Swayam Shikshan Prayog and Hindustan Unilever Limited (HUL) partnering with ACCESS Development Services. These partnerships allowed First Energy and HUL to easily distribute their products in areas the NGOs were already established.

*First Energy*, a company that designs clean, energy efficient stoves, began distributing its product to communities in India using a third party in 2006. In just five years the company was able to distribute 400,000 stoves (Thurber, Phadke, Nagavarapu, Shrimali, & Zerriffi, 2014). The success First Energy experienced is a result of its unique marketing strategy. Instead of trying to develop a customer base themselves, First Energy used the resources of their NGO partner, Swayam Shikshan Prayog (Thurber et al., 2014). This allowed First Energy to develop credibility in India and start distributing its stoves more quickly and effectively.

*Hindustan Unilever Limited (HUL)* came to India in 2005 with its Pureit water filtration device, attempting to impact household water-treatment in the country (Brown et al., 2009). Two years later, HUL partnered with an NGO called ACCESS Development Services, a support organization for micro-finance institutions (Freeman et al., 2012). The two parties began a pilot program intended to provide micro-loans to low-income women and self help groups (SHG) by using micro-finance institutions. With the micro-loans they were provided, these SHG members were able to purchase their own Pureit devices. Despite bad history regarding micro-lending to SHG members in India, the HUL pilot program attained almost 100 percent repayment on loans given for Pureit filters (Brown et al., 2009). Achieving loan repayment rates close to 100 percent is a goal for many institutions.



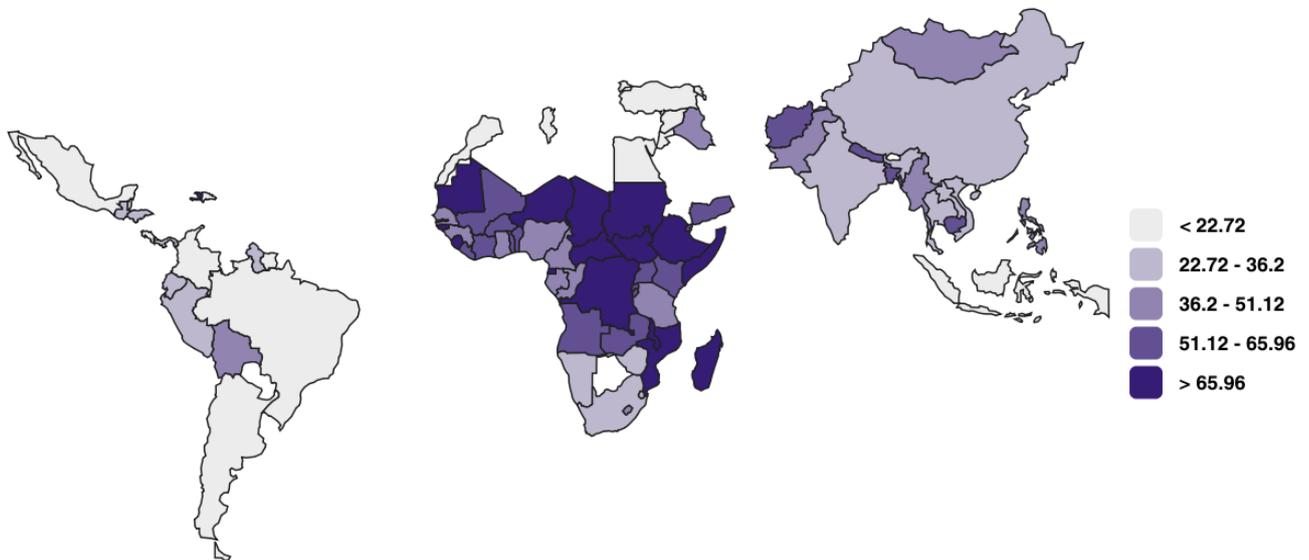
**LUMKANI**  
PROTECTING AGAINST FIRES

## Assessing Potential Partners

Lumkani is looking to use a micro-lending model to provide its product to residents of at risk communities. **This project aimed to increase the distribution of Lumkani fire detectors, designed to decrease fire related loss in low-income communities, by assessing potential relationships between micro-lenders including NGOs, retailers, home improvement organizations, and financial service providers.** The research we have conducted allowed us to assess the global micro-lending landscape with a specialized focus on South Africa. Micro-lenders benefit when the likelihood of loan default decreases. By uncovering details related to how fire impacts each business, or prevent them from expanding their business, we were able to determine the potential savings for a company through a partnership with Lumkani. Providing Lumkani with this information about the micro-lending landscape revealed potential paths for expanding the business.

# Global Settlement Fires

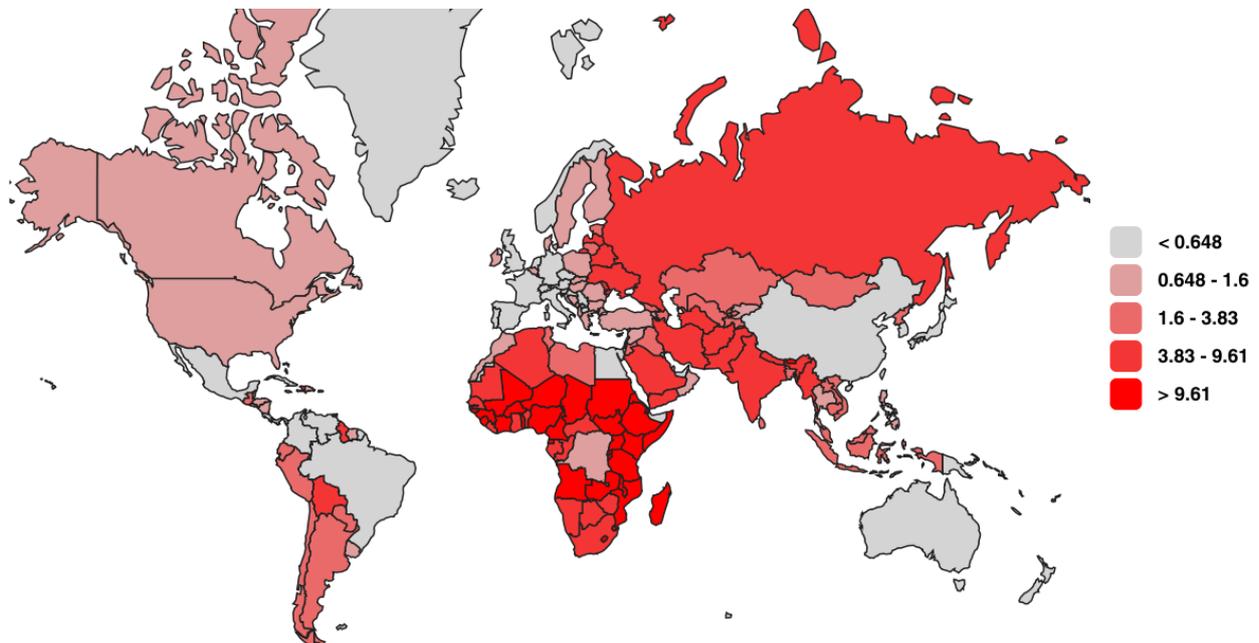
Figure 3: Percent of Urban Population that lives in a Slum



(The World Bank, 2014)

Urban informal settlement settlements are a global problem centered in Africa but also impacting areas in Asia and South America. Seen in Figure 3, darker blue regions indicate countries with a higher percentage of the population living in informal settlements.

Figure 4: Deaths caused by fires per 100,000 deaths

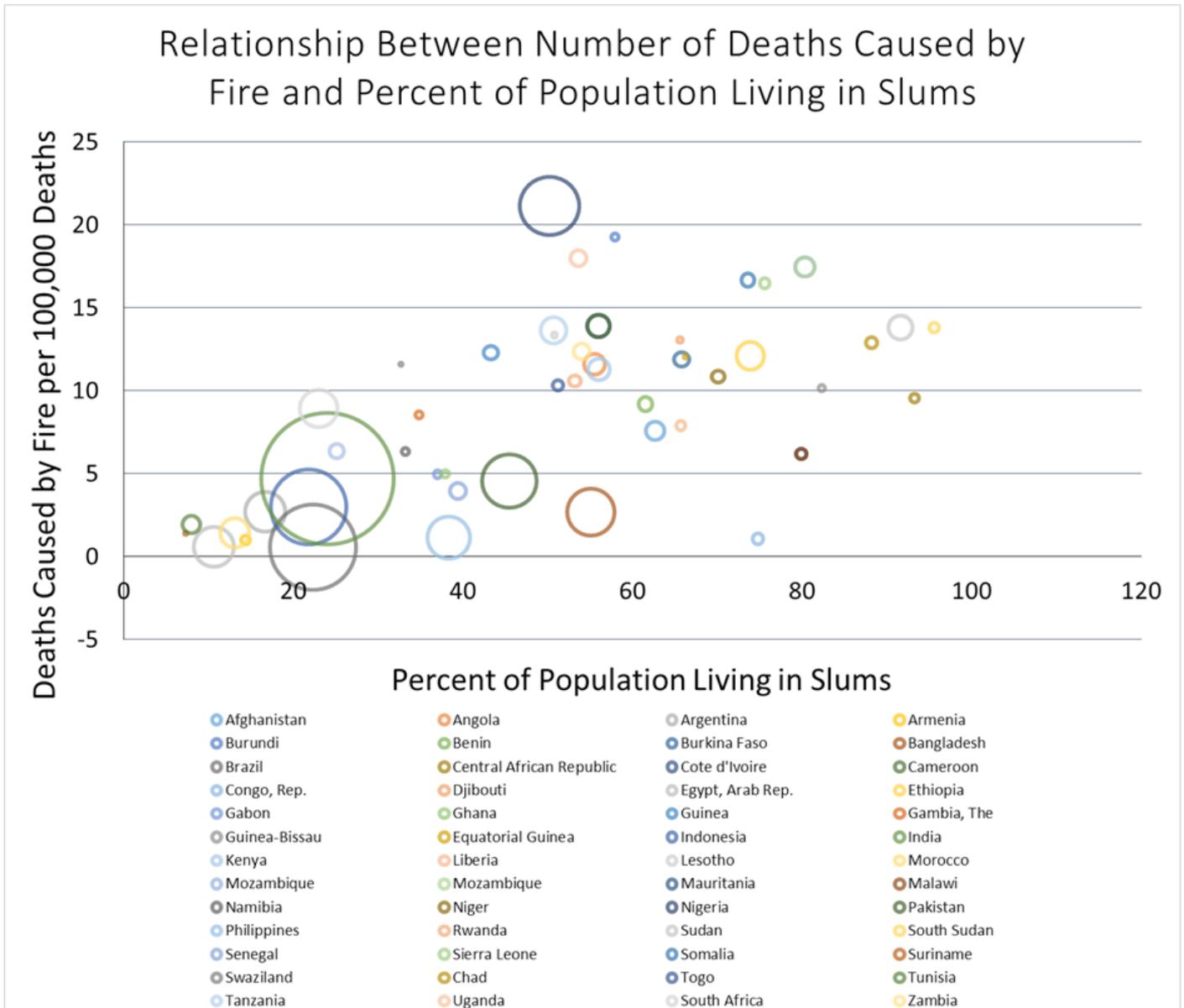


(World Life Expectancy, 2014)

One of the largest problems in informal settlements is the risk of fire. Many of the same countries with a large population living in slums have a higher death rate due to fires. As seen in Figure 4, darker red regions indicate higher number of deaths caused by fire.

# Global Settlement Fires

Figure 5: Combination of Urban Slums and Fire Deaths



(World Bank, 2014)

There is a loose correlation between the percentage of country's population that lives in informal settlements and the number deaths caused by fire. Figure 5 shows countries with high slum populations plotted against the deaths caused by fires. The total size of the circles in Figure 5 is the total urban population living in slums. The plot indicates that there is a market for fire protection technologies in many countries, including South Africa.

# Global Settlement Fires

Figure 6: Aftermath of a fire in Masiphumelele



(GroundUp, 2015)

A 2015 fire in township of Masiphumelele destroyed over 1,000 homes, a destruction evident in the photo above (GroundUp, 2015).

## Informal Settlement Fires in South Africa

Fire poses a significant risk to low-income communities in South Africa, where it is estimated that one person dies in a shack fire every two days (Lumkani Indiegogo, 2015). **Ian Schnetler, chief fire officer in Cape Town, says, “there [are] only four or five days on average a year when we don’t respond to [a settlement fire]”** (Walls & Zweig, 2016, p. 94). A more specific study, performed in the Dontse Yakhe informal settlement, found that fire is the main disaster risk in low income residential areas in South Africa (Harte, Sowman, Hastings, & Childs, 2015).

According to the 2011 South African Census, 13.5 percent of the country’s population resides in low-income areas such as informal settlements and townships (Statistics South Africa, 2011). Ruth Massey

(2015, p. 4), a geographer from the University of Stellenbosch, notes that “nearly 70 percent of sub-Saharan Africa’s urban population live in informal settlements and populations are expected to double by 2030” meaning more people will be at risk of fires. Mark Pelling and Ben Wisner found that “high residential densities make it easier for fire to spread between dwellings and difficult for emergency services to reach affected areas” (2012, p. 113). If fires are allowed to spread uncontrollably, they can ignite entire communities, posing a serious threat to the lives of residents living in the area and destroying everything they own. This was exemplified on January 1, 2013, when three fires spread in Khayelitsha and Thembeni settlements killing five people and leaving 4,000 others homeless (News24, 2013). Fires are a prevalent issue to residents of informal settlements in South Africa.

# Global Settlement Fires

## Global Response to Informal Settlement Fires

Protecting informal settlements from fire is difficult because fires can be caused for many reasons. However, fire protection technology generally falls under two main categories: active or passive. Active protection refers to technology that actively works to reduce the risk of fire. While passive technology refers to technology that seeks to prevent the spread of a fire in the event that one occurs.

### Active Solutions

Fire is a problem in informal settlements because it is so prevalent in everyday life. Various organizations have worked to actively reduce the risk of fire in informal settlements or slums by modifying or adding safety precautions to devices currently in use. The organization 5 Star Stoves, for example, has developed a two plate gasification stove that burns more efficiently reducing the number of particulates emitted into the environment making it cleaner and less likely to cause respiratory illnesses (Seed, 2016). The stove has an added safety feature that causes the stove's flame to extinguish if it is tipped over which reduces the risk of fires spreading in the event of an accident (Shezi, 2016). Another organization called Kevin's Kandles has taken a similar active approach to address the issue of fire. According to Kevin Dawson, the founder of Kevin's Kandles, candles are one of the leading causes of fires because they can be easily knocked over or burn through their bases if they are forgotten about (2016). The Kevin's Kandle does not because it does not burn like a traditional candle. The Kevin's Kandle consists of a small glass filled roughly two thirds full of water. On top of the water sits a half inch of vegetable oil used for fuel. The Kevin's Kandle wick sits on top the vegetable oil. The water in the bottom of the glass works as a self extinguishing safety device that extinguishes the flame once all the vegetable oil is consumed or the Kandle is knocked over. Inventions such as these do improve the safety of informal settlements because they reduce the risk of fire, however, they do not provide any security when a fire does occur.

### Passive Solutions

Other companies and organizations have taken a more passive route to preventing the spread of fires. Instead of working to actively reduce the spread of fire these organizations have worked to protect homes from the spread of fire once one has ignited. These measures have included: coating homes with fire resistant paint, constructing homes from fire resistant materials, restructuring the layout of neighborhoods, and removing the need for candle light by installing solar powered lights with a smoke detector.

One method of passive fire protection is fireproofing the homes either through fire retardant coatings or constructing the homes from fire resistant materials. A study on the properties of shungite nanopowder was conducted to examine the possibility of using fire resistant paint to reduce the risk of house fires (Sergeevna, 2013). The study focused on the conductivity levels of shungite, a mineral that is almost 100% carbon, and how paint containing shungite reacted to extreme heat (Sergeevna, 2013). The paint successfully insulated the materials tested (Sergeevna, 2013). Another study, performed by Harun Tanyildizi, looked at methods to increase the fire resistance capacity of concrete (Tanyildizi, 2013). Tanyildizi concluded that adding the polymorph silica fume to concrete greatly increased the concrete's strength and heat resistance. Houses constructed from this special concrete would be more structurally sound and fire resistant (Tanyildizi, 2013).

# Global Settlement Fires

## Organization of Homes

Insufficient space between buildings is a major risk to the spread of fires in settlements. A study analyzing the impact of fires on New York City communities concluded that increasing the distance between buildings reduced the risk of fires significantly (Wallace & Wallace, 2011). During the 1970's, planned cutbacks in fire departments resulted in more fires spreading out of control (Wallace & Wallace, 2011). The number of disastrous fires could have been reduced had the buildings not been constructed so close together. Low income urban communities in South Africa have high population densities, increasing the risk of devastating fires.

In South Africa many informal settlements are often too dense to install utilities properly. Consequently, water services are only installed on the edge of these settlements (Fieuw and Hendler, 2014). Emergency response teams are located outside most communities and have difficulty navigating into communities to address fires (Prinsloo, 2015). In order to resolve this problem many organizations such as Slum Dwellers International have worked to re-block or reorganize the informal settlements to reduce the spread of fires and allow for the proper installation of utilities.



**SDI**  
SHACK/SLUM DWELLERS  
INTERNATIONAL

Figure 7: Shacurity Products



(LeadSA, 2014)

While most devices fall into either the passive or active fire protection category some devices use aspects from both categories in an attempt to provide more overall security. The company i Power SA has developed a product called Shacurity that falls into this category. The Shacurity product consists of a solar panel, two LED lights, a recharging outlet, a smoke alarm and a fire extinguisher (LeadSA, 2014). The solar powered lights and the fire extinguisher provide active fire protection to informal settlements because they reduce the dependence on fire induced lighting such as candles and provide the homeowner with proper technology to put out small fires before they becomes disastrous. On the other hand, the smoke detector provides the settlement with passive fire protection because it will sound an alarm in the event of a fire which will allow the homeowner to take the necessary actions to eliminate the fire.

# Lumkani

Figure 8: Lumkani's Heat Sensor



(Lumkani, 2016)

## Lumkani's Solution to Informal Settlement Fires

### About the Company

*Lumkani*, a isiXhosa word meaning “be careful,” is a start-up organization based in Cape Town, South Africa, that aims to minimize the spread of fires in informal settlements through in-home heat detector networks (Lumkani, 2016). The organization was founded by Samuel Ginsberg, François Petousis, Paul Mesarcik, Emily Vining, Max Basler and David Gluckman (Eastaugh, 2016). The current sensor design (see Figure 8) and features are the result of feedback from the community and Lumkani's desire to continue improving (Mesarcik, 2015).

### About the Sensor

The heat detector, which runs for multiple years on a single AA battery, is triggered by a rapid increase in temperature. Since the device is triggered by smoke and not heat, it will not interfere with everyday cooking and heating, but will effectively activate in the case of an actual fire (Mesarcik, 2015). Once triggered, it notifies all detectors within a 60 meter radius of the danger (see Figure 9), enabling a community to respond to the threat (Lumkani, 2016). In 2013, Lumkani developed a

separate device that communicates with the in-home devices to record the general Global Positioning (GPS) coordinates of a fire, and sends text message alerts to nearby residents (Lumkani, 2016). In the future, Lumkani plans to send these GPS coordinates to municipal emergency response personnel to improve response times to fires (Mesarcik, 2015).

Figure 9: Lumkani's sensors alert nearby homes



(Indiegogo Lumkani, 2016)

# Lumkani

## Lumkani's History

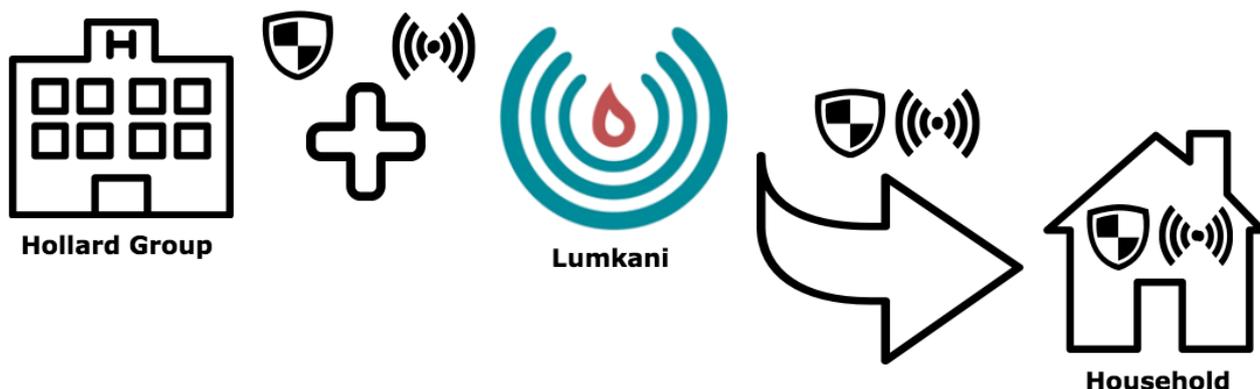
The idea of Lumkani stemmed from an honors thesis written by François Petousis while attending University of Cape Town's Business School (HR Future, 2014). With help from the Student Social Venture Program at the university, the project (then known as *Khusela*, meaning "to protect") entered the Global Social Venture Competition at University of California, Berkeley. The group placed in the top five, and won the People's Choice Award (HR Future, 2014). This was just one of many awards they have gone on to win. By raising the necessary funds and partnering with organizations such as the Community Organization Resource Centre, Lumkani began selling devices for 10 USD in order to install them in thousands of homes (Field, 2015). Lumkani has already prevented multiple settlement fires and is looking to make its product more affordable (Eastaugh, 2016).

## Lumkani's Original Funding Model

Lumkani's original business model involved obtaining funds from external sources via crowdfunding, awards, and donations. Through Indiegogo, an online crowdfunding platform, Lumkani raised 96,607 USD, roughly double its initial goal (Lumkani Indiegogo, 2015). Lumkani used the extra funds to "get more detectors to more households" and increase their impact (Global Innovation Exchange, 2015). According to Joachim Hemer, author of *A Snapshot on Crowdfunding* (2011), crowd funding is most successful when only a small amount of seed money is needed to get the project off the ground. Hemer specifically discusses technology based start-ups and draws the general conclusion that "crowdfunding cannot replace traditional sources of entrepreneurial finance, particularly not in the later stages" (Hemer, 2011). While Lumkani's success in this campaign was a great initial funding method, counting on crowdfunding and donations is not a sustainable long-term business plan.

## Lumkani & Hollard Group Partnership

Figure 10: Lumkani's current insurance and device bundle model



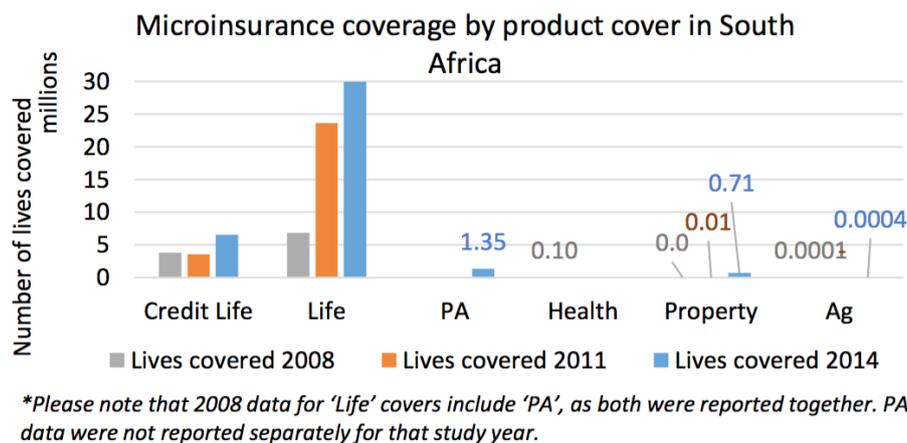
Funding devices through crowdfunding, awards, and donations worked well, but Lumkani wants to use alternative marketing methods to reach more residents. In 2016, Lumkani partnered with Hollard Group to offer insurance to residents. This partnership allows Lumkani to sell household insurance bundled with heat sensors directly to residents (Figure 10). This combination is mutually beneficial because the risk of an insurance payout is decreased when the sensors are installed. Lumkani and Hollard Group have established small shops that sell insurance directly to residents in several informal settlements in Johannesburg, South

Africa (Mesarcik, 2016). They gather information about the location, interior, and exterior of homes using a smartphone application, in order to appraise the value of the homes. Customers then pay a monthly premium to receive the device and insurance coverage. As long as customers pay for the insurance they get a Lumkani fire sensor installed in their home. In the event of damages, Hollard Group handles all claims covered by the insurance. According to Lumkani, this model is the first of its type in the world.

## Micro-Insurance

Insurance companies selling to low-income communities, like Hollard Group and Lumkani, are participating in what is known as “micro-insurance.” The South African National Treasury (2008) defines micro-insurance as, “insurance accessed by or accessible to the low-income population” and specifies that it must be available from a variety of providers who follow “accepted insurance practices” (SA NT, 2008). In a report on micro-insurance companies in Africa, the Microinsurance Network (2015) identified property insurance as coverage for damage to homes, personal property, and other assets. A financial service company called Lloyd’s identified fire as one of the risks that property insurance covers, and claimed that low-income households are in places with “higher exposure to natural hazards” (Lloyd, 2009). A partnership between a property insurance provider, Hollard Group, and a company trying to reduce fires, such as Lumkani, is mutually beneficial.

**Figure 11: Micro-Insurance in South Africa**



(Micro-Insurance Network, 2014)

## Benefits from Partnership

Lumkani and Hollard Group’s partnership benefits both organizations as well as the low-income residents. Customers of the insurance and device bundle will have a warning system and protection in case of damage to their property. Business professors Joseph Akotey and Charles Adjasi (2015, p. 373) note that, “[low-income] insured households have lower levels of asset inequality than uninsured households” and that “the long-term [benefit] of the avoidance of asset loss... [is] sustained poverty reduction.” Residents who have insurance will have an easier time gaining assets (Adjasi & Akotey, 2015). In the past, insurance companies often avoided low-income communities because of lack of data, higher risks, and irregular payments (Lloyd, 2009). While Lumkani’s sensors only address fire risks, costs saved by claim reduction could make these packages more financially feasible for insurance companies. Lloyd’s report titled “Insurance in Developing Countries” (2009, p. 11) identified “1.5 to 3 billion potential policies” that could be offered to low-income residents. When exploring the challenges of selling micro-insurance Lloyd concluded that while, “[current] profits are modest... there is the potential for significant returns in the future” (Lloyd, 2009, p. 4). Lumkani’s partnership with Hollard Group will allow them to expand distribution of its devices globally.

## Potential Issues with Partnership

The benefits of this partnership are extremely promising for Lumkani, but there are some drawbacks to consider. According to studies conducted by the Microinsurance Network, as of 2014, 64 percent of all people in South Africa had some type of micro-insurance, but only 1.3 percent of South Africans had property coverage (Figure 11) (Microinsurance Network, 2014). With such a low percentage of the population purchasing property insurance, it may be very difficult for Lumkani to find residents who are interested in the insurance. Another concern is that fires are not the only risk to residents’ assets. A report titled “Insurance for the Poor?,” noted that in poor neighborhoods theft is a constant threat to assets, and policy protection is limited or absent (Dercon, Bold, & Calvo, 2008, p. 9). Since Lumkani’s devices do not affect the risks of theft, insurance premiums may still be too expensive for many residents (Lloyd, 2009).

# Lumkani Micro-Lending Model

## Potential Lumkani Micro-Lending Model

Lumkani wants to pursue new customers or partners for its insurance and device bundle that would maximize distribution in urban areas with informal homes around the world. Lumkani hopes to expand its products internationally using these partners. These customers would be organizations that are directly affected by fires and currently interact with residents of fire prone communities. Micro-lenders, micro-finance institutions that lend to people with low-incomes, rely on the financial stability of residents for their business. Figure 12 shows that without Lumkani's protection both the resident and lender suffer. A micro-lending partnership is beneficial to Lumkani, micro-lenders, and residents.

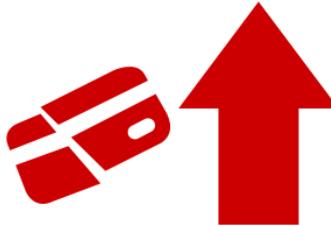
Figure 12: Mutually Beneficial Micro-Lending Model



### Without Lumkani Protection



Fire risk for residents



Default risk for lenders



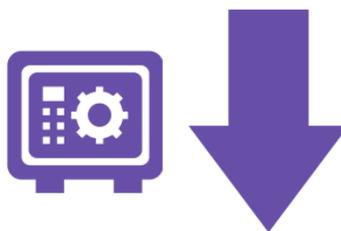
Credit costs for residents



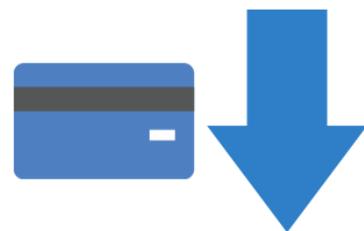
### With Lumkani Protection



Fire risk for residents



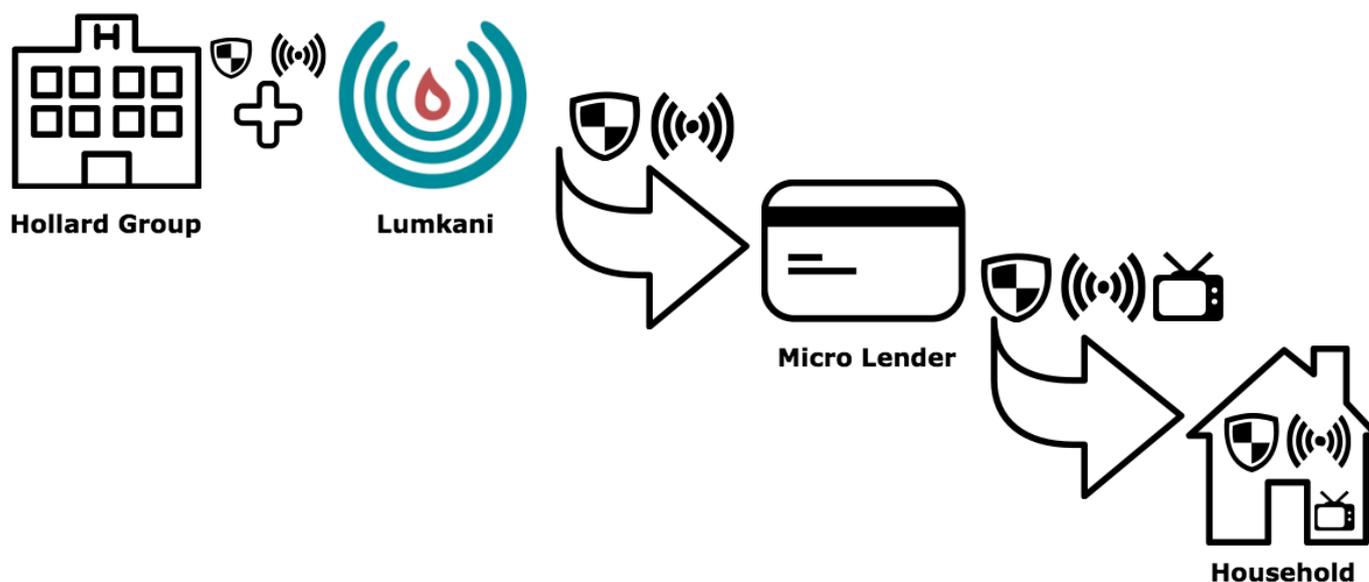
Default risk for lenders



Credit costs for residents

# Lumkani Micro-Lending Model

Figure 13: Potential Micro-Lender Marketing Model



Lumkani's insurance bundle might make hire-purchase agreements cheaper for customers, drawing more business to a retailer, or reduce the default risk of the loan for the retailer (Figure 13). In the event of a fire Lumkani's insurance provider, Hollard Group, would handle all claims paying back the credit provider and then the customer, as required by the South African National Credit Act of 2015. This model could be adapted so that if credit recipients can show they have Lumkani's coverage, the micro-lender would allow them to refinance their existing loans and receive discounts when purchasing new items.

## Consumer Credit Insurance

Lumkani and Hollard Group's insurance could act as a type of Consumer Credit Insurance (CCI). CCI is insurance that consumers purchase to protect their credit payments. This protects consumers by covering loan or credit payments in the event of unemployment, illness, injury, or death (South African National Treasury, 2014). CCI also adds protection to creditors lending to people with extremely low incomes or high risk. While this is a useful form of protection for the lenders, it is often criticized as unfair to consumers. The South African National Treasury (NT) and Financial Services Board (FSB) produced a report titled "The Consumer Credit Insurance Market in South Africa" (2014) which found that many CCIs lacked transparency in their costs, held high premiums, and offered coverage that varied from the needs of the consumers (SA NT, 2014). KPMG, a professional service company focusing on finances, believes that in order to "regain trust," financial institutions must "build new relationships with

both customers and regulators" (KPMG, 2014, p. 3). Lumkani's insurance bundle with Hollard could act as a type of CCI insurance that protects the customer and the lender.

## Benefits

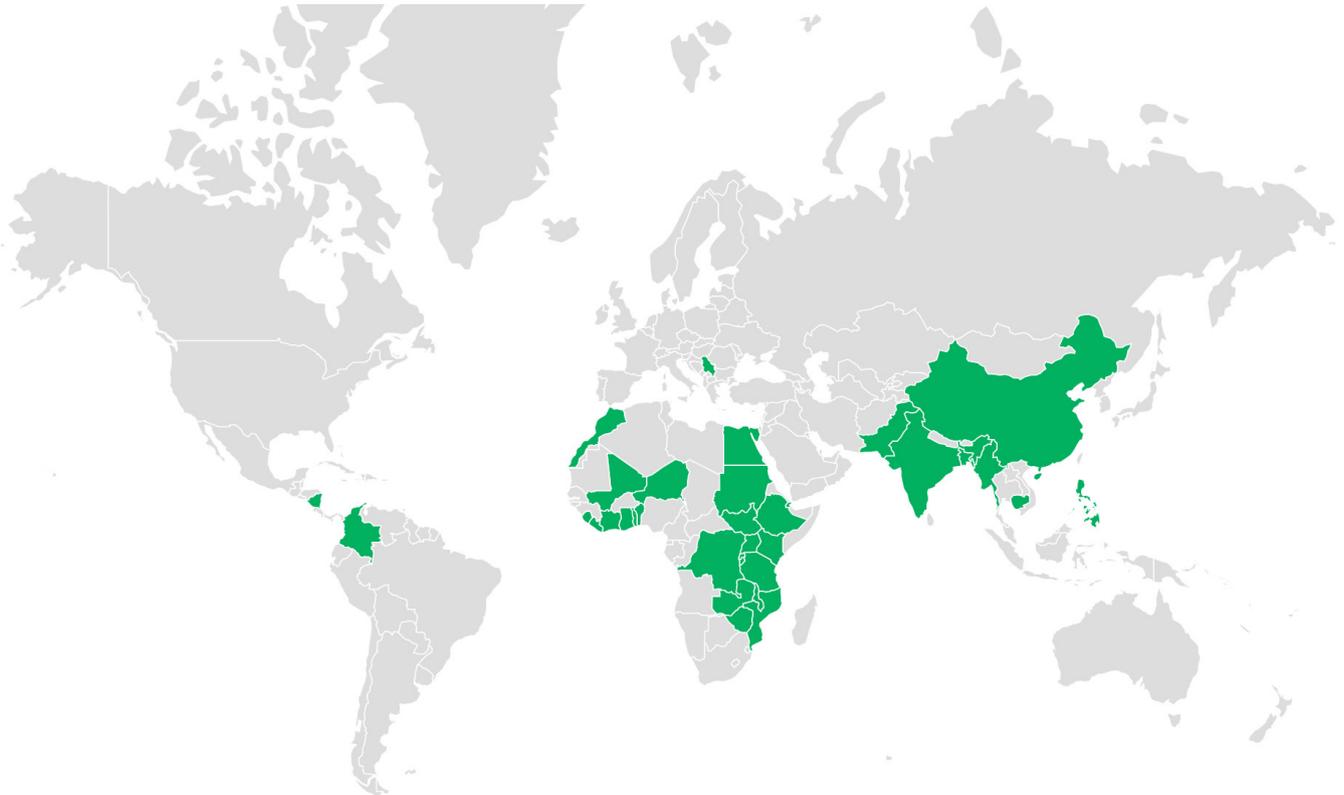
This new marketing method is based on the principle that micro-lenders are interested in purchasing insurance to protect their loans. Micro-lenders commonly require insurance or offer some of their own. This ensures that if the loan is not paid back by the consumer, they still receive a full payment (Ranyard & McHugh, 2012). Many consumers without property insurance who lose their assets in fires will not have enough money to continue paying off their loans. Lumkani could sell its insurance and devices to micro-lenders, who would provide the sensors to residents. This arrangement would get sensors into low-income homes and help to ensure that the micro-lenders are at less risk of customers defaulting on loans. This distribution method has the added benefit of targeting residents who might not be considering purchasing insurance.

## Drawbacks

The model breaks down if the benefits of the special bundles are not successfully communicated to the micro-lender salesperson (Warren, Varney, & Horwath, 2014). This complexity may make this difficult to establish with partners and adds "third-party risks [which] are often among those overlooked" in business arrangements (Warren et al., 2014).

# Global Micro-Lending

Figure 14: Global Micro-Lending by NGOs



Countries where loans and credit are offered by major NGO micro-lenders are highlighted in green.

## Non-Government Organizations

A potential group of partners for Lumkani are non-government organizations or NGOs. Relationships between NGOs and private corporations can be highly beneficial for both parties involved. Each partner provides a different set of strengths that can fill gaps in the other's business model and allows for the development of unique and effective business models that otherwise would have been unattainable by either party (Dahan, Doh, Oetzel, & Yaziji, 2010). Expanding into a new market is a complicated process especially in markets located in developing countries. Using existing marketing strategies are often not feasible and companies must often redesign their process in order to make a profit (Dahan et al., 2010). However, NGOs often have access to the information necessary to make these changes because they have a deeper understanding of the social problem and a readily available client base (Dahan et al., 2010).

Partnerships between NGO's and corporations can typically be classified into three types relationships: limited, partial, and total collaboration. In the first case, both parties have independent business models that can be carried out independently. In the second relationship both parties have incomplete or partial business models that, when combined, create a working model that is beneficial for both partners. In the third case, neither party has an existing business model, and the two partners work together to develop a model that creates a profit for the corporation and allows the NGO to deliver "impactful social value" (Dahan et al., 2010, p. 330). Lumkani would benefit most from a partnership in case one or two with NGOs that either provide micro-credit in areas with high fire risk or have a mission that aligns with Lumkani's. An NGO with an existing business model will have an existing customer base and a better understanding of the social factors that influence the market environment, which will allow Lumkani to sell its product without too much initial setup.

# Case Study

## Distributing Oorja Stoves through NGO and Commercial Sector Collaboration

Non-government organizations provide assistance for a host of different issues using a variety of different methods. One effective method is by forming a relationship with a for profit corporation such as a social enterprise. A prime example of the effectiveness of this relationship is the partnership between the social enterprise First Energy and the NGO Swayam Shikshan Prayog to distribute cookstoves in India after a program run by the Indian Government was unsuccessful.

### Stove Distribution

Wood and biomass cook stoves are used for cooking in homes all across India and the world (Hanbar & Karve, 2002). In India alone, roughly 120 million households rely upon wood burning cook stoves (Thurber, Phadke, Nagavarapu, Shrimali, & Zerriffi, 2014). However, this type of stove is a major contributor to pollution, deforestation, and health complications (2002, Thurber et al., 2014). It is estimated that wood fueled cookstoves are responsible for over four million premature deaths every year (Thurber et al., 2014). Hanbar and Karve (2002) claim that the Indian government started the National Programme on Improved Chulha (NPIC) in 1984 as an attempt to improve the health and well-being of Indians and mitigate the deforestation problem by providing poor communities with cleaner more efficient cook stoves. By 2001 the program was able to deliver stoves to 32.77 million homes or roughly 27 percent of the potential customers (Hanbar & Karve, 2002).

Although the program delivered millions of stoves, and the stoves addressed the problems of efficiency and cleanliness, the organization did not account for the cooking styles and habits of the customers. As such, the stoves were not widely accepted (Jue, 2011). In addition, According to Diana Jue (2011) of the Stanford Social Innovation Review, the stoves were handcrafted by artisans on location which meant distribution was slow and cumbersome. The government agency in charge of overseeing the project also had no accountability for poor performance, and did not develop quality control or user education programs (Jue, 2011).

In contrast, during the early 1980's the Chinese government developed a similar program with the goal of delivering cleaner cook stoves (Smith & Keyun, 2010). However, because this program utilized the availability of corporations, it was more successful in distributing

the stoves. In approximately 10 years the program distributed over 130 million stoves (Smith & Keyun, 2010).

Figure 15: Oorja Stove



(Pandey, 2011)

With the discontinuation of the NPIC, many experts in the donor field felt that the distribution of the stoves would be greatly improved by taking a commercial approach to the problem either through strictly for profit corporations or social enterprises with charitable elements; one such corporation that has been successful is First Energy, which helped distribute over 400,000 Oorja stoves in India between 2006 and 2010 (Thurber et al., 2014). According to Mark C. Thurber (2014), Associate Director at Stanford University, First Energy partnered with local NGO's to develop a unique distribution model that helped streamline the production process. Instead of trying to develop a customer base themselves, First Energy used the existing customer base from the NGO Swayam Shikshan Prayog (SSP) to quickly enter the market; the employees at SSP worked as sales representatives distributing the stoves to inaccessible communities. As the market for Oorja stoves continued to grow First Energy's network expanded to include network managers and maintenance support, further improving First Energy's distribution and sales rates (Thurber et al., 2014).

The limited success in the NPIC program shows that stove distribution in India is a complex issue. While some experts argue that commercializing the process will improve distribution, a combination or collaboration of the two sectors may in fact provide the best results. First Energy's commercial orientation allowed it to distribute stoves on the scale that it did, but it was the company's Social Enterprise Instincts and collaboration with NGO's that allowed First Energy to develop such an extensive and successful supply chain (Thurber et al., 2014, p. 139).

# Case Study

## Grameen Bank Providing Credit to Low-Income Women in Bangladesh

### History of Grameen Bank

Grameen Bank was founded by Dr. Muhammad Yunus to provide loans to residents of low-income areas who lacked access to credit. Many people in Bangladesh lacked the capital or credit record needed to receive a loan from a formal bank, forcing them to borrow from local moneylenders at significantly higher interest rates because they were often regarded as too risky (Bernasek, 2003). Dr. Yunus concluded that access to affordable credit was vital to fighting poverty because credit represents a fundamental human right (Jansen & Pippard, 1998). Without the resources to improve economic situation, all other human rights cannot be fully realized (Jansen & Pippard, 1998).

### Focusing on Helping Women

Dr. Yunus realized that providing credit to women in low-income areas was a much larger issue to address because of their lower status in Bengali society (Bernasek, 2003). According to Bernasek, women were often required to defer control of land they inherited to a male relative deemed fit to take care of them and their children (2003). Women also have limited financial capabilities because they are required to have a male relative co-sign and negotiate the terms of any loans they take out (Bernasek, 2003).

### How the Group Loans Work

Grameen Bank focuses on providing loans to women in low-income areas to help bypass these cultural barriers. Women formed groups of five and were jointly responsible for repaying the loans taken out by individuals in the group; this allowed individuals to take on larger loans than they would have by themselves, increasing their financial capabilities and their ability to make positive impacts for their families (Bernasek, 2003). The method of group repayment worked because individual borrowers felt a social obligation to help the other members of their lending groups (Jansen & Pippard, 1998). Several women stated that they would not have felt comfortable participating in the lending program had they taken on loans from Grameen Bank as individuals, further showing the appeal of a group lending approach (Bernasek, 2003). The Bangladesh government gave official recognition to the Grameen Bank in 1983 after 7 years of trial testing in villages across the country (Bernasek, 2003).



### Accomplishments

Increased access to credit and financial backing through Grameen Bank loans has dramatically helped women in low-income areas in Bangladesh. Through Grameen Bank's group lending approach, women were able to receive loans for activities such as raising cattle, raising poultry, and food processing (Bernasek, 2003). Grameen Bank has also increased its portfolio of lending options, allowing borrowers to take out loans for capital projects on their homes, garden irrigation, and seasonal cultivation, activities central to the well-being and quality of one's household (Bernasek, 2003). Poverty rates were found to be lower among Grameen Bank borrowers compared to non-borrowers in certain districts in Bangladesh (Bernasek, 2003). Grameen Bank demonstrated the social and fiscal benefits micro-lending can provide. As a micro-lender, Grameen Bank was able to improve the socioeconomic status and overall quality of life for low-income families.

Grameen Bank revolutionized the way residents of low-income communities could take on loans, and has grown to be one of the largest micro-finance institutions in Bangladesh (Bernasek, 2003). As of 2015, Grameen Bank provided loans to 8.81 million people in Bangladesh (Grameen Bank, 2016). Over 97 percent of Grameen Bank borrowers are women, and the Bank has reported repayment rates on their loans to be above 97 percent (Grameen Bank, 2016). With 2,568 branches, Grameen Bank provides financial services in 81,392 villages, covering more than 97 percent of the total villages in Bangladesh (Grameen Bank, 2016). Grameen Bank has become a staple organization in the world of micro-finance, with similar methods of financial inclusion being implemented in projects in 58 different countries around the world, including the United States, Canada, France, Norway, and The Netherlands (Grameen Bank, 2016).

# Case Study

## Distributing Pureit Water Filtration Devices in India

### Water Filtration is a Large Issue

It is estimated that 783 million people around the world lack access to clean drinking water (Berman, 2009). The consumption of unclean water can lead to cases of diarrhea, a disease that causes 801,000 child deaths every year (CDC, 2015). The World Health Organization (WHO) describes water related diseases, including diarrhea, as the leading cause of death around the world (UN Water, 2013).

### Market for Filters in India

With approximately 1.2 billion inhabitants, India is the world's second most populous country (Tiwari & Herstatt, 2012). The country has experienced a population growth rate of seven percent per year for more than a decade (Tiwari & Herstatt, 2012). Almost 70 percent of the country's population resides in rural areas afflicted with infrastructural shortcomings, including lack of access to filtered water (Tiwari & Herstatt, 2012). According to a survey from the Ministry of Health and Welfare in India, only 10 percent of the Indian population reported boiling their water before consumption (Freeman, Trinies, Biosson, Mak & Clasen, 2012). India ranks first in the world in countries afflicted with diarrheal diseases, accounting for over 386,000 deaths per year (Freeman et al., 2012).

Many people in India lack the financial services needed to save to purchase a water filtration system outright. Private sector and micro-finance institution intervention played a significant role in the development of affordable clean water solutions (Brown, Outlaw, Clasen, Wu & Sobsey, 2009). In 2005, the organization Hindustan Unilever Limited (HUL) entered the world of micro-finance in India with their Pureit water filtration device, attempting to impact the household water-treatment field in the country (Brown et al., 2009). In 2007, HUL partnered with the NGO ACCESS Development Services, a support organization for microfinance institutions (Freeman et al., 2012). This initiative sought to provide microloans to low-income women and self help groups (SHG), so that they could purchase their own Pureit devices. Individual Pureit filters were sold at 1,500 Indian Rupees (RS) (32 USD) at the beginning of the pilot program and provided purification for 1,500 Liters of water. The device's filter would then have to be replaced for an additional RS 350 (7 USD) (Freeman et al., 2012). More than two thirds of SHG members who purchased Pureit devices reported

Figure 16: Pureit Water Filter



needing replacement filters, but continued to use the device anyway (Freeman et al., 2012), which resulted in not all water being purified.

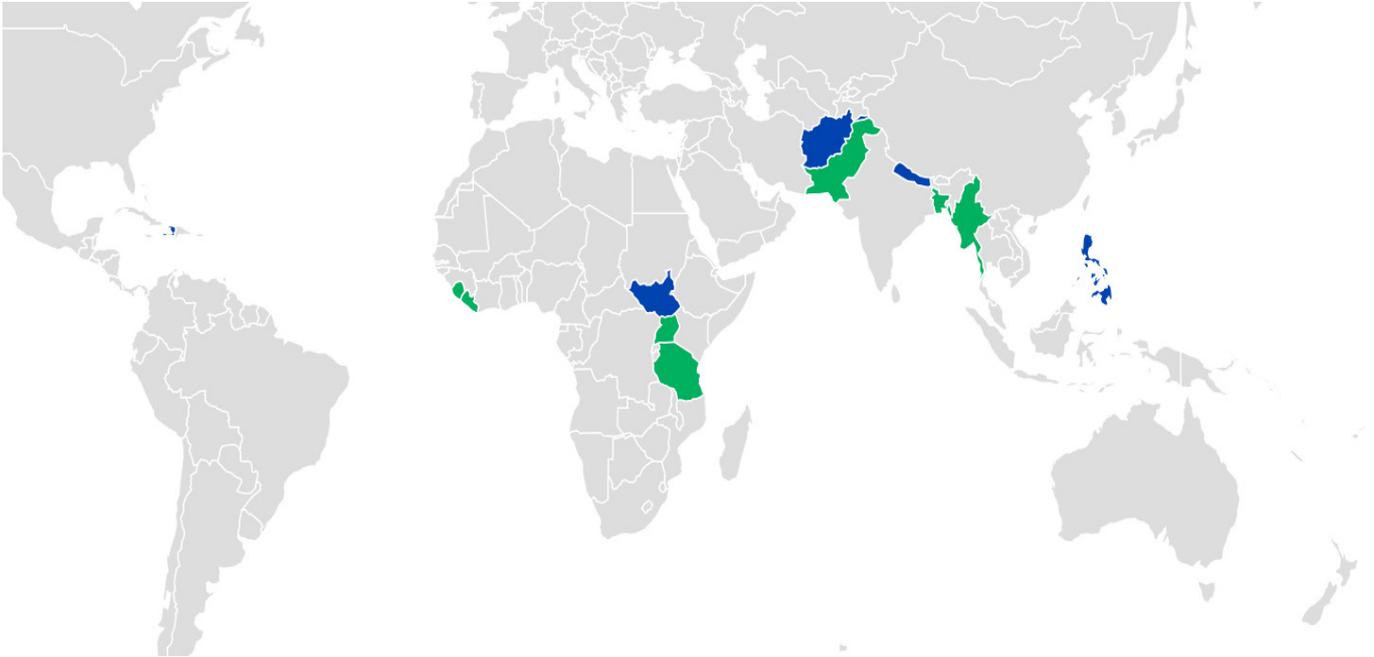
### Results of the Micro-Lending

The pilot program had varied success in providing Pureit filters to SHG members in India throughout its duration. Despite bad history regarding micro-lending to SHG members in India, the HUL pilot program attained almost 100 percent repayment on loans given for Pureit filters, with interest rates from 12-18 percent and 3-12 month loan periods (Brown et al., 2009). As of June 2009, eleven different ACCESS MFI partners recruited 262,353 members to participate in the pilot program (Freeman et al., 2012). However, only 6,556 Pureit filters had been sold to 9.8 percent of total participants (Freeman et al., 2012). The pilot program determined that targeted lending practices of MFIS would present a viable way of providing clean water to low-income residents, considering that 83 percent of households that purchased Pureit filters survived on a daily income of under 3 USD (Brown et al., 2009). Overall, the HUL and ACCESS pilot program had limited adoption, but the loans were successfully paid by clients showing that the lending strategies worked.

# Global Micro-Lending

## Building Resources Across Communities (BRAC)

Figure 17: Global Impact of BRAC



*BRAC operates in the blue and green highlighted countries. Green indicates micro-credit is offered (BRAC, 2016).*

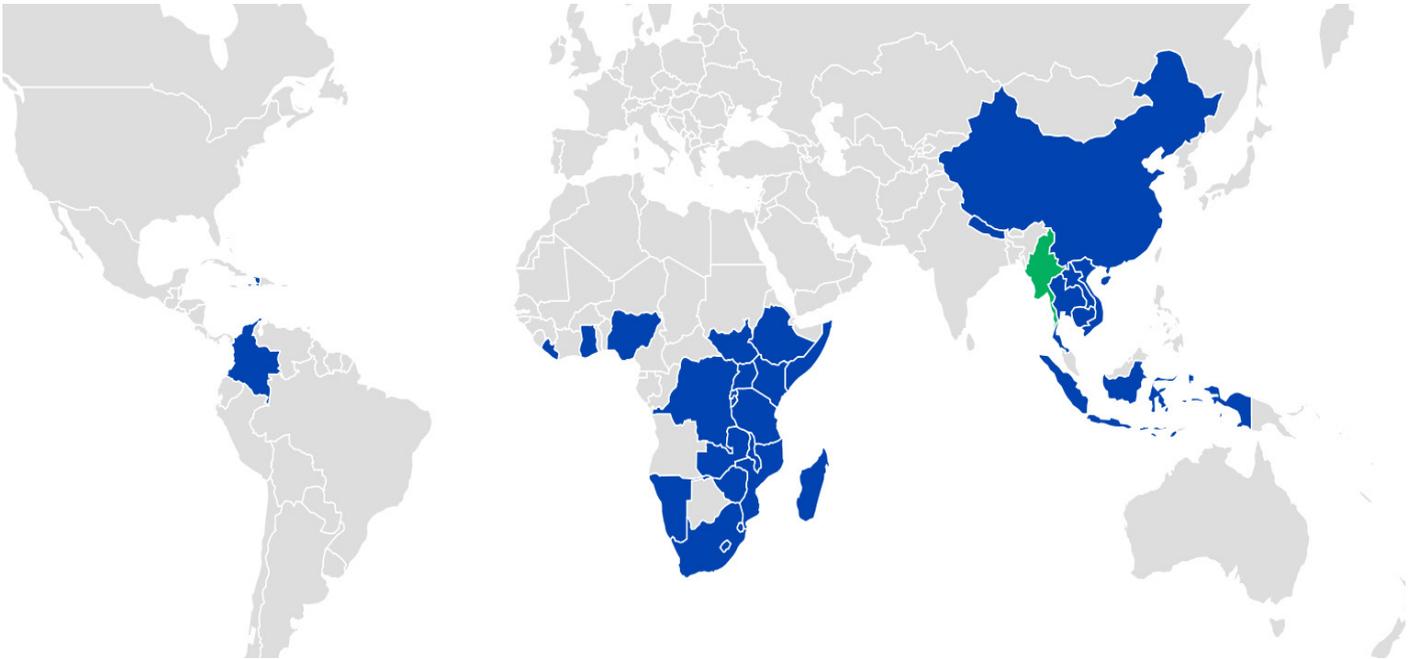
### About BRAC

Building Resources Across Communities (BRAC) is an NGO that started in Bangladesh with the goal of improving the lives of those living in poverty. It is the largest developmental organization in the world in terms of employees and people served; it claims to interact with one in every 55 people on the planet (BRAC, 2016). Most of the loans it offers involve women and entrepreneurs specifically. However, as shown in Figure 17, BRAC offers micro-finance loans to residents of Bangladesh, Pakistan, Sierra Leone, Uganda, Liberia, Tanzania, and Myanmar (BRAC, 2016). A large percentage of the urban population in these countries live in slums (The World Bank, 2016). In 2015, BRAC piloted a program that provided emergency loans to almost 300 households in flood prone areas (BRAC, 2015). BRAC showed a willingness to address residents faced with natural hazards.

# Global Micro-Lending

## Pact

Figure 18: Global Impact of Pact



*Pact operates in the blue and green highlighted countries. Green indicates micro-credit is offered (Pact, 2016).*

### About Pact

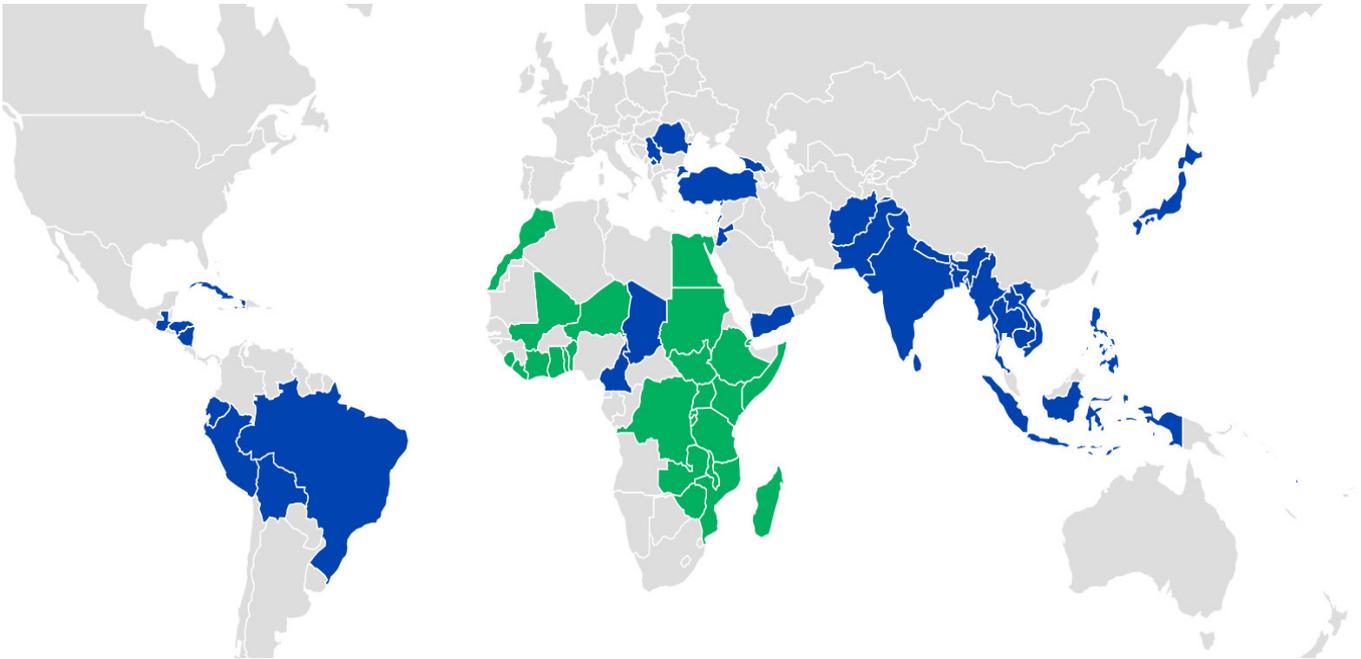
Pact is an NGO founded in 1971 that works to provide poor and marginalized people with healthy dignified lives and the ability to effectively and sustainably use the resources around them (Pact, 2016). Pact believes that change is most effectively brought about through local solutions. As such, it works to accomplish its mission by strengthening the capacity of local organizations and developing governance networks (Pact, 2016). As can be seen in Figure 18, Pact is involved in programs across the globe in over thirty countries. Currently Pact only has micro-finance programs set up in Myanmar, where it is one of the largest emerging micro-finance programs (Pact, 2016). In 2014 alone, the program provided over 255 million US dollars in loans, with a repayment rate of 99.31 percent (Pact, 2016). With the success of the micro-finance program in Myanmar, Pact is looking to expand into other countries.



# Global Micro-Lending

Cooperative for Assistance and Relief Everywhere (CARE)

Figure 20: Global Impact of CARE



*CARE operates in the blue and green highlighted countries. Green indicates micro-credit is offered (CARE, 2016).*

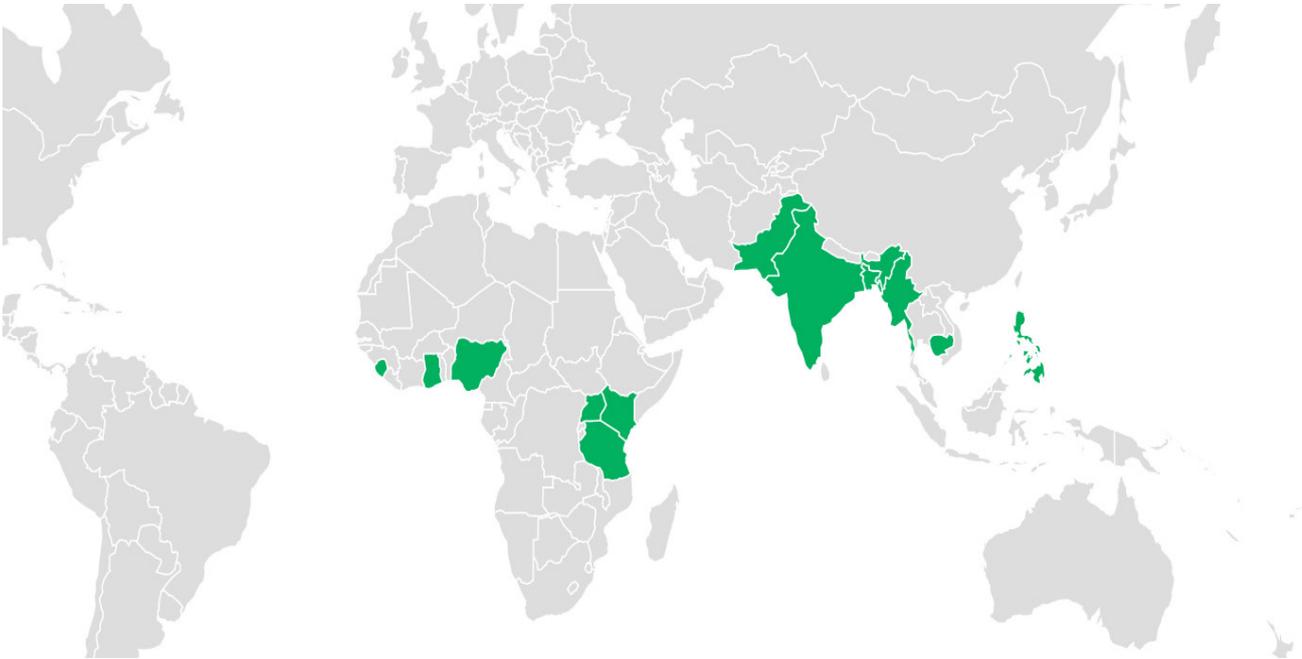
## About CARE

Cooperative for Assistance and Relief Everywhere (CARE) is a global NGO that focuses on development and disaster relief projects, and works to save lives and end poverty in developing countries around the world (CARE, 2016). CARE works globally to provide economic opportunities to poor communities, including micro-loans and self-help programs. In 2013, CARE served 97 million people through 927 poverty fighting projects in 91 different countries (CARE, 2013). The organization's Village Savings and Loans Associations (VSLA) are structured to allow community members to meet in groups every week to deposit money into an internal loan fund (Maes, 2007). VSLA members may then take short-term loans from this fund, with interest rates ranging between 5-10 percent per month (Maes, 2007). VSLA programs have been widely successful helping over 5 million people in 35 countries across Africa, see Figure 20, with a loan repayment rate of 99 percent (CARE Economic Development, 2016).

# Global Micro-Lending

## Association for Social Advancement (ASA)

Figure 21: Global Impact of ASA



*ASA offers micro-credit in green highlighted countries (ASA, 2016).*

### About ASA

Association for Social Advancement (ASA) is one of the largest micro-finance institutions in Bangladesh. Its mission is to provide low-income people with a better livelihood and the means to escape poverty (ASA, 2016c). ASA's primary focus is micro-finance, micro-credit, and insurance (ASA, 2016c). ASA offers primary loans ranging up to BDT 70,000 (886.31 USD) over 12 months, and special loans ranging from BDT 71,000 to BDT 10,000,000 (898.97 to 126,615.50 USD) over 30 months (ASA, 2016b). One of the unique aspects of ASA is their insurance program. For 0.3 percent of the loan, clients can purchase insurance that will cover their loan in the event of their death (ASA, 2016a). Since 2010, the loan repayment rate has been above 99.5 percent (ASA, 2015). Recently, ASA has expanded their programs to include healthcare for poor individuals, education programs to lower dropout rates in primary schools, agricultural support, and sanitation programs to provide the poor with more resources (ASA, 2016c).

In 2007, ASA developed another program called ASA International (ASA International, 2016). The mission of this program is to develop micro-finance institutions in heavily populated urban areas across Asia and Africa that follow similar procedures as the ASA program in Bangladesh (ASA International, 2016).

# Modeling South African Lenders

## Economic Model

### Interest Rate Income

To demonstrate the value of Lumkani's product, we generated economic models that estimate savings for potential partners. The following equation was produced by The Consultative Group to Assist the Poor (CGAP) to calculate the income from a loan (Rosenberg, 2013). This equation indicates the interest income needed to balance expenses and make a profit (Rosenberg, 2013).

$$\text{Income from Interest} = (\text{Loan Loss Expense}) + (\text{Costs of Funds}) + (\text{Operating Expense}) + (\text{Profit})^1$$

The expenses and costs in this equation account for ways a company loses or spends money to provide loans. As the expenses and costs increase, lenders must increase their interest rates in order to make a profit from the loan. High-interest rates determined by these factors have been criticized due to the struggle it can cause low-income customers (Rosenberg et al., 2015). Low-income borrowers with high default risks increase the Loan Loss Expense value, making a lender charge them higher interests rates to maintain profits.

### Using the Model to show Benefits of Partnership

The benefit of Lumkani's product is that it saves the lender money and reduces the total default risk. Since the loan is insured, the risk of default caused by fire is eliminated, thus removing the cost of fire from the Loan Loss Expense value. Lumkani's product completely protects lenders from fires because the lender is paid for the loss by the insurance company as required by the National Credit Act of 2015 (South African National Treasury, 2015).

### Calculating Expense of Fires for Lenders

Expected monetary value (EMV) is a key tool used in quantitative risk analysis that helps quantify risks, such as the risk of fire in informal settlements, as expenses (Sharma, 2015). The expected monetary value calculation used in this model is dependent on Fire Loan Default Percentage, Loan Default Loss, and the Number of Loans.

$$\text{EMV} = (\text{Loan Default Fire Risk \%}^2) \times (\text{Loss from Default}) \times (\text{Number of Loans})^3$$

#### Equation Notes:

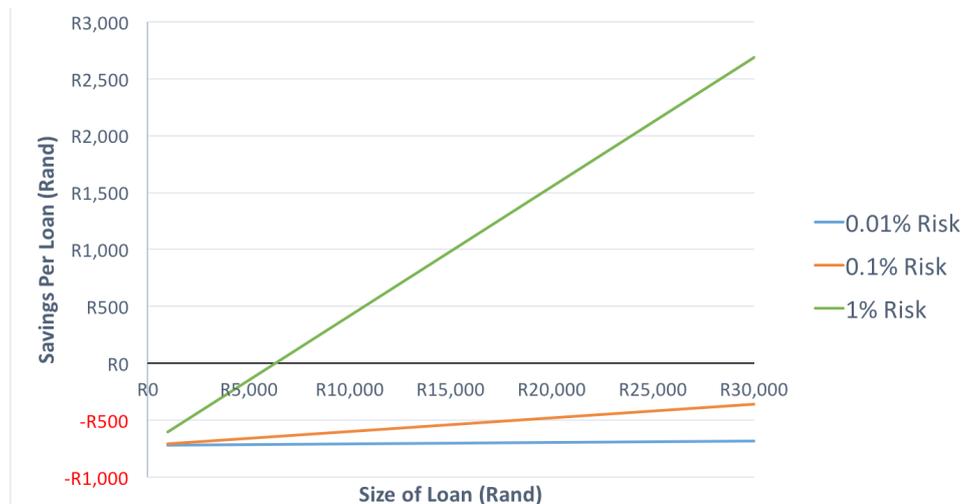
1. Income from Interest is the income generated from the interest rates the company charges with loans. Loan Loss Expense is the money lost to borrowers failing to make repayments. The Costs of Funds represents the expenses of acquiring the necessary capital to fund all of the loans an organization provides. Operating Expenses would encompass all overhead costs including supplies, travel, collection, and salaries (Rosenberg, Gaul, Ford, & Tomilova, 2015). Profit is the difference between income and expenses for the micro-lender. The Interest Income variable is dependent upon the other variables.

2. Loan Default Fire Risk percentage is calculated by taking the percent risk of a fire in a given month, P, and finding the risk a fire will not occur, 1 - P. To find the odds a fire will not occur during all the months the loan is offered this value is multiplied by itself for each month. This makes the probability that no fires will occur, (1 - P)<sup>n</sup>, where n is the number of months the loan lasts. Finally, to find the probability of at least one fire this value must be subtracted from 1. This leaves us with: Loan Default Fire Risk % = 1 - (1 - P)<sup>n</sup>

3. Loan Default Fire Risk percentage represents the probability of one or more fires occurring and causing a loan default during the lifetime of a loan, see calculations below for details. Loss from Default represents the average amount a micro-lender will lose when a client defaults on a loan; when data is lacking, this can be estimated as half of the average loan size. Number of Loans is the number of loans offered to the area that has the given risk percentage.

# Modeling South African Lenders

Figure 22: Saving per Loan vs Size of Loan



## Cost of Protecting Fire Prone Borrowers

The EMV equations produce an estimate of the cost from fires that can be eliminated by Lumkani's product. If the costs to insure the fire prone borrowers is less than the EMV value, a potential partner should save money by working with Lumkani. The following equation estimates the cost of the fire protection:

$$\text{Cost of Protection} = (\text{Number of Loans}) \times (\text{Monthly Insurance Cost}) \times (\text{Avg. Loan Length})^1$$

$$\text{Savings for Partner} = \text{EMV Expense} - \text{Cost of Protection}$$

A positive difference between the EMV and Cost of Protection values means that the Loan Loss Expense value of the interest equation will be decreased. Depending on money saved and the mission of the organization, this can either increase profit for the organization or decrease the interest rate for residents.

The projected benefit of a partnership based on this model hinges on a high risk of fires that will lead to loan defaults. Assuming that if a home is destroyed in a fire, the resident will default on their loan, we can use the probability a home is destroyed during a given month to produce an estimated default percentage. Data gathered from South African news articles showed that almost 4,000 shacks were destroyed over the last 18 months, or approximately 220 destroyed homes per month (Gluckman, 2016). The 2011 South African census reported that 1.9 million South Africans lived in shacks (Statistics South Africa, 2011). Based on these numbers, any given shack dweller has approximately a one in 8,600 or 0.012% chance of losing their home to fire every month. While still a high percentage, this number is an underestimate due to unreported fires. The lack of data on the actual risk of fire to a given resident makes it hard to know if this model is effective. Figure 22 shows the savings for a partner as loan size increases for areas with 0.01, 0.1, and 1 percent monthly fire risks. A successful partner needs large loans and a high enough risk of fire to make the cost/savings of the insurance fit their needs. If a lender can target settlements like Masiphumelele, which accounted for 1,500 of the 4,000 destroyed homes (Gluckman, 2016), the fire risk may be enough to make the model extremely beneficial. This model needs a high risk of fire to work, certain partners may be better at reaching these high risk communities.

### Equation Notes:

1. Number of Loans refers to the total number of protected loans, which should only be residents in urban shacks with fire risk. Monthly Insurance Cost is the price of Lumkani's product per month. This includes the device, insurance, installation, and collection. This cost is approximately 60 Rand per month, but is a function of the number of loans advanced because collection costs, 30 percent of the expenses, can be lowered if residents are densely settled. Monthly Insurance Cost is multiplied by the Average Loan Length to determine the cost of protecting a single loan during repayment.

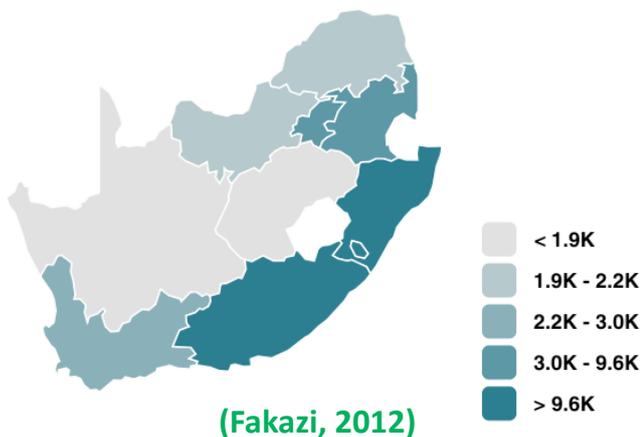
# Modeling South African Lenders

## Housing Micro-Lenders

### About Housing Micro-Lenders

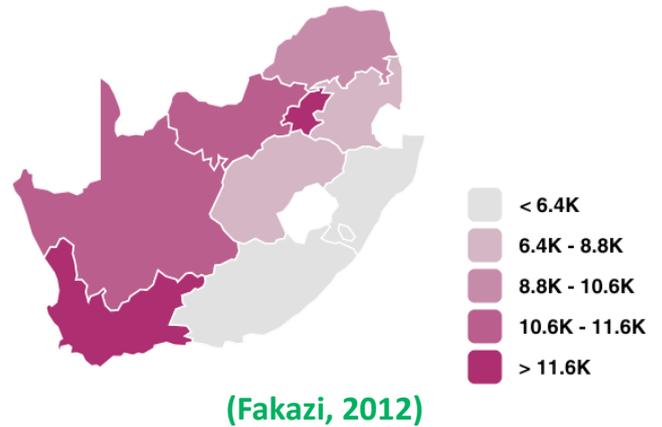
Housing Micro-Lenders (HML) provide credit to individuals looking to buy, build, or upgrade their homes or shelters (Bankseta, 2013). Families in these settlements usually cannot afford a mortgage or an established property, so they build and upgrade their homes as they are able (Bankseta, 2013). However, small loans can make the upgrading process more affordable. South Africa has an estimated urban demand for housing loans of over 13.88 billion rand or 1 billion US dollars (Kihato, 2014). Due to the demand for housing loans, this market could be a great fit for Lumkani to allow lenders to expand their business. Unlike most countries, South Africa uses state funding to support its HMLs (Kihato, 2014). The Rural Housing Loan Fund (RHLF), which is part of the Department of Human Settlements used a network of intermediary lenders to distribute almost 160 million Rand worth of loans in 2012 (Fakazi, 2012).

**Figure 23: Number of Loans from RHLF Intermediaries**



However, loans funded by the government are given “exclusively to employed people with regular incomes”, which excludes the 2.3 million informally employed South Africans (Kihato, 2014, p. 3). The size of loans differ based on the province, shown in Figure 24. The average loan is much bigger on the western side of South Africa, with the largest average loan size in the Western Cape. However, there are more loans given out on the south-eastern shore of South Africa, see Figure 23. These intermediary lenders work with housing supply retailers to offer loans to residents for building

**Figure 24: Average Loan Size from RHLF Intermediaries**



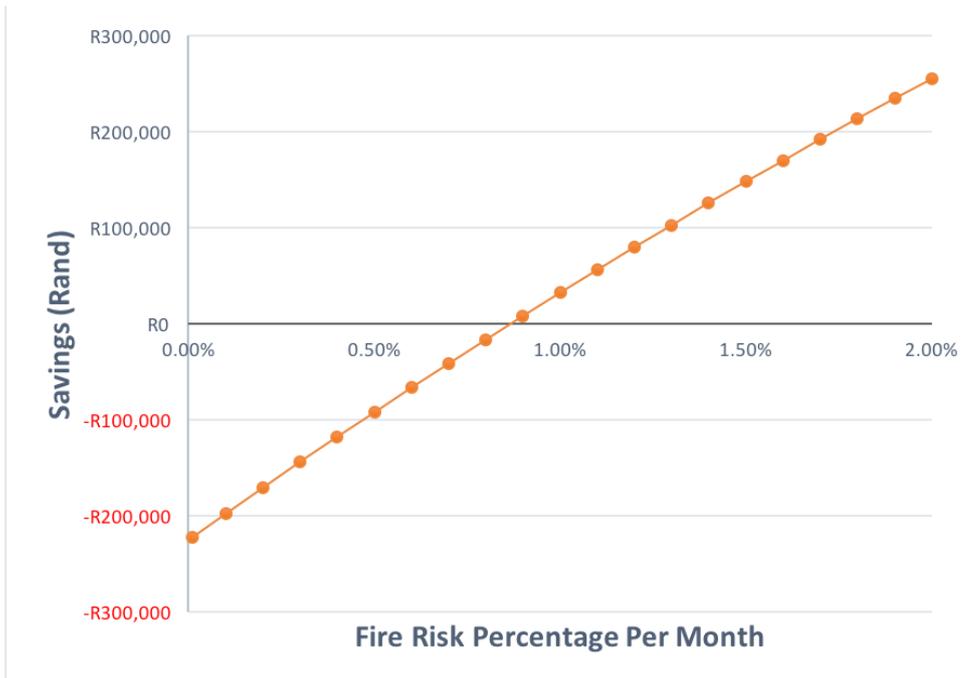
materials and labor (Fakazi, 2012). Residents can apply for loans directly through an HML or at a building supply store that is working with an HML. Loan sizes range from 10,000 to 100,000 Rand (Kihato, 2014). HML’s have a positive impact on many residents, but can be limited by mandates from funding sources, like the RHLF.

### Case: Norufin Housing

Norufin Housing is a developmental credit provider partially backed by the RHLF (Norufin, 2016). Its vision is to provide proper housing to low and medium income residents of rural and urban areas (Norufin, 2016). In an interview, Norufin’s founder and CEO, Sherwell Rakhudu, indicated that while Norufin Housing’s loans are not currently affected by fires, Lumkani’s protection could help them move its lending business into fire prone areas (Rakhudu, 2016). Norufin Housing currently offers most of its loans to rural areas with only 8 percent of its loans coming from informal settlements and 40 percent coming from townships (Rakhudu, 2016). Rakhudu indicated that fires play an insignificant role in Norufin’s current offerings, but showed an understanding that moving into informal settlements would increase that risk (Rakhudu, 2016). Rakhudu expressed enthusiasm about the possibility in developing new partnerships to ensure fire/ loan protection for its clients.

# Modeling South African Lenders

Figure 25: Norufin Savings vs Monthly Fire Risk



## Savings Calculations

$$\begin{aligned} \text{Savings for Norufin} &= ((\text{Fire Loan Default \%}) \times ((\text{Loan Default Loss}) / 2) \times (\text{Number of loans})) \\ &- ((\text{Number of Loans}) \times (\text{Monthly Rate}) \times (\text{Avg. Loan Length})) \end{aligned}$$

$$= ((\text{Fire Loan Default \%}) \times (14,200 / 2) \times 250) - (250 \times 60 \times 15)$$

If Norufin breaks even, Savings for Norufin is 0, and the Fire Loan Default percentage is

$$(1 - (1 - (\text{Monthly Fire Risk}))^{(\text{Avg. Loan Length})})$$

$$\begin{aligned} (250 \times 60 \times 15) &= \\ ((1 - (1 - (\text{Monthly Fire Risk}))^{15}) \times &(14,200 / 2) \times 250) \end{aligned}$$

$$\begin{aligned} (60 \times 15 \times 2) / (14,200) &= \\ 1 - (1 - (\text{Monthly Fire Risk}))^{15} & \end{aligned}$$

$$\text{Monthly Fire Risk} = 1 - (1 - ((60 \times 15 \times 2) / (14,200)))^{(1/15)}$$

$$\text{Monthly Fire Risk} = 0.00899566087 \text{ or } 0.90\%$$

## Modeling Norufin Housing as a Partner

According to the Centre for Affordable Housing Finance in Africa, in 2014 Norufin Housing offered 2,700 loans at an average value of 14,200 Rand (Kihato, 2014). On average, these loans were paid back in 15 months (Kihato, 2014). These values can be plugged into our economic model to get an estimated minimum risk percentage needed in an area to benefit Norufin Housing.

Using our partner savings economic model we found that to make insuring residents worthwhile, monthly fire risk would need to be at least 0.9 percent. If informal settlement residents can be identified by lenders as high risk clients, this model may work for Norufin Housing and similar organizations.

## Other Housing Micro-Lenders

Norufin Housing's micro-lending offerings are similar to those from other HMLs, like Bayport, Lendcor, Elite Group, Izwe loans, Kuyasa Fund, and Mazwe Financial Services, see Appendix A for more details (Kihato, 2014). These groups lend across South Africa, but some focus on certain regions. Kuyasa Fund operates mainly near the southern coast of South Africa, and is looking to expand into the central part of South Africa. Elite group is also somewhat clustered, but in the northeastern part of South Africa. Lendcor, whose business looks similar to Norufin, is active in all 9 provinces. Many of these organization loan to rural areas as part of RHLF funding requirements, but, as seen with Norufin, this does not mean they are not interested in expanding to urban areas.

## About the Interview

We found Norufin Housing in a list of housing micro-finance organizations in a Bankseta report (Bankseta, 2013). We reached out to Maria Titus, whose email was listed on Norufin's website, she responded with the contact information of the company's founder and CEO, Sherwell Rakhudu. Upon emailing Mr. Rakhudu, we set up a time for an interview. As the Chief Executive Officer of the company, we assumed that he would have a good understanding of how the organization worked. The interview was conducted and recorded by Riley McManus and Paul Roberts, after obtaining consent to do so, see Appendix D.

# Modeling South African Lenders

## Retailers offering Hire-Purchase Agreements

### Why do retailers offer micro-finance?

South Africa is the top ranked country in the world for access to credit (The Banking Sector Education and Training Authority, 2013). This is both good and bad for South Africa's economy. It indicates that there are many credit options available and the rights of the customers are protected. However, it also indicates that much of the population is dependent upon credit for survival (The Banking Sector Education and Training Authority, 2013). Ten percent of the 1.4 trillion Rand personal credit market belongs to low-income households earning less than 10,000 Rand a month (The Banking Sector Education and Training Authority, 2013). A high percentage of the population lives around the poverty line. From 2008-2009, 52 percent of the South African population lived below the upper bound poverty line of 2.50 USD (The Banking Sector Education and Training Authority, 2013). Of this low-income market, 74 percent comes from consumption credit accounts (The Banking Sector Education and Training Authority, 2013). Since retailers offer products consumers depend upon, they often offer finance opportunities such as credit cards, loans, and insurance (The Banking Sector Education and Training Authority, 2013). This helps to increase customer bases, improve sales and protect retailers from risk in the event of customers defaulting on loans (Finmark Trust, 2014).

### Types of Retailers

Retail interactions can typically be classified into two categories: short-term and long-term purchases. Short-term purchases often include smaller sums of money and are made more often, whereas long-term purchases often include larger sums of money but are made much less often. Food, housing supplies, and clothes can be classified as short term purchases, while furniture, electronics, and appliances are can be classified as long term purchases (The Banking Sector Education and Training Authority, 2013).

### What are Hire Purchase Agreements?

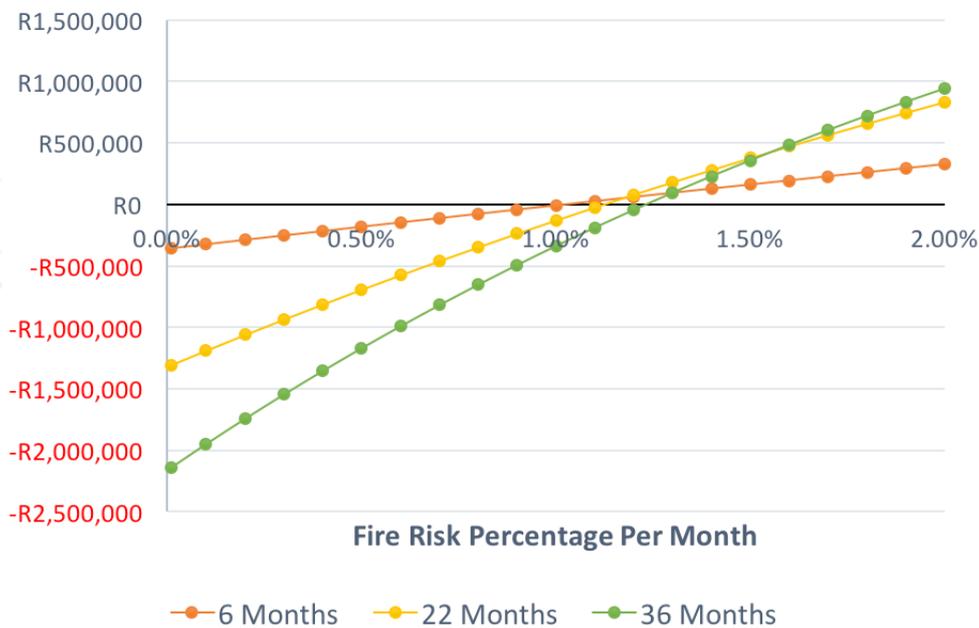
Many retailers offer credit through hire-purchase agreements for customers who cannot afford to buy a product upfront. Hire purchase agreements, or installment sales agreements, are ways buyers can pay for goods over time by paying an initial deposit and then paying monthly installments (Business Dictionary, 2016). The buyer can take the product home, but they do not own it until they have completed all their payments (Business Dictionary, 2016). The total cost of these agreements is higher than buying the product outright with cash, because of interest on total cost (Western Cape Government, 2012). This payment method makes up the majority of sales at major South African retailers like Lewis, JD Group, and Truworths (Finmark Trust, 2014).

### Case: JD Group

JD Group is one of the largest furniture retailers in South Africa. JD Group originally had seven retail brands and over 1000 stores nationwide (Finmark Trust, 2014). JD Group offers its own in-house insurance plan to cover the loans offered (Finmark Trust, 2014). In 2012, JD Group's financial sector accounted for 53 percent of the company's profit, compared to the 21 percent accounted for by the furniture retail sector overall (Finmark Trust, 2014). However, within the past three years, JD Group experienced a slow patch in the micro-credit field that caused them to sell off their financial division which become part of Steinhoff International Holdings (Tarrant, 2016). In 2014, JD group experienced a deficit of 1.923 billion Rand, whereas the year prior JD Group had a profit of 632 million Rand (Fin24, 2014). According to the Senior Manager of Credit Acquisitions, Karabo Moshoeshoe, since the sale, JD Group has been working with Steinhoff to ease out of the micro-finance field in order to focus more on furniture retail (Moshoeshoe, 2016). JD Group plans to condense their retail stores down from 14 brands to only four that will include Bradlows, Rochester, Russels, and Sleepmasters (Tarrant, 2016).

# Modeling South African Lenders

Figure 26: JD Group Savings vs Monthly Fire Risk



## Modeling JD Group as a Partner

There was limited data available about JD Group’s current credit offerings, but their minimum loan length offered is 6 month and the maximum loan length offered is 36 months. Three equations can be made with the minimum, midpoint, and maximum durations, using an estimated loss from default of 12,000 Rand based on trends in other stores. We will also assume 1000 loans will be given out, but this will not affect the equations.

If JD Group offers loans to areas with risks as high or higher around 1.2 percent, see calculations from model, they can save money by working with Lumkani. However, one challenge is that JD Group does not currently have information on which credit recipients live in informal settlements (Moshoeshoe, 2016). This means they risk may not be high enough to justify a partnership.

## Savings Calculations

$$\begin{aligned} \text{Savings for JD Group} &= ((\text{Fire Loan Default \%}) \times ((\text{Loan Default Loss}) / 2) \times (\text{Number of loans})) \\ &- ((\text{Number of Loans}) \times (\text{Monthly Rate}) \times (\text{Avg. Loan Length})) \\ &= ((\text{Fire Loan Default \%}) \times (12,000 / 2) \times 1000) - (1000 \times 60 \times (\text{Loan Length})) \end{aligned}$$

If JD Group breaks even, Savings for JD Group is 0, and the Fire Loan Default percentage is  $1 - (1 - (\text{Monthly Fire Risk}))^{(\text{Loan Length})}$

$$(1000 \times 60 \times (\text{Loan Length})) = ((1 - (1 - (\text{Monthly Fire Risk}))^{(\text{Loan Length})}) \times (12,000 / 2) \times 1000)$$

$$\begin{aligned} (60 \times (\text{Loan Length}) \times 2) / (12,000) &= \\ 1 - (1 - (\text{Monthly Fire Risk}))^{(\text{Loan Length})} \end{aligned}$$

$$\begin{aligned} \text{Monthly Fire Risk} &= \\ 1 - (1 - ((60 \times (\text{Loan Length}) \times 2) / (12,000)))^{(1 / (\text{Loan Length}))} \end{aligned}$$

### Minimum Loan Duration:

$$\begin{aligned} \text{Monthly Fire Risk} &= 1 - (1 - ((60 \times 6 \times 2) / (12,000)))^{(1/6)} \\ &= 0.01025957508 \text{ or } \mathbf{1.0\%} \end{aligned}$$

### Mid Loan Duration:

$$\begin{aligned} \text{Monthly Fire Risk} &= 1 - (1 - ((60 \times 22 \times 2) / (12,000)))^{(1/22)} \\ &= 0.01123016374 \text{ or } \mathbf{1.1\%} \end{aligned}$$

### Maximum Loan Duration:

$$\begin{aligned} \text{Monthly Fire Risk} &= 1 - (1 - ((60 \times 36 \times 2) / (12,000)))^{(1/36)} \\ &= 0.01232033939 \text{ or } \mathbf{1.2\%} \end{aligned}$$

## About the Interview

While conducting research to find a representative that would have information on credit offerings, we were able to find Karabo Moshoeshoe, Senior Manager of Credit Acquisitions. We emailed Mr. Moshoeshoe and set up a phone interview with him. Our phone interview was conducted by Paul Roberts and Riley McManus. The call was not recorded, but both interviewers took notes throughout the call, see Appendix D for details.

# Modeling South African Lenders

## Other Retailers in the field

The other major players in the retail field that offer micro-lending options are Edcon Limited, Truworths, The Foschini Group, Mr Price, Identity Stores, and Lewis Group, see Appendix B for details (Bankseta, 2016). Despite the slow period in retail micro-lending, Edcon has expressed interest in continuing to pursue micro-finance options for its clients (Kew, 2016). Edcon recently began renovating some of their outlet stores in order to boost sales (Kew, 2016). While the process appears to be slow, last year Edcon only saw a deficit of 2.5 billion Rand as opposed to the 5 billion Rand deficit from two years ago (Kew, 2016). It appears that there may be a decrease in the number of furniture retailers that offer micro-lending options whereas there may be an increase in the number of micro-lending options offered by retailers that sell clothing or other smaller products.

## Retailer Partners Concerns

While many retailers offer credit, there are other characteristics to consider before forming a partnership. These aspects include the widespread distribution of the stores, the infrequency of purchases made at these stores, and the ethics of the retailer's business model.

## Creating Detector Mesh Network

One of the defining characteristics of the Lumkani detector is the added protection of the detector network created when multiple homes have devices. Without the network the effectiveness of the device is significantly diminished. In order to maximize the protection offered by the Lumkani device and minimize the number of claims, lenders would need to focus their distribution to a given area or settlement. While many of the retailers that offer credit sales have significant penetration across South Africa, they little control over their customer's geographic location. This limits their ability to develop heat detector networks, reducing the effectiveness of the detector. In isolated locations, partnerships with retailers may yield much better results.

## Frequency of Purchases

Another aspect of a retailer partnership is the frequency of purchases made at different retail stores. Developing an effective detector network within a community through a partnership with a retailer would require a substantial number of nearby residents to make purchases from the retailer. While this is possible, the frequency of purchases is highly variable depending upon the types of products sold by the retailers. Based on the parameters of the economic model developed in this project, the Lumkani detector insurance bundle is more profitable the larger and longer the loan. However, larger loans are typically taken out for less frequently purchased items, such as furniture, whereas the more frequently purchased items, such as groceries and clothes, are purchased using much smaller loans paid back over a shorter period which is less beneficial (Finmark, 2014). This limits the feasibility of using a retailer to market the Lumkani product because it could take years to develop a fully effective detector network.

## Questionable Ethics by Retailers

The final aspect of the retail partnership is the ethics of the potential partner's business strategy. As a social enterprise, Lumkani is heavily invested in helping its customers. However, many retail companies are more focused on making a profit. Consequently, many of the programs developed to help low income clients make purchases are extremely profitable for retailers. Retail companies that offered customers loans at high interest rates and included other fees, have been accused of tricking individuals into agreeing to over-priced loans, without explaining all the options available (Rees, 2012). For example, loans from Lewis Group charged 120 percent the cost of a product for insurance and maintenance. A customer would have to pay an extra R10,824 for a R8,700 product (Rees, 2015). In the past JD Group made a 40 percent profit margin off of credit, because it could use in-house insurance to avoid the 21 percent limit set by the government (Rees, 2015). In recent years these retailers were criticized for their behavior and some had their reputations damaged (Rose, 2015). To avoid partners with unethical practices Lumkani could look for retailers with more ethical business models. However, these retailers are typically out performed by their less honorable competitors making them weaker partners (Rose, 2015).

# Modeling South African Lenders

## Micro-Lending Financial Institutions

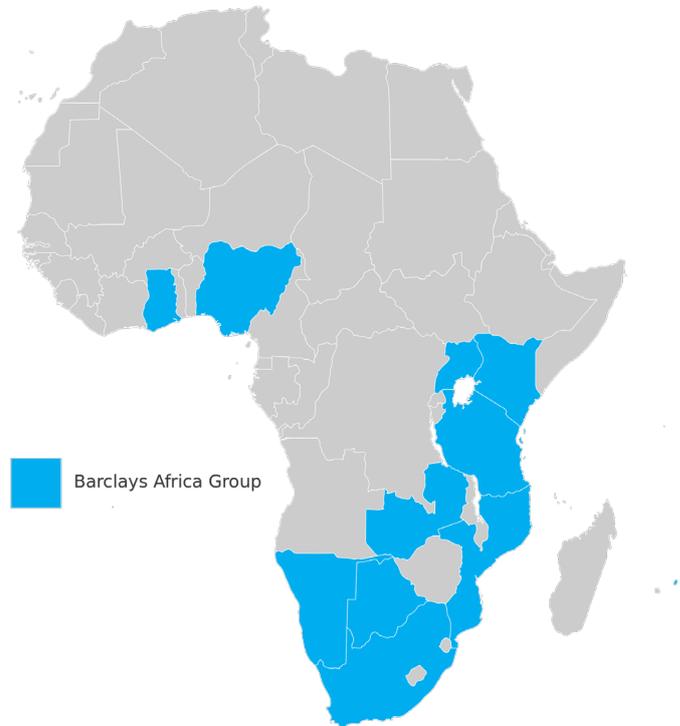
### Financial Institutions in South Africa

South Africa is the largest economy in the entire continent (Bankseta, 2013). Its banking system is stable and competitive, even when compared to more industrialized countries. In fact, the system was ranked third by the World Economic Forum Global Competitiveness Survey in 2014 (Matoti, 2014). Over time, regulations, products, and participation within the system have changed, allowing some banks, usually referred to as Alternative Banks (Bankseta, 2013), to target low-income citizens (Matoti, 2014). By appealing to this demographic, Capitec Bank and African Bank have experienced 600 percent and 268 percent asset growth, respectively, over just four years (Bankseta, 2013). The larger, more established banks, like ABSA, FNB, Nedbank, Barclays, and Standard Bank, are referred to as primary banks. Details about these institutions can be found in Appendix C. Their low fees and services such as loans, insurance, and money-transfer services appeal to entry level citizens, someone that does not have any prior banking experience (The Banking Sector Education and Training Authority, 2013). In addition, the primary banks have the best technology when it comes to mobile banking, which may be the easiest way to reach more customers and help promote financial inclusion (Bankseta, 2013).

### Case: Barclays Africa Group Limited

Barclays Africa Group Limited is a diverse financial service provider for individuals and businesses (Barclays, 2016). Barclays aspires to be the largest financial services group in the African countries they operate in, while promoting long term sustainability (Barclays, 2016). In an interview with Rajal Vaidya, Chief Revenue Officer of Barclays, Mr. Vaidya said that Barclays children organizations do not offer loans to individuals that lack stable employment, and

Figure 27: Barclays Africa



(Rasagy, 2015)

that it would be difficult to extend loans to residents of informal settlements (Vaidya, 2016). Mr. Vaidya also noted that fire would not be a major factor in determining if Barclays were to expand into informal settlements, as status of employment would be a more significant factor (Vaidya, 2016). Barclays does have insurance built into the loans that they offer, which covers the balance of loans in the event of the borrower's death (Vaidya, 2016). Mr. Vaidya also stated that there were other insurance options for their clients to purchase to cover things like retrenchment (Vaidya, 2016). These insurance offerings are purchased from third party organizations that are in close business relationships with Barclays (Vaidya, 2016).

### About the Interview

We were able to get in contact with Rajal Vaidya, Chief Revenue Officer (CRO) of Barclays Africa Group Limited. Upon emailing Mr. Vaidya, he arranged for a time for us to interview him. As a CRO for Barclays, he said he managed banking operations in 10 different countries in Africa. The interview was conducted by phone by Riley McManus and Kevin Guth. The call was not recorded, but both interviewers took notes throughout the interview. For details about the interview, questions, and consent form see Appendix D.

# Recommendations

Our research, interviews, and observations of the micro-lending field both in South Africa and globally has shown that, while not all micro-lending organizations will work well with Lumkani, the potential for partnerships does exist. One major concern with using micro-lenders as partners is that not every resident qualifies for a loan. It could be extremely difficult to get a sensor into the majority of homes in an informal settlement using this model. This will vary depending on the partner's willingness to offer loans to the most financially impaired residents of informal settlements or those that are unemployed. Partnering with a third party micro-lending organization can be beneficial to all parties involved, but finding the best partner may not be easy.

## Retailer Micro-Lenders

The over indebtedness of many South Africans caused a financial collapse for many retailers just a few years ago; currently the retail credit market is unstable and still recovering. Major players like JD Group are trying to redefine the industry without using credit. The fluctuations in this market might make Lumkani's product the competitive edge a company is looking for, or just another failed financial venture. The risk in this market is high and retailers are usually based in one country. Thus, international expansion would most likely require new partnerships for every country.

## Housing Micro-Lenders

Home improvement lending organizations could make excellent partners to test the effectiveness of lending models. Housing finance groups are more active in South Africa than in other countries due to support from the government. This limits the potential for expansion to financially unstable countries, but offers a more sturdy region to test this market. These lenders share similar mission statements with Lumkani and promote sustainable housing for low-income residents. South African based home improvement lenders that operate in low-income areas could be used as partners to pilot the model and collect data to identify the benefits. Understanding whether the fire risks are great enough to justify extra expense by lenders would help when reaching out to global organizations. Any housing lender that lends to residents of informal settlements could immediately introduce this product into their market. For companies that do not conduct a lot of business in informal settlements, Lumkani's device and insurance could help encourage them to expand their

business by protecting their loans from the risk of fire and extending their demographic. Since Norufin was interested in this product, it is likely that organizations like Kuyasa Fund and Lendcor would be interested as well.

## Financial Institutions

Banks could easily become the largest players in the micro-lending field. Currently, banks have very limited micro-lending offerings, but if they chose to enter the market they should be very effective. We found communicating with banks, even to gather data, was extremely difficult. Without a contact, forming a partnership might not be possible.

The data that Lumkani is currently collecting on fires in settlements, will be extremely useful once patterns and rates of risk emerge. With a more accurate assumption of the risk level each home in a given settlement faces, Lumkani can show potential partners the economic benefit of a partnership. Even without considering the economic impact, it is known that Lumkani has saved hundreds of households from burning to the ground. As the data grows, Lumkani will be able to show the mission based value of its product, which will appeal to many NGOs that work to improve the lives of residents in low-income areas. For both of these reasons, Lumkani should to continue to collect data through its devices, residents, and fire response organizations.

## Final thoughts

Assuming that the risk of fire is high in communities, partnering with Lumkani is economically beneficial for micro-lenders. Lumkani's product helps lenders currently offering credit in informal settlements or lenders looking to expand into high risk settlements. To test the financial feasibility of this model partnerships with housing micro-lenders operating in South Africa should be formed. Large NGOs in the micro-lending field are great options to expand globally and reach residents around the world. Banks and retailers have the potential to be large partners within South Africa, but have ethical concerns, are harder to work with, and might not be ready for micro-lending for a few years.

# Reflection

## Riley and T. Sam's Experiences in Mbekweni and Dal Josaphat Townships

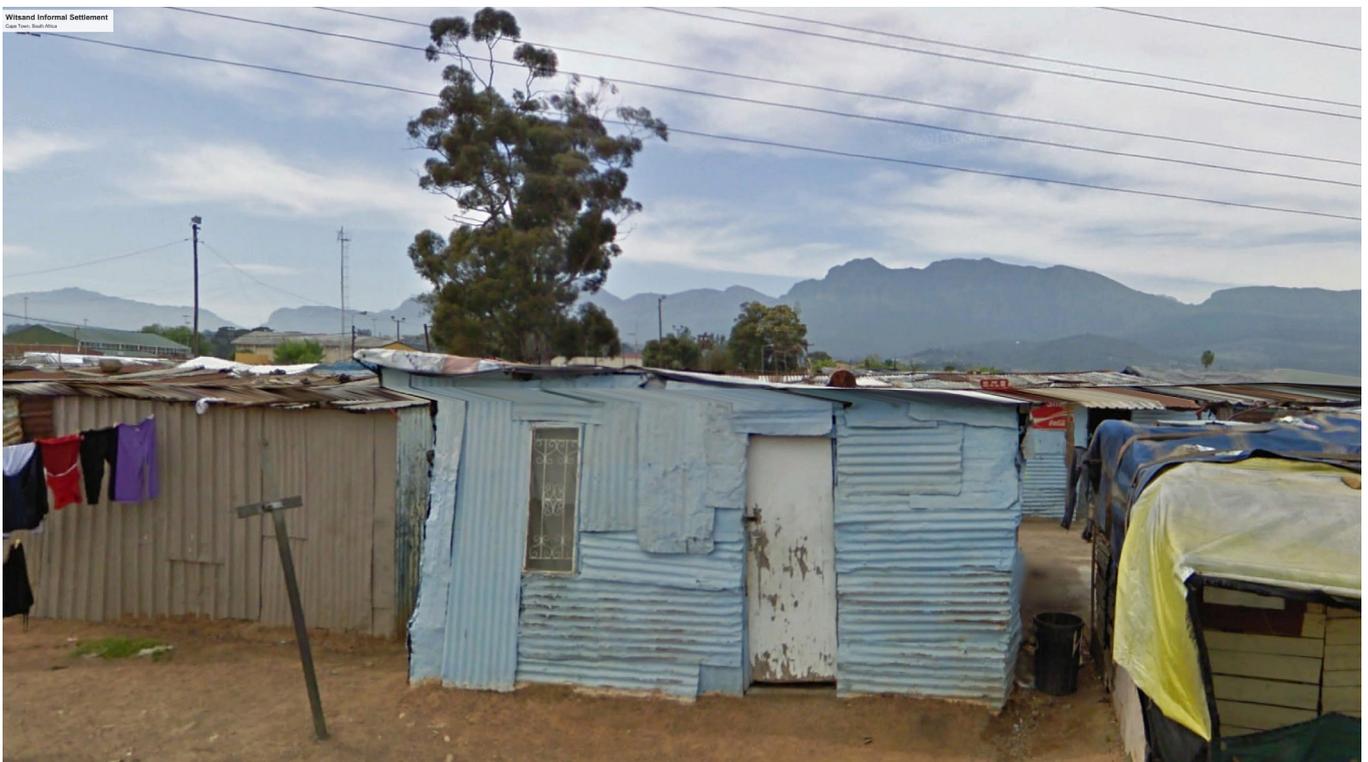
### The Prevalence of Fire Risk

Riley McManus

Today, T. Sam Lynn, and I had the opportunity to visit the townships of Mbekweni and Dal Josaphat with Clive Nqiwa. We were there to replace the batteries and capture pictures of the homes and feedback from residents that own the device. It was a humbling experience to see how different the living situations were, not only from the homes I am used to seeing, but also from what I expected. Couches, chairs, and mattresses existed in familiar setups; cabinets with dishes were mounted on the walls; each home was different, reminding us that these were homes, not just places to live. Being the only white people in sight was a strange experience, because everyone knew that we were not local. After learning a few isiXhosa phrases from Clive, we were able to communicate enough to say "hello" (*Molo*) upon entering a home and

"Thank you very much" (*enkosi kakhulu*) while leaving. Although we were most likely not pronouncing the words correctly, most residents showed us a genuine appreciation for attempting to be as respectful as possible. While I replaced the batteries of each device, I looked around at the cooking setups, furniture, curtains, walls, and ceilings. As a Fire Protection Engineering major, I could not stop thinking about what a fire would look like in each home and how quickly it would spread to neighboring homes. Because of the height of the ceilings, small size of rooms, and proximity of flammable materials to cooking setups, I concluded that every fire would most likely be out of control in less than 30 seconds. Once the fire was out of control, it would only be minutes before it spread to a neighboring home, increasing the power and growth speed of the fire. Meeting and communicating with the residents of these settlements made it even harder for me to stop thinking about how quickly their lives could be flipped upside down by fire.

Figure 28: Shack in Mbekweni Township



(Google Earth, 2016)

# Reflection

## Interactions with People

Sam Lynn

Nothing could have ever prepare me for my visit to the informal settlements. I had done plenty of research on the danger of fires in them and heard other people's stories and opinions about visiting them, but the idea of an informal settlement was still alien to me. Up to this point the closest I had come to the informal settlements was driving past them on the highway, listening to my taxi driver describe his experience growing up. All I could do was form assumptions based upon what I had learned and my experience with poverty in other countries.

Nevertheless, I was definitely not ready for my trip. My research had not prepared me for the emotional human interaction aspect of the trip, and my experience in other countries was so vastly different that it was hard to make a comparison between the two.

When I first learned that we were going to the informal settlements my first reaction was excitement. This was a once in a lifetime experience I had heard so much about. My groupmate Riley and I were going to visit the Mbekweni and Dal Josaphat informal settlements with Clive, a black Lumkani employee to perform the pretty routine task of changing batteries in the Lumkani detectors that had been installed there. However, this was not going to be just a routine trip for anyone involved. This was going to be the first time that Clive went into these informal settlements with white people and it was our first time going. Even Clive did not know what to expect and that made me nervous. On our drive to the settlements Clive explained our tasks for the day—change the battery and have the resident fill out a questionnaire about the detector. These were all pretty easy tasks, but at the end he added, “follow my lead and do everything I tell you to do. These are safe settlements, but if at any time you feel uncomfortable or unsafe let me know because I do not know how the people will react to you.” At this point my excitement began to turn into nervousness. What were we getting ourselves into? My iPhone was in my pocket, was that going to be stolen? Clive's phone had been stolen only a couple weeks before.

Arriving in the settlement my feelings were not assuaged. We stepped out of the car and I felt an awkward tension. Everyone was staring at Riley and I. We stuck out like sore thumbs. To make things more awkward Clive took my phone and hid it in his car, but he didn't just put it out of plain sight in the glove compartment like most people do in a bad neighborhood. He hid it underneath the floor mats. At this point I did not really know how to feel—I was excited for the adventure but I was nervous being in a new location unable to communicate with the people I was supposed to help. Luckily the trip quickly became much more positive once we actually started replacing the batteries. Riley and I would go into the homes after Clive and give our best isiXhosa hello and then we would go about our work. At first we got confused and reserved expressions from the people, but our silly attempts to say hello diffused the tension and people began to open up a little. Some of the little kids even played with us a little. One boy in particular was adventurous and tried to have a chest puffing contest with Riley. I am still not sure who won.

Yet, despite the positive interactions with all the residents in their homes I still felt a little out of place and I still felt like there was some tension. Occasionally, as we were walking into a home a group of people walking by would stop and stare at us from a distance. They would yell something over to Clive in isiXhosa and he would yell back a quick response before ushering us into the home we were entering. When we asked Clive about it once we were back in the car he just shrugged it off saying the people were just asking what we were doing so he told them. Being in a situation where my presence was questioned is an experience I had never had before. It was a truly eye opening experience. I experienced it for one day and thought it was a bit disconcerting and yet people of different skin colors have these types of interactions every day. Before this visit, I could not wrap my head around the concept of how it must feel to be an outsider like that but now after this visit that experience is relatable.

# Reflection

## Paul and Kevin's Experiences in the Witsand Township

### Standard of Living

Paul Roberts

On November 18th, Kevin and I replaced batteries in one of the first settlements to receive Lumkani's sensors. Visiting the informal settlement of Witsand changed my perception of how people in shacks live. Before visiting, I thought people who lived in shacks were going hungry and had almost nothing to their name. However, visiting the settlement showed me that the major issues were the lack of space and resources to upgrade to formal homes. Many residents had fully furnished homes inside the shacks with televisions, speaker systems, and sometimes couches. What I saw in the homes made me realize that a retail based credit model was possible. Almost every home was playing the radio and people seemed to be in good moods. The living conditions were hard, but not unbearable.

The threat of fire was extremely apparent; most houses had wooden frames and used cardboard as an interior wallpaper/insulation. We came across the remains of a home that had burned several months before, but fortunately did not spread to other homes. Seeing firsthand the devastation a fire can cause to a single home, was eye opening about issue of fires.

### How it Became Real

Kevin Guth

On November 18th, Paul and I traveled to the Informal Settlement of Witsand in the Western Cape. We assisted with replacing batteries in the Lumkani first generation devices, as Witsand was one of the first settlements to have the devices installed. The experience of going into an informal settlement was something I definitely desired as part of this project, as well as interacting with the people who lived in shacks. We were met with hospitality and geniality from everyone we interacted with, something I was not expecting going into an informal settlement. I had anticipated some hostility from residents while in the settlement due to my skin color. Many shacks appeared to be at risk of fire given their construction of wood, scrap metal, and cardboard. Residents had to leave their homes to access the water pumps, toilets, and showers constructed by the local municipality, something I had not anticipated as a problem people would face.

After leaving work for the day, I thought about how my life would have turned out differently if I were raised in an informal settlement, and what my outlook on the world would have been. While I may not ever be able to experience first hand what it is like living in an informal settlement, the time I spent in the shacks and interacting with residents helped me empathize with their living situations. I gained a broader scope on the world in the process, and the experience is one that I'll never forget.

**Figure 24: Shacks in Witsand Township**



(Google Earth, 2016)

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# Appendix

## Appendix A: Retail Micro-Lenders

Company	Product	Description	Lumkani Fit
JD Group	Furniture	JD Group is a major retailer in South Africa that specializes in furniture sales. In 2013, Steinhoff International Holdings Ltd acquired a controlling hold on the company and sold off the financial division to focus on pure retail sales (Tarrant, 2016). The percent of credit sales has gone from 60% to 17% in just over 2 years (Tarrant, 2016). JD Group had their own in house insurance that they offer to customers when purchasing on credit, but after recent changes this is not certain (Finmark Trust, 2014).	JD Group may not be a good fit because they are trying to shift away from credit sales. Additionally they offer in house credit which could make Lumkani's insurance offering less of interest.
Lewis Group	Retail	Lewis Group is massive retailer with thousands of stores in South Africa. They offer credit with their purchases and require customers using credit to have credit life insurance (Finmark Trust, 2013). They have made the news multiple times for shady insurance profits from consumers (Rees, 2012).	Lewis Group is great for Lumkani in its massive credit sales and reach throughout South Africa. However, it already has a partnership with Monarch Insurance with its credit. Additionally, its practices might be considered unethical and would not make a great partner for Lumkani in terms of image.
Truworhs International	Retail	Truworhs International is a fashion retailer with more than 728 stores in South Africa, and 49 in the rest of Africa (Truworhs, 2016). According to their last financial report, 69% of their sales involve credit(Truworhs, 2016).	Their target seems to be mainly middle-class, but if Truworhs is interested in expanding their business to increase the size of their target demographic, Lumkani may be a good fit seeing as how they already offer credit. If risks such as fire are what is restricting their loan demographic, we know Lumkani can help.
Edcon Limited	Retail	Edcon is the largest non-food retailer in South Africa. They have 1400 stores with 9 different store formats.	Financial Reports suggest that credit sales have been decreasing recently (Edcon, 2016), but context of the report tells me that they do not want this. Lumkani may be able to help them increase credit sales by offering a device/insurance that protects the consumer from not being able to payback their loan due to fire. They currently have ABSA credit offerings that they supplement from in-house, but are potentially looking for a longer-term solution (Edcon, 2016).
Foschini Group	Clothing	Foschini Group is a woman's fashion store with over 200 stores in Southern Africa (Foschini, 2016).	In a financial report from 2016, the company mentions that they always investigate new credit options based on the ever-changing customer base. 42.8% of their Turn-over Contribution was through credit (Foschini, 2016). Even though interest rates have been rising, their credit sales have increased by 5.9% and 4.3% this year and last year, respectively (Foschini, 2016).
Identity Stores	Clothing	Identity Stores, owned by Truworhs, is a large clothing store in South Africa. They offer in store credit which accounted for 60% of retail sales in 2016 (Truworhs, 2016).	Clothing companies that use credit are visited more frequently than furniture retailers (Finmark Trust, 2015). This provides more opportunities for people to signup with Lumkani.
Mr. Price	Retail	Mr. Price is a large retailer in South Africa. They mainly target middle and upper class. 17% of sales are credit (Mr. Price, 2016).	Based on Financial Report 2016, they seem hesitant to expand credit purchases. Did not find details on what their reasoning for that is.

# Appendix

Contact at Company	Interview Status and findings
<p>Contact: Karabo Moshoeshoe            Position: Senior Manager Credit Acquisitions.            Johannesburg, SA.            Email: karabom@jdg.co.za</p>	<p>Interview occurred on November 15. We learned that JD Group is currently recovering from rough financial times and is currently focusing on sales not finance.</p>
<p>Contact: Lambert Fick            Position: General Manager Lewis Group            Email: LambertF@lewisgroup.co.za</p> <p>Second Contact: Neels Verwey            Position: Manager of Insurance Services            Email: neels.verwey@lewisgroup.co.za</p>	<p>Positive initial response. We were given the name of another contact, but we never got a response.</p>
<p>Contact: David Pfaff            Position: Chief Financial Officer Designate.            Email: dpfaff@truworths.co.za,</p>	<p>Response to initial email was that Truworth's does not offer microcredit. We responded letting them know that we were interested in credit, in general. They then said that their policy will not allow for this.</p>
<p>Attempted contact: Mark Bower, Deputy CEO.</p>	<p>Initial email to set up an interview bounced. We were unable to guess the correct email. Email format for employees there is usually "first initial + surname@edcon.co.za" .</p>
<p>Contact: Mike Wilson            Position: Senior Risk Advisor at the Foschini Group.            Email: mikew@tfg.co.za</p> <p>Contact: Carmen Van Der Vyver            Position: Head of Enterprise Risk            Phone Number: 021 - 937 4769</p>	<p>Sent email requesting an interview. We got an email response saying he was retired, but we given the contact info for Carmen Van Der Vyver, Head of Enterprise Risk, 021 - 937 4769.</p>
<p>Contact: Filled out general contact form on website</p>	<p>No response to our initial inquiry about setting up an interview.</p>
<p>Contact: General Email            Email: <a href="http://www.mrpricegroup.com/Quick-Links/Contact-Us.aspx">http://www.mrpricegroup.com/Quick-Links/Contact-Us.aspx</a> (fill in the box on the right)</p>	<p>Sent general email and did not hear back.</p>

# Appendix

## Appendix B: Housing Micro-Lenders

Company	Product	Description
Lendcor	Home Improvement Supplies	Lendcor is a company that tries to increase access to Housing loans through partnerships with NGO's, Government, developers, building contractors, and material suppliers (Gardner, 2008). The customer can go to any of these merchants and fill out a form, or apply through an app. If they qualify, Lendcor will give advance the loan to the merchant (Lendcor, 2016).
Mazwe Financial Services	Home Improvement Supplies	Mazwe Financial services is one of the top providers of housing micro-finance in South Africa (BANKSETA, 2013). It offers short-term loans used for consumption, housing, education, consolidation, emergency, and enterprise purposes (Bloomberg, 2016).
Norufin Housing	Home Improvement Supplies	Norufin Housing is a registered Developmental Credit Provider, and is funded by the Rural Housing Loan Fund (RHLF) which gets their funding from the Department of Human Settlements (Rural Housing Loan Fund, 2016). They are based in Mahikeng, Western Province (Norufin Housing, 2016). Since 1998, they have assisted 120,000 people with home improvement through their broker/merchant network (Norufin Housing, 2016). They claim to work in rural and urban areas throughout the country (Rahkudu, 2016).
Kuyasa Fund	Housing Finance	Provides microfinance services to help increase housing development (Kuyasa, 2016).

# Appendix

Lumkani Fit	Contact at Company	Interview Status and findings
Lumkani could have fit here if their customers were residents of informal settlements. However, each loan recipient must be employed and have regular income, which is not the case for many of these residents.	Contact: Sandy Aitken Position: Risk Manager Email: <a href="mailto:saitken@lendcorgroup.co.za">saitken@lendcorgroup.co.za</a>  Contact: John Aitken Position: CEO Email: <a href="mailto:jaitken@lendcorgroup.co.za">jaitken@lendcorgroup.co.za</a> .	John conversed with me via email and we learned that the company advances their loans to the material suppliers, not the resident. Residents would have to be employed, have credit references, etc. He has no experience lending to informal settlements. The website <a href="http://www.lendcor.co.za/about-us/team">http://www.lendcor.co.za/about-us/team</a> has all of the telephone numbers of executive employees.
Uncertain as their website is down, but they offer credit to residents so potential exists.	Contact: General information email Email: <a href="mailto:mazwefinancialservices@gmail.com">mazwefinancialservices@gmail.com</a>	The general email got no response. Called and was passed along to a manager who left a number to call back at. They never called back. Tried to email Nomalanga Tshatsha, senior credit manager, but none of our guesses at her email were correct.
We thought Lumkani would be a good fit here, because their website makes it seem that they have many customers in rural, and urban settlements, however that was not the case according to CEO Sherwell Rakhudu. 8% of their loans go to informal settlements and 40% in townships. However, Mr. Rakhudu did express his recent findings that there are many informal settlements in Mahikeng, where Norufin is headquartered. He said that fire could be a huge problem and that he would be interested in a product like Lumkani's	Contact: Sherwell Rakhudu Position: CEO (We also think he is the founder) Email: <a href="mailto:Sherwell@norufin.co.za">Sherwell@norufin.co.za</a>	The company is interested in expanding business into informal settlements. Mr. Rakhudu's information has been passed on to David to explore the potential partnership.
Lumkani and Kuyasa have very similar mission statements and interests.	Attempted contact: Olivia van Rooyen Position: Executive Director	The email address that Francois gave us did not work. We tried to figure out her email with no success.

# Appendix

## Appendix C: Financial Institutions Micro-Lenders

Company	Product	Description	Lumkani Fit
Bayport Financial Services	Loan provider	Bayport is one of the largest providers of unsecured credit that is not a bank (Bayport Financial Services, 2016). It is Partially funded by the Rural Housing Loan Fund (RHLF) (RHLF, 2016) and provides personal loans to individuals (Bayport Financial Services, 2016).	Bayport is not a retailer and is not a bank. This makes them a potentially different type of partner for Lumkani. They have branches in other countries reach which means they could help Lumkani expand globally
Elite Group	Small Personal Loans	Elite group offers corporate and personal loans, and its micro-loans are tailor made to the customers needs (Elite Group, 2016). The organization is partially funded by the Rural Housing Loan Fund (RHLF) (Rural Loan Housing Fund, 2016).	Personal loans offered to low-income residents fits a simple partnership model for Lumkani.
Izwe Loans	Personal Loans	Izwe Loans targets the formally employed market by offering unsecured-loans; loans that do not require property as collateral (Izwe, 2016). Izwe Loans is a micro financier and offers loans between R1 - R50,000 that span between 9 and 60 months (Izwe, 2016). Izwe complies with the National Credit Regulator (NCR) and the Financial Services Board (FSB)	Izwe Loans may represent a good company for Lumkani to partner with because of their approach to micro-finance. Izwe Loans is interested in pursuing technologies that would help them expand their reach to people in rural areas (GNA, 2016). In terms of assisting people in acquiring loans to help attain Lumkani's devices, Izwe could represent a viable partner.
ABSA	Bank	ABSA is a large bank in South African that has recently been work on financial inclusion with bank accounts for low-income residents. ABSA provides credit offerings as low as R250 (ABSA, 2016).	A partnership with Lumkani depends on how much micro-credit they offer to residents of informal homes, and the credit they are planning to offer in the future.
First National Bank	Bank	First National Bank is one of the four largest banks in South Africa, and provides services in Botswana as well (First National Bank, 2016). FNB provides housing and personal loans at interest rates of 10.5 percent (FNB, 2016).	Depending on FNB's interest in micro-lending, it could be a good partner, but FNB currently does not offer loans to people that do not have a credit report, evidence of capacity, etc. which means they most likely do not work with many people from informal settlements.
Nedbank	Bank	Nedbank claims to have the largest banking network in Africa, with more than 2,000 branches in 39 countries (Nedbank, 2016). The prime interest rate is 10.5 percent (Nedbank, 2016).	Nedbank experienced, like many other lenders, a decrease in credit growth. If they want to expand their market, Lumkani can help make informal settlements less risky to lend to, whether businesses or residents.
Standard Bank	Bank	Standard Bank, headquartered in Johannesburg, South Africa, provides services to 20 countries in Sub-Saharan South Africa, and offers specialized personal loans (Standard Bank, 2016). Standard has worked with various retailers to develop Access Points; banking programs that provides low-income customers with cash services. Access Points allow customers to purchase prepaid airtime and electricity, and pay for goods (Banksetta, 2013).	Standard bank is attempting to make bank accounts accessible to low-income communities. If they are interested in joining the micro-lending field, Lumkani might make a great partner.
Capitec Bank	Bank	Capitec is rated as the best bank in the world by Laferty. The Bank does not deal with traditional business banking, but rather the employees and customers of companies.	Capitec aims to provide a simpler, and more accessible form of banking that appeals to people in low-incomes areas. Offers fixed-rate loans up to R250,000 over 1-84 months (Capitec, 2016).
Barclays Africa Group Limited	Bank	Barclays Africa Group Limited is a large financial services provider in Africa (Barclays, 2016). The organization is comprised of ten banks outside of Africa and maintains a majority stake in ABSA (Vaidya, 2016).	The organizations that Barclays owns do not offer loans to individuals that lack stable employment, making extending loans to residents of informal settlements difficult (Vaidya, 2016). Barclays considers having formal employment to be a more important factor than the risk of fire when providing loans (Vaidya, 2016).

# Appendix

Contact at Company	Interview Status and findings
Contact: Chris Lubbe Position: Credit Executive Email: chris.lubbe@bayport.co.za	No response to our initial inquiry about setting up an interview
Emailed head office general address, no response. Attempted to contact Gert Oosthuizen, General Manager of Personal Finance, and were unsuccessful.	Unsuccessful at contacting anyone from this organization
Contact: General Information email Email: info@izwe.co.za	Received initial email response confirming that our email had been received but there was no further communication after that
Contact: General information email Email: absa@absa.co.za	We attempted various phone call and email strategies but were only transferred and given new numbers to call, never establishing a formal contact.
Contact: General Information Inquiry form on website	Could not locate an email address to contact. Filled out the general information inquiry form, but did not get a response.
Contact: general information email Email: clientfeedback@nedbank.co.za financialplanning@nedbank.co.za smallbusinessservices@nedbank.co.za contactcentre@nedbank.co.za	Nedbank responded to our email. Said we should go to one of the branches and talk to someone about setting up an interview. When we went to the branch we were told general information about credit offerings, but they could not provide the contact information for anyone in the company due to confidentiality policies.
Contact 1: Alta Grobbelaar Position: Credit Risk Manager Email: alta.grobbelaar@standardbank.co.za  Contact 2: Sammy Mentoro Position: Manager Operational Risk Email: sammy.mentoro@standardbank.co.za	We emailed Alta who seemed to be ok with meeting, but never replied to our follow up. Sammy Mentoro never responded to our emails.
Contact: General Email Email: contactcentre@capitecbank.co.za	Sent general emails, they responded asking for a business presentation, so Emily told us to focus our time elsewhere.
Contact: Rajal Vaidya Position: Chief Revenue Officer Email: Rajal.Vaidya@barclays.com	Interview with Mr. Vaidya on December 2. From the interview we learned that Barclays does not offer loans to people unless they have a stable income, disqualifying a lot of people from informal settlements. Barclays does have insurance built into the loans they offer, which covers the balance of loans in the case of death of their clients. There are options for the client to purchase insurance that covers things like retrenchment. These insurance offerings are purchased from 3rd party organizations, who are usually in business relationships with Barclays.

# Appendix

## Appendix D: Interview Details, Questions, and Consent Form

### Interview Details

To learn more about these potential partners, we conducted semi-structured interviews with representatives from the organizations listed above. The interviews were performed by different members of our team. As such, the semi-structured format ensured that information was ascertained in an organized manner, while still giving each interviewer the freedom to ask case specific questions, modify language to accommodate to the interviewee, offer clarifications, and probe for additional information (Jamshed, 2014). Representatives that were interviewed signed a written consent form, found in below, and were given the freedom to end the interview at any time. Each interview took approximately one hour to complete and provided information related to the following:

- The company's current credit offerings for low-income customers.
- How credit they offer is affected by the risk of fires.
- How the organization determines what interest rates to offer customers
- The company's interest in offering insurance for their customers that protects its credit.

When consent was given, interviews were recorded using a voice recorder. This allowed the interviewer to focus primarily on maintaining the flow of the conversation to get the most out of the interview. In the event that an interviewee did not consent to being recorded, present members took notes on the main points of the conversation. After each interview was concluded we wrote notes summarizing key points of the recorded conversation and performed a general text analysis. We looked for repeating themes that indicated compatibility with Lumkani's new marketing approach (Willig, 2013). We continued the data collection and analysis procedure until we had contacted the major companies or had established clear themes between all companies. We reached this point when we had exhausted our list or found no significant differences between companies we interviewed.

### Questions

1. What credit options do you offer to customers?
2. Do you currently offer insurance with your credit packages and what does the insurance cover?
3. Are you interested in offering insurance for customers' belongings?
4. Do you offer credit to residents of low-income communities and what factors do you look at when offering credit?
5. About what percentage of your sales are credit sales and, of those, what percentage are to people living in informal housing?
6. How do fire risks affect customers' loan and interest costs?
7. How would your rates change if fire risk was significantly decreased?
8. What are your goals for the future regarding microcredit?
9. What are some factors that limit your ability to offer credit to customers?
10. Are there certain settlements or areas from which many residents shop at your stores?

# Appendix

## Consent Form

### Participation Form and Statement of Rights

We are students at Worcester Polytechnic Institute in Worcester, Massachusetts. We are conducting a research project on behalf of Lumkani to determine an effective marketing model to increase the distribution of Lumkani fire detectors, which are currently packaged with insurance, in low-income communities by assessing potential relationships between third party entities. As part of this project we are conducting a series of interviews with key individuals. We have asked you to participate because we believe you have unique knowledge of these issues that will be valuable to the project.

Before we begin, we would like to thank you for taking the time to participate in this interview which will last about one hour. Your participation is entirely voluntary. You may refuse to discuss any question or terminate the interview at any time. With your permission we would like to record the interview. The tapes, notes, and subsequent transcripts of the interview will be kept confidential, and will be accessible by only the members of the team and our immediate faculty advisors. Your name will not be used in any subsequent report or publication without your permission.

If you consent to be interviewed at this time, we would ask that you indicate your agreement below.

I agree to participate in the interview

\_\_\_\_\_

Interviewee Signature

\_\_\_\_\_

Date

\_\_\_\_\_

Interviewee Name

Please initial for permission to record

\_\_\_\_\_

Interviewee Initials

\_\_\_\_\_

Interviewer signature

\_\_\_\_\_

Date