Disaster Management Measures of Microfinance Institutions in Sri Lanka[1]

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Abstract

The paper analyzes the effectiveness of current disaster management practices of Microfinance Institutions (MFIs) in Kalutara District, Sri Lanka, with special reference to the 2008 flood. It also seeks to find possible links between disaster management and microfinance at different stages of disaster management cycle. To meet the objectives of the study, a field survey was conducted in three Divisional Secretarial divisions, namely Bulathsinhala, Dodangoda and Palindanuwara, which are the most severely affected divisions of the District. The literature review found that direct and indirect disaster management measures of MFIs enhance the resilient of its members against disasters. The survey findings revealed that MFIs in the Kalutara District scrutinize direct disaster management tools to enhance the capacity of its members against disasters. Moreover, the regression analyses confirmed that the probability of being recovered is higher for microfinance member than non-members. Therefore, we conclude that microfinance play an effective role in disaster management. Nonetheless, the current disaster management measures of MFIs in the Kalutara district have largely focused on post disaster management strategies such as disaster recovery loans. In our opinion, risk management (pre-disaster) is more effective than crisis management (post-disaster) in any disaster management program. Therefore, it is recommended to implement risk management strategies such as

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micro insurance, disaster awareness programs and disaster mitigation loans to get more effective outcomes of the disaster management initiatives of MFIs.

Key words: Disaster Management - Flood - Kalutara District - Microfinance - Microfinance Institutions - Micro Insurance

Introduction

The global concerns over the alarming threats of natural disasters has been intensified in recent times, Disasters bring about multiple damages to the affected community, but its impacts on individuals depend on the level of exposure and the vulnerability. Disaster literature attests that poor people and disadvantaged groups; women, children, low-caste people, ethnic minorities, are more vulnerable than their counterparts (Sharma, 2001; Ariyabandu, 2003; Reutela, 2006; Ray, 2010). Further, frequent outbreak of disasters hindered the potential growth momentum of nations in general and low-income countries, in particular. Therefore, finding ways and means to minimize disaster risk has been the prime motive of disaster management agencies, policy makers and academics in the recent past.

Microfinance has been recognized as an effective way to manage the negative consequences of disasters. On the one hand, disaster literature has revealed that poverty is a fundamental cause of vulnerability. On the other hand microfinance has been recognized as the effective instrument in poverty alleviation (Khalily, 2004). Moreover, women in general and women headed households, in particular, are considered as highly vulnerable groups for disasters. Surprisingly, the positive impact of microfinance on women empowerment is well-documented in the recent literature. Therefore, it is reasonable to presume that these microfinance activities indirectly help to reduce the vulnerabilities of disaster-prone communities. Further, Microfinance Institutions (MFIs) largely cater to the poor and near-poor clients who are excluded from the formal financial system. However, these clients are highly vulnerable to external shocks such as disasters. Hence, naturally, MFIs have an adverse selection of a highly vulnerable group of people as their clientele. Thus, besides its indirect measures, MFIs should directly address the issue of disaster management within its “curricular” to ensure its long-term sustainability.

Accordingly, this study attempts to analyze the effectiveness of current disaster management practices of MIFs in Sri Lanka, with special reference to the Kalutara District. It also seeks to review possible links between disaster management and microfinance referring to the pre-disaster, disaster occurrence and post-disaster management phases. The potential role of MFIs in disaster management has been empirically studied by many scholars. For instance, effectiveness of post-disaster credits in the case of natural disasters in India by Ray (2010), loan re-scheduling in the context of floods in Bangladesh by Shoji (2007) and micro-enterprise credits in post-conflict reconstruction in Bosnia and Herzegovina by Matul and Tsilikounas (2004) are some of the significant studies cited in the disaster management literature. Nagarajan and McNulty (2004) argue that microfinance does exist and perform effectively especially in the post-disaster period, but their presence in relief management are not well-documented. In the context of Sri Lanka, it is difficult to find any empirical analysis of the effectiveness of microfinance in disaster management. Further, disaster management literature does not account for the indirect impact of microfinance on capacity building. Therefore, the study intends to fill some of these gaps in the disaster management and microfinance literature.

The rest of the paper is structured as follows: Section 2 provides a review of the literature focusing on direct and indirect disaster management measures employed by MFIs, followed by the methodology in Section 3. Section 4 presents the probit estimations and other findings. The conclusions are presented in Section 5.

Literature Review

A disaster is a "serious disruption of the functioning of a society, causing widespread human, material, or environmental losses, which exceed the ability of affected society to cope using only its own resources" (Shaluf, 2007). Among the different disaster management models exhibited in the literature (Asghar et al., 2006), the Disaster Management Cycle is the most common in use, and it consists of three phases; pre-disaster management, disaster occurrence management and post-disaster management. Further, it is explained as a cyclical process in which completion of one phase leads to the emergence another phase of the cycle. Pre-disaster management includes activities related to preparedness and mitigation, whereas disaster occurrence management includes initiatives taken to ensure

that the emergency need of victims is met, and suffering is minimized. Rehabilitation and reconstruction activities carried out aiming at the early recovery of the victims are called post-disaster management (Khan et al., 2008).

In general, microfinance refers to providing small short-term loans to poor people without any collateral, especially who are treated as unbankable by the formal banking system, and accepting tiny savings as deposits (Ronchi, 2004; Armendariz & Morduch, 2007). Bangladesh is the first country that experimented with microfinance in its present-day format as a mode of re-establishing the income-generating activities of the poor who suffered from the civil war and floods in 1972 (Nagarajan & McNulty, 2004). Thus, it can be argued that microfinance was introduced to enhance the resilient (capacity) of poor against natural and man-made disasters. Further, microfinance is recognized as a "convenient channel" to reach the poor during a disaster due to its close proximity to clients, group lending structure, and regular contact with the clients (Parker & Nagarajan, 2000). Moreover, disaster management activities channelling through the MFIs help to curb inefficiencies in emergency assistance due to aforementioned reasons. According to Sen (2001) as cited in Khalily (2004), active microfinance members possess higher ability to manage adverse shocks of disasters. How do microfinance members gain these extra resilient against disasters? Sections 2.1 and 2.2 address to this question.

Direct Disaster Management Measures

Khan and Kurosaki (2007) have estimated that delay in repayments of microfinance loans in earthquake hit areas of Pakistan is 52 percent higher than unaffected areas. The study stresses the significance of taking disaster management measures to ensure long-term sustainability of MFIs. Hence, if not properly addressed, MFIs are absorbing an unavoidable risk into their portfolios due to its selection bias; adverse selection of a highly vulnerable group of people as clients. Nonetheless, the Typology of Risk in Microfinance (Fernando, 2008) has not explicitly taken the disaster risk into account in analyzing risk associated with microfinance activities. However, empirical findings suggest that MFIs should directly address the subject of Disaster Management within its "curricular". Hence, section 2.1 reviews direct disaster management measures that have been used by MFIs at pre-disaster, disaster occurrence and post-disaster scenarios.

Pre-Disaster Management

In this stage, MFIs can employ four main types of disaster risk mitigation tools; disaster mitigation loans, disaster awareness programs, disaster saving accounts and disaster micro insurance. MFIs encourage risk mitigation activities of disaster-prone members by providing disaster risk reduction/preparedness loans. For instance, many MFIs together with the Bangladesh Bank have granted loans to construct flood resilient concrete and tin houses for a selected group of flood prone members (Brown & Nagarajan, 2000). Already, some MFIs conduct knowledge dissemination activities about health issues, gender role and legal rights (Morduch, 1999). The principle of regular meeting, (MFIs usually have monthly or weekly meetings with its members), and the structure of MFIs create a "perfect class room" for this kind of knowledge dissemination activities. These monthly or weekly meetings can be effectively utilized to educate the disaster-prone members about the good practices in the wake of a disaster. Disaster saving account is a special account that is designed with restricted withdrawal privileges to the holder. The account is maintained to accumulate saving to cope up with a specific disaster event. Therefore, depositors gain withdrawing privileges only in the realization of the pre-defined disaster event.

Disaster-specific micro insurance is not a preferred area for MFIs (Brown & Nagarajan, 2000). Adverse selection and moral hazard, the common problems in any form of insurance, are difficult to eliminate in disaster-specific micro insurance (Pantoja, 2002; Armendariz & Morduch, 2007). According to Brown and Churchill (2000), problems associated with risk assessment, risk measurement, risk pooling, and the possibility of happening multiple losses simultaneously are more specific reasons that hindered the potential of using micro insurance in disasters (Mechler et al., 2006). However, the aforesaid problems that arise with indemnity-based insurance can be eliminated, to a certain extent, by using an indexed-based micro insurance design (Pantoja, 2002; Mechler et al., 2006). A triggering event such as a drop in rainfall below a specific level (Kumar & Newport, 2005) or weather condition in a given date (Armendariz & Morduch, 2007) have the used as common indices to estimate risk exposure and damage. The new design helps to address moral hazard and adverse selection issues, the high transaction cost attached with individual risk assessment, and damage evaluation. Further, it allows offering an affordable insurance

premium given that individual risk is independent of the disaster risk. Lack of human and technical expertise within the MFIs can be tackled by choosing an appropriate delivery model. Among the four types of insurance delivery models described in the literature, partner-agent model (other three types include full-service model, community-based model and provider model) works well in disaster-related micro insurance because it helps to combine the core competencies of both microfinance and insurance. In the partner-agent model, commercial insurer designs the product with the collaboration of MFIs and delivered through the microfinance client network. Therefore, MFIs transfer its risk to a commercial insurer while earning a fixed income (such as service charges) and securing the livelihood of poor clients. On the other hand, the insurer manages to reach a niche of market segment at a low operational cost.

Disaster Occurrence Management

These are the measures that implement during a disaster time; rescue operations and emergency responses. MFIs can play only a limited role during the rescue operations, compared to other co-partners such as security forces, fire brigade and life guard groups. However, MFIs, especially due to its physical proximity to clients, can provide essential assistances such as food, medicines and shelters, for the disaster affected people (Parker & Nagarajan, 2000; Pantoja, 2002). Nevertheless, such program should be brief and offers only for a shorter period as it is not a core business of MFIs (Kumar & Newport, 2005). Disaster communication and early warnings of disasters serve as effective tools to reduce the disaster impact on disaster-prone communities. Adverse impacts of 2004 Tsunami on Sri Lanka could have been mitigated if people in the risky areas were informed about the incident, or at least, they were aware about such an incident called Tsunami. MFIs are a cost-efficient channel to disseminate early warnings to the disaster-prone members (Parker & Nagarajan, 2000). Therefore, an efficient disaster management system can be developed by creating a proper link between emergency managing organizations, for example, Disaster Management Center (DMC) and Meteorological Department in Sri Lanka, and MFIs. Disaster-related deposit is another tool that can be used by MFIs to help its clients during the disaster occurrence period. The concept is similar to safe locker facilities provided by many formal financial institutions. This enables poor clients to find a safe haven for their valuables in a wake of a disaster. In cases where fore-warning is possible, disaster-

related deposits can be introduced effectively. For instance, BRAC has introduced non-interest bearing saving accounts during the 1998-flood in Bangladesh, to secure the excess money balances of members (Brown & Nagarajan, 2000).

Post-Disaster Management

Loan rescheduling, rehabilitation loans and reconstruction loans are the main tools utilized by MFI in the post-disaster management phase. Loan rescheduling program may contain either rescheduling repayment; for instance, increasing loan repayment period, or rescheduling interest rate of borrowed fund, or both. Nevertheless, MFIs should not offer any loan write-offs as it affects on future repayment behaviour of members (Kumar & Newport, 2005). Many MFIs disburse credits among members under strict repayment conditions, which are combined with group responsibility and short-term regular repayments. Yet, in a disaster situation, strict repayment system does not work well as disaster damages the repaying ability of the members. If the system continues during the period of disaster, MFIs may fail to achieve its main objective of poverty alleviation because members have to borrow more funds to repay their loan in the absence of their regular income sources. Hence, many studies recognize the importance of loan rescheduling in the post-disaster period (Pantoja, 2002; Shoji, 2007; 2010). Shoji (2007) argues that the flexible repayment system played a crucial role to reduce the members' dependence on informal money lenders in the post-disaster reconstruction. According to his findings, microfinance members who did not entitle for loan rescheduling had borrowed more funds from informal sources than non-microfinance respondents. This confirms the high dependence of microfinance members on informal borrowing in the post-disaster, if strict repayment policy continues. However, MFIs should try to have a trade-off between loan rescheduling and stability of the institute (Shoji, 2007). In addition, microcredit plays an instrumental role in restoring the livelihood activities of the disaster affected poor (Ray, 2010).

Indirect Disaster Management Measures of MFIs

Disaster impacts are numerous on affected communities, but the magnitude of impact on households could be different depending on their level of exposure and vulnerability. Poverty level of household is a main determinant of the vulnerability (Sharma, 2001; Reutela,

2006) because, low-income and lack of sound economic background pressure poor people to live in cheap, but hazard prone locations such as flood plains, unsuitable hill sides, etc. (Ariyabandu, 2003). Lack of access to resources (natural, human, social and financial) and opportunities (market, policy and institutional) also increase the vulnerability of poor against disasters (Ray, 2010). In addition, high dependency on agricultural income, which is directly proportional to weather changes (Kumar & Newport, 2005), also increase the vulnerability of poor in a disaster situation. Therefore, poverty alleviation initiatives of MFIs improve the resilient of households against disasters.

Microfinance, through its group lending structure, enhances women empowerment, especially in the societies where patriarchal culture is prevailing (Sanyal, 2009). Some studies have shown that the impact of microfinance on female headed household is greater than male headed household (Zohir et al., 2001; Khalily, 2004). Microfinance empowers women, not only in individual perspective (Kabeer, 1998; Zaman, 1999; Khalily, 2004; Pitt et al., 2006; Ray, 2010) but also in collective perspective (Sanyal, 2009). Women empowerment is critically important in disaster management as women in general and women headed households, in particular, are highly vulnerable groups for disasters (Ariyabandu, 2003; Ray, 2009; 2010). Therefore, women empowerment activities of the MFIs indirectly reduce the disaster vulnerabilities of women.

Households having a single source of income are more vulnerable to external shocks as compared to a household having multiple sources of income (Khan & Kurasoki, 2007). Nonetheless, income diversification within the same geographical region is less resilient for disasters. Therefore, helping households to diversify their income, especially to the non-agricultural sector, bring a definite advantage in capacity building. Microfinance members have a relatively high potential to diversify their income sources than others (Armendariz & Morduch, 2007). Thus, income diversification initiatives of MFIs reduce the vulnerability of its members.

By definition, microfinance encourages regular and tiny saving and disburses credits among their members on group responsibility and, possibly, without any collateral. According to Armendariz and Morduch (2007) close proximity of the MFIs and regular contact with clients encourage regular saving, in tiny amounts. Sometimes,

the accumulated saving balances are not so big; however, it makes a difference of the life style of poor and near poor by creating an extra liquidity (Armendariz & Morduch, 2007). The extra liquidity created through accumulation of saving enhances the capacity of disaster-prone communities as it increases the access to resources and opportunities at all the three stages of the disaster. In the post-disaster stage, many disaster victims used to borrow funds from informal sources to meet their liquidity requirements. This is due to the supply constraints and the lack of opportunities in the formal sector. However, those who have access to the formal financial sector are better off as they can borrow funds under favourable terms than those who are not. However, high dependency of microfinance members on informal sector has been condensed by providing microcredit.

According to the above arguments, indirect and direct disaster management measures of the MFIs increase the resilient of its members against disasters. Figure 1 shows the links between disaster management cycle and disaster management tools available for MFIs. In conclusion, the literature provides strong evidence to support the involvement of microfinance in disaster management.

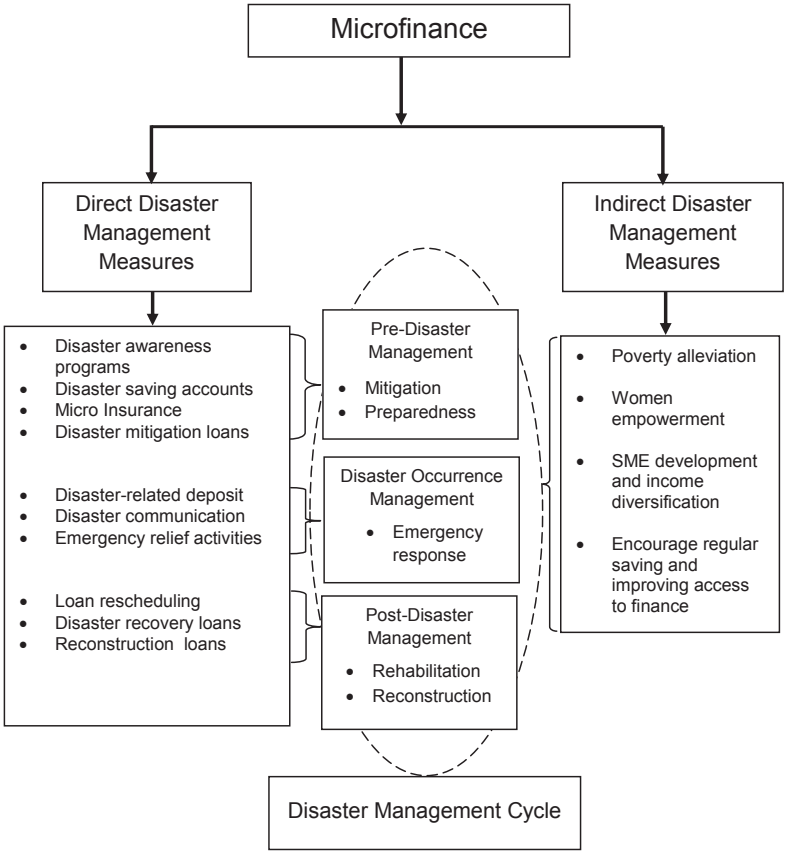
Methodology

The study design followed the case study methodology. Flood is the most frequent disaster in Sri Lanka. In 2008, many parts of the country were affected by severe floods. According to the "DesInventar" database, the event accounted for 49 lives, and more than 400,000 people were affected. Nearly 45,000 houses were damaged, and around 6000 people were evacuated. In addition, this was the most recent disaster event before the field survey. Therefore, the 2008 - flood was selected as the disaster event for the study. Field survey and a key informant survey were conducted, and quantitative and qualitative tools were employed to derive conclusions.

Data and Sampling

The Kalutara District was selected as the geographical location of the study. Kalutara is a natural disaster-prone area for floods, landslides, cyclone, epidemics, sea erosion and Tsunami.

Figure 1: The Role of Microfinance in Disaster Management



Source: Compiled by the author

Flood is an annual event where in April, May or October monsoons bring the flood into the District. According to the DMC of Sri Lanka, 12 out of 14 Divisional Secretariat (DS) divisions within the Kalutara District are vulnerable for flood. In 2008, Kalutara was the most severely affected district in the country. Further, microfinance is a well-known concept in the district due to the presence of famous MFIs in Sri Lanka such as Sanasa, Sarvodaya and Ceylinco Grameen Bank. Therefore, we believe that the selected geographical location

provides a reasonable background to achieve the objectives of the study.

DS divisions in the Kalutara District have heterogeneous characteristics. Hence to avoid the regional bias in the sample, three DS divisions, namely, Dodangoda, Pallindanuwara and Bulathsinghala, were selected by employing stratified sampling technique. In 2008, the number of flood affected households was 177,690 in the Kalutara District in which nearly 56% were registered from the above three DS divisions. Therefore, using the number of flood affected households in each division as the criteria, a sample of 60 respondents was selected. Given the budget and other constrains, data collection was limited to one Grama Niladari Division (GND) from each DS division. The selection of GNDs was based on the severity of flood impacts in 2008 and the availability of microfinance services within the GNDs. Selected GNDs were Palada from Pallindanuwara, Ukwatta from Dodangoda and Yatagampitiya from Bulathsinghala.

Table 1 shows the number of flood affected household in each DS division in the Kalutara District, and the selected respondents from each GND. In the final stage, random sampling technique was employed to select responding households from each GND. Therefore, we believe that the random process we employed to select the responding households has minimized the limitations of small sample in our quantitative analysis.

Household survey was conducted in the first week of September 2009. A standardized self-prepared questionnaire was used for data collection, and the questionnaire consists of five sections that include demographic details of household members, disaster vulnerability details, microfinance activities during the flood-2008, recovery level of households and other details. Before we developed the final questionnaire, a pilot survey was conducted at Ukwatta GND in the Dodangoda DS. The questionnaire was administrated by a group of invigilators, including the researcher. In addition, a key informant survey was carried out in two stages. In the first stage- before the survey- a series of interviews conducted with the officers of DMC of Sri Lanka, the Kalutara District coordinator of DMC, representative of UNDP Sri Lanka office and the welfare officers of each DS office.

Table 1: Number of Flood Affected People in Kalutara District - 2008

Divisional Secretariat Division	Affected People	Percentage	Sample Selected	Study Village (Grama Niladhari Divisions)
Palindanuwara	25,900	14.58	15	Palada
Millaniya	16,247	9.14	-	-
Walallavita	8,025	4.52	-	-
Bulathsinghala	41,700	23.47	25	Yatagampitiya
Dodangoda	31,200	17.56	20	Ukwatta
Madurawala	25,000	14.07	-	-
Kalutara	12,654	7.12	-	-
Mathugama	2,734	1.54	-	-
Ingiriya	8,067	4.54	-	-
Bandaragama	1,800	1.01	-	-
Beruwala	34	0.02	-	-
Horana	400	0.23	-	-
Panadura	1,749	0.98	-	-
Agalawatta	2,180	1.23	-	-
Total	**177,690**	**100.00**	**60**	**-**

Source: Compiled by the author based on DesInventar Database 2009

In the second stage of the survey, office bearers of MFIs and GN officers were interviewed. Out of 60 household details, four questionnaires were rejected due to incompleteness of data, and the remaining 56 household level observations and 211 individual observations were scrutinized for data analysis.

Historical disaster data was extracted from the “DesInventar” database, which contains disaster information about Sri Lanka from 1978 to date. The database is administrated by the Network of Social Studies on Disaster Prevention in Latin America, LA RED, which is a non-profit NGO with over 12 years of activities, mainly in Latin America, the Caribbean, Asia and Africa.

Testable Hypotheses

Vulnerability Analysis

Cannon (1994) identifies health status as one of the three aspects of vulnerability, and as explained by Few (2007), health states are an immediate concern in the post-flood rehabilitation. And also, about 28% of the respondents suffered from flood-related illness such as diarrhea and fewer. Therefore, health status of flood affected people was examined as a vulnerability factor. In addition, formal financial sector tends to cease their operation or reduce the scale of operation in a disaster situation by creating a vacuum in the financial market. On the other hand, demand for emergency funds increase as people try to meet their increasing liquidity requirements. Hence, many victims, poor in particular, have to depend on informal borrowing in the post-disaster period. In the sample, households that have borrowed funds in the post-disaster period, nearly 56 percent have borrowed from informal sources at an average interest rate of 70 percent per annum. The informal interest rate is way above the formal average rate of 11 percent and microfinance average lending rate of 21 percent. Hence, the determinants of post-disaster borrowings exhibit the various aspects of financial vulnerability of the victims. Moreover, those who are having a sound risk coping strategies such as insurance and enough saving are less likely to use borrowing in the post-disaster phase. In the above context, two hypotheses were developed to test the disaster-related vulnerabilities of respondents in the three GNDs as follows:

Hypothesis 1

Physical vulnerability of disaster affected people in the Kalutara District depends on a set of social, economic and geographical factors.

Hypothesis 2

Financially vulnerable people and those who do not possess sound risk coping strategies have a high probability to access post-disaster credits.

Impact of Microfinance on Household Recovery

According to the survey findings, recovery levels were significantly different among households. A group of households had fully recovered while another group was struggling to re-establish the pre-disaster condition. It is, therefore, interesting to analyze the underlying causes of quick recovery of some households than the others. If microfinance plays an effective role in disaster management, through indirect and direct disaster management measures, its members should have a higher potential to recover than non-members. Therefore, we adopt the following hypothesis:

Hypothesis 3

Due to the indirect and direct disaster management measures of MFIs, microfinance members have a higher probability of being recovered from the disaster-related losses than non-members.

Specification of the Regression Models

Three regression models were developed to test the above hypotheses. Model 1 analyzes the determinants of being suffered from water-related illnesses after the flood - 2008 by employing individual data with 211 observations. The specification of Model 1 is as follows:

$$Illness(y = 1) = f(M_{ij}, S_j, RD_j, AD_j, L_j) \quad ---------(01)$$

Where, illness is a dummy variable, which takes 1 if member i in the household j is suffered from any flood-related diseases and zero otherwise. Members in the same household have different vulnerability exposures depending upon their age and gender (Ariayabandu,2003; Ray, 2010). Therefore, Mij captures the significance of individual characteristics in physical vulnerabilities. Availability of clean water and appropriate sanitary facilities are major determinants of healthy life. In a flood situation, people who do not have those facilities possess a greater risk of being sick than others. Hence, Sj controls the impact of such facilities on the dependent variable. Introducing regional dummies are common in regression analysis as it helps to control for unobserved heterogeneities at the

regional level (Sawada & Shimizutani, 2008; Shoji, 2010). Moreover, we observed some regional disparities in the effectiveness of disaster preparedness, disaster relief and rescue operations in the Kalutara district. Of the three DS divisions, Dodangoda is more urbanized, and had a proper pre-disaster management system, whereas post-disaster relief and rehabilitation operations have been effectively implemented in the Palindanuwara DS division. For instance, DMC with collaboration of JICA has completed the disaster mapping project before the flood-2008 in many GN divisions of the Dodangoda DS divisions, including Ukwatta GND. Therefore, in order to control for such unobserved heterogeneities in divisional level, regional dummies (RDj) were introduced. Sawada and Shimizutani (2008) have controlled for the degree of house and asset damages to capture the determinants of post-disaster borrowings in earthquake hit Kobe, Japan. Moreover, Matul and Tsilikounas (2004) argue that households with fewer assets are more vulnerable for disasters than those who have more assets. Therefore, households that experience major damages to their stock of assets have a higher vulnerability than others. Hence, ADj (asset damages and degree of house damages; full, major and minor) included to capture such impacts on physical vulnerability. Finally, distance between disaster event and locality of the respondents, for example, distance to the epicenter in case of earthquake (Khan & Kurosaki, 2007) and distance to the river in case of floods (Shoji, 2010) is another determinant of vulnerability. Therefore, Lj measures the distance between river and the house as a determinant of being sick after the flood.

Model 2 was formulated to identify the determinants of post-disaster borrowing behaviour of the disaster victims, and it employed 56 household observations to estimate the coefficients.

$$borrowings\ (y_i = 1) = f(HH_i, H_i, EA_i, AD_i, LQ_i) - - - - - - (02)$$

Where, the borrowings is a dummy variable, which takes 1 if i th household has any post-disaster borrowings or zero otherwise. HHi represents a set of characteristics of the household head (age, age square, gender and maximum educational attainment), and Hi represents a set of characteristics of the household, which includes insurance dummy and fixed income dummy. Insurance is an effective pre-disaster risk mitigation strategy (Shylendra & Bhirdikar, 2009). Therefore, those who are having a formal insurance should have

a lower reliance on post-disaster borrowing as they are entitled to claim the damages from the insurer. According to Khan and Kurasoki (2007) households with stable income have reported a low rate of delaying repayments; hence it is reasonable to assume that income fluctuation increases financial vulnerability of households. Therefore, insurance and fixed income dummies were introduced. EAi dummy includes the compensation or other external assistance received by the household. If victims are compensated by the government or any other organization, it is assumed that they do not need to access the post-disaster borrowings. However, if the victims are not fully compensated, their behaviour cannot be predicted. ADi contains dummy variables for household asset damages and degree of house damages. LQi represents the quantity of arable lands (paddy and agricultural) available for the household. Quantity of land ownership, which does not change in a short period of time, is considered as a proxy variable for poverty because the recorded income during the survey, which was conducted 15 months after the disaster, seems to be significantly different from the income at the time of disaster. We expect a negative coefficient for land ownership as poor families-those who possess lower quantity of land for cultivation - expected to depend more on the post-disaster borrowings.

Model 3 intended to capture the effectiveness of microfinance involvement in disaster management by employing 56 household observations. The sample consists of 36 microfinance member households and 20 non-member households. Microfinance members and non-members were selected using purely randomized sampling technique; hence we have avoided the possible selection bias of the sample. The sample consists of 28 households who have recovered and the same number of households who are not. The specification of the model is as follows:

$$recovered\ (yes = 1) = f(HH_i, H_i, RD_i, EA_i, AD_i, MF_i) - - - - - - - (03)$$

where, recovered is a dummy variable, which takes 1 if household i is recovered from flood related loses and zero otherwise. HHi , Hi , ADi and EAi share the same characteristics as in Model 2. Further, RDi controls for the regional disparities as justified in Model 1. MFi represents the microfinance membership, which takes 1 if at least one household member has microfinance membership or zero otherwise. If the disaster management measures of MFIs in

the region are effective, microfinance members should have a higher probability to recover than non-members. Hence, if the coefficient of MFi is significant while controlled for all other regressors, it concludes that microfinance members have recovered more quickly than non-members, otherwise, it says that microfinance does not have a significant impact on recovery. Therefore, the MF dummy helps to capture the effectiveness of disaster management measures of MFIs in the Kalutara District. Summary statistics of variables used in the three models are given in Table 2.

Table 2: Summary Statistics of the Variables

Description	Observations	Mean	Standard Deviation	Min.	Max.
(A) Individual Data (Model 1) Dependent Variable					
Dummy for Disaster Illness	211	0.1280	0.3348	0	1
Independent Variables					
Age	211	31.0379	19.7288	1	87
Age Squared	211	1350.735	1430.8080	1	7569
Sex Dummy	211	0.5071	0.5011	0	1
Dummy for Safe Water Availability	211	0.5450	0.4992	0	1
Dummy for Safe Sanitary Facilities	211	0.8957	0.3063	0	1
Regional Dummy 1	211	0.4408	0.4977	0	1
Regional Dummy 2	211	0.2417	0.4291	0	1
Distance from Main River (Meters)	211	490.2607	659.5912	5	3000
House Damage Dummy 1	211	0.1232	0.3295	0	1
House Damage Dummy 2	211	0.0521	0.2228	0	1
House Damage Dummy 3	211	0.0142	0.1187	0	1
Household Asset Damages Dummy	211	0.2180	0.4139	0	1

Cont'd...

(B) Household Level Data (Model 2 and 3) Dependent Variables					
Dummy for Post-Disaster Borrowings	56	0.2857	0.4558	0	1
Dummy for Household Recovery	56	0.5000	0.5045	0	1
Independent Variables					
Age	56	45.0179	12.6699	25	73
Age Square	56	2184.268	1186.4640	625	5329
Sex Dummy	56	0.9107	0.2877	0	1
Primary Education Dummy	56	0.3750	0.4885	0	1
Secondary Education Dummy	56	0.5357	0.5032	0	1
Insurance Dummy	56	0.1071	0.3121	0	1
Fixed Income Dummy	56	0.2679	0.4469	0	1
Dummy for Compensations	56	0.8571	0.3531	0	1
Household Asset Damages Dummy	56	0.8214	0.3865	0	1
House Damage Dummy 1	56	0.4643	0.5032	0	1
House Damage Dummy 2	56	0.1964	0.4009	0	1
House Damage dummy 3	56	0.0536	0.2272	0	1
Quantity of Agricultural-Land	56	35.1071	74.2126	0	360
Quantity of Paddy Lands	56	43.3393	93.8320	0	560
Dummy for Microfinance Membership	56	0.6429	0.4835	0	1
Regional Dummy 1	56	0.4464	0.5016	0	1
Regional Dummy 2	56	0.2321	0.4260	0	1

Source: Compiled by the author based on survey data 2009

Findings and Analysis

Research findings indicate that MFIs in the study area have been directly involved in disaster management activities to reduce the vulnerabilities of their members. Among the 10 disaster management tools identified through the literature, three tools are in operation with varying degrees. Disaster recovery loan is the most frequently employed disaster management tool by MFIs. Nearly 46% of the respondents received disaster recovery loans from MFIs immediately after the floods. Pre-disaster awareness program and disaster rehabilitation programs are the other tools that have been implemented.

Table 3 exhibits the disaster management tools available for MFIs at three phases of disaster management cycle and the percentage of households within the sample who received such services. It is clear from the data that disaster management activities of MFIs are more frequent in the post-disaster period. Although some exposure in the pre-disaster management is visible; disaster awareness program, MFIs have not touched more effective risk management strategies such as micro insurance and disaster saving within their risk management framework.

Among the respondents, about 70% have experienced varying degree of damages on their houses, and about 82% have lost or damaged some of their household assets. Households have scrutinized different funding sources, which include saving, government and private aids, formal and informal loans, business profits, proceeds of selling assets, and income generated by working additional hours, to re-establish their lost properties and livelihood activities.

Figure 2 presents various funding sources that scrutinized by victims in the post-reconstruction stage, and It should be noted that some households have used multiple sources of funding for reconstruction. Among the total that experienced any form of damage, 43% have used their existing saving for reconstruction purposes. Meantime, both informal borrowings and government aid accounted for 19 percent each of the frequencies of funding sources. Banking practices among the responding households are not impressive. For instance, about 28% of household heads do not have at least a normal saving account. Nevertheless, many disaster victims have

utilized their existing saving in the rehabilitation and reconstruction stage. Thus, it is reasonable to assume that these households accumulated micro saving in MFIs, or some other informal sources. In addition, availability of post-disaster loans was more frequent for microfinance members. Accordingly, our qualitative study suggests that micro savings and recovery loan have some significant impact on the recovery of microfinance members.

Table 3: Disaster Management Practices of MFIs in the Selected Three Villages

Disaster Management Phase and the Tool	Percentage of Households Received the Service
Pre-Disaster Management	
Pre-Disaster Awareness Programs	11%
Disaster Saving Accounts	00%
Disaster Micro Insurance Schemes	00%
Disaster Risk Mitigation Loans	00%
Disaster Occurrence Management	
Disaster Communication Programs	00%
Disaster Rehabilitation Programs	14%
Disaster-Related Deposits	00%
Post-Disaster Managing	
Loan Re-Scheduling	00%
Disaster Recovery Loans	46%
Reconstruction Loan	00%

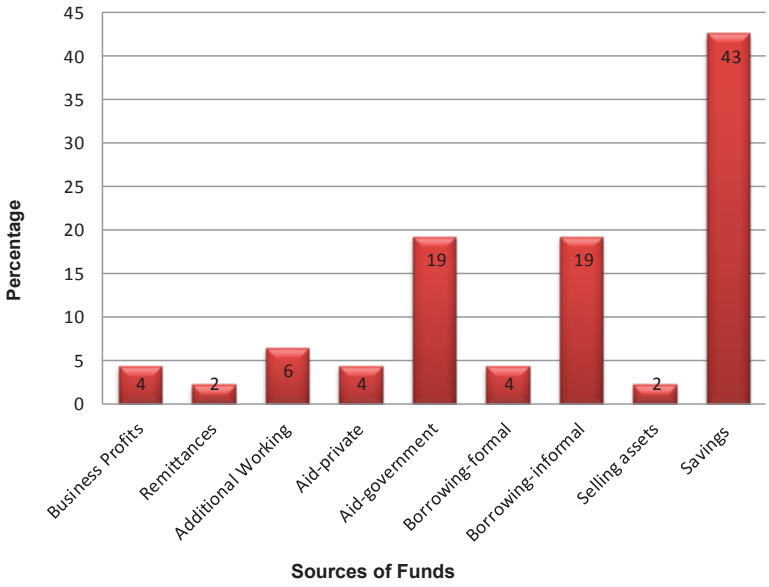
Source: Compiled by the author based on survey data 2009

Regression Analyses

Findings of the regression analyses are presented in the following sub-section. All the three dependent variables are binary variables, 1 or 0. The OLS was not an appropriate technique as most of the estimated coefficients were negative and greater than one. Therefore, probit models were estimated by maximum likelihood. The dprobit command in STATA provides the marginal effects of independent variables on the dependent variable. The three models were estimated with dprobit command. Further, the significance level

of the coefficients is estimated based on robust standard errors. The estimated results of model 1 are presented in Table 4.

Figure 2: Main Sources of Funds Utilized for Recovery



Source: Compiled by the author based survey data 2009

Accordingly, children, elders and females are more vulnerable to flood-related illnesses compared to their counterparts. Negative coefficient of age and the positive coefficient of age square are significant at 99% confidence level. Negative coefficient of age suggests that lower age respondents have higher probability of being suffered from disease than elders, whereas positive coefficient of age square confirms that beyond age 45, probability tends to increase again. The coefficient of sex dummy is negative and significant at 95% confidence level. Therefore, we can conclude that probability of being suffered from disease is higher for female respondents than their male counterparts. Further, respondents of Bulathsinghala DS division are more vulnerable than the respondents in Dodangoda DS division. However, the difference is not significant between Palindanuwara and Dodangoda. Therefore, as we expected, regions where disaster management practices are effective, vulnerabilities were lower. Finally, coefficient of the dummy variable for household asset damages is positive and highly significant.

Table 4: Determinants of Post - Flood Illness

Dummy for Disaster Illness (If Suffered from any Flood Related Diseases = 1)	
Age	-0.0106***
	(-4.603)
Age Squared	0.000118***
	(4.263)
Sex Dummy (Male=1)	-0.0775**
	(-2.342)
Dummy for Safe Water Availability (Yes=1)	-0.0328
	(-1.099)
Dummy for Availability of Safe Sanitary Facilities (Yes=1)	-0.0564
	(-1.147)
Regional Dummy 1 (Bulathsinghala=1)	0.119*
	(1.833)
Regional Dummy 2 (Palindanuwara=1)	0.0568
	(0.834)
Distance from Main River	3.08e-05
	(1.451)
House Damage Dummy 1 (Minor Damage=1)	-0.0155
	(-0.324)
House Damage Dummy 2 (Major Damage=1)	0.0723
	(0.888)
House Damage Dummy 3 (Full Damage=1)	-0.0261
	(-0.401)
Household Asset Damages Dummy (Yes=1)	0.354***
	(3.153)
Observations	211
Log Likelihood	-54.104
Prob > chi2	0.000
Pseudo R2	0.330

Notes: Figures in parentheses are robust z-statistics.
**significant at 10% level; ** significant at 5% level; ***significant at 1% level*

Source: Compiled by the Author based on Survey Data 2009

Table 5: Determinants of Post - Disaster Borrowings

	Dummy for Post-Disaster Borrowings (If Funds have Borrowed After Flood - 2008 = 1)
Age	-0.0742**
	(-2.374)
Age Square	0.000734**
	(2.165)
Sex Dummy (If Household Head is a Male=1)	-0.366
	(-1.134)
Primary Education Dummy (If Maximum Educational Attainment of Household Head is Primary=1)	0.758***
	(2.917)
Secondary Education Dummy (If Maximum Educational Attainment of Household Head is Secondary=1)	0.410*
	(1.950)
Insurance Dummy (If Household has any Type of Insurance=1)	-0.122
	(-0.652)
If Household Member has a Fixed Income Source (Yes=1)	0.696***
	(3.226)
Dummy for Compensations (If not Compensated=1)	-0.610***
	(-3.054)
Household Asset Damages Dummy (yes=1)	-0.182
	(-1.075)
House Damage Dummy 1 (Minor Damage=1)	-0.0280
	(-0.203)
House Damage Dummy 2 (Major Damage=1)	0.338*
	(1.689)
House damage dummy 3 (fully damage=1)	0.488
	(1.234)

Cont'd...

Quantity of Agricultural-Land	-0.00013 (-0.184)
Quantity of Paddy Lands	-0.00051 (-0.647)
Observations	56
Log Likelihood	-20.855
Prob > chi2	0.002
Pseudo R2	0.378

Notes: Figures in parentheses are robust z-statistics
** significant at 10% level; ** significant at 5% level; ***significant at 1% level*

Source: Compiled by the Author based on Survey Data 2009

These findings confirm the existence of some social and geographical differences in health-related vulnerabilities among the respondents. The estimated results of the model 2 are presented in Table 5.

Accordingly, age has a negative relationship with post disaster borrowings. Younger household heads have a lower probability to access the post-disaster loans. However, after age 51, the probability tends to increase. Hence, it is confirmed that elderly household heads are more financially vulnerable in the post-disaster period. However, we cannot find any gender dimensions in the financial vulnerability as the coefficient for the sex dummy is not significant.

We considered the tertiary education as the base category of two education dummies. Findings confirmed that a household head with a primary education has a higher probability of 0.76 to access post-disaster loan than the base category. Further, if the education level of the house head is secondary, the probability of being access to the post-disaster borrowings is 0.41 higher than the base category. It also shows that household heads with primary education has higher probability to access post-disaster borrowings than household heads with secondary education. The insurance dummy is not significant, but it has a negative relationship with post-disaster borrowings as expected. The probability of access to post-disaster borrowing is 0.70 point higher for those who are having a fixed income. Many government and private sector organizations in Sri Lanka disburse concessional loans to their workers in the post-disaster

period. For a government worker, the annual interest rate is about 4 percent for emergency loans. Even though there is no real need for such external funds, disaster affected workers claim for concessional loans to get realized the benefits of low-interest funds. Thus, we interpret this as an outcome of rent seeking behaviour of workers. Highly significant and negative coefficient exhibits that non-compensated households are less probable to access to post-disaster borrowing than compensated households. This may be due to the fact that, the victim who get the compensation is more likely to experience more damages than those who did not get it or else, the compensation might be not sufficient for reconstruction purposes. During the survey we observed that some severely damaged households had not received any compensation while less severely damaged households have received some compensation. Therefore, we attribute this positive impact for the latter, which is insufficiency of compensations. Severity of house damage is another significant determinant of post-disaster borrowings. Households that have experienced major house damages have a higher probability of 0.34 to access post-disaster borrowings than a household who have not experienced any house damages. Therefore, our findings confirm that financially vulnerable and less disaster risk-averse households are more likely to borrow fund in the post-disaster stage.

Table 6 shows the regression output of Model 3. Age and education dummies are not significant at any conventional significance levels; hence we cannot find any impact of the education and the age of the house head on household recovery. Nonetheless, the probability of being recovered is significantly higher for the male headed households than female headed households. This is in line with the literature findings that female headed households are more vulnerable to disasters. However, surprisingly, the impact of insurance and having fixed income are not significantly influenced on household recovery. Further, households in Dodangoda DS division have a higher probability to recover than that of Palindanuwara DS division. However, there is no any significant difference of recovery between Dodangoda and Bulathsinghala. Hence, we suspect that unobserved factors (unobserved heterogeneity) in three DS divisions influence differently on household recovery.

Most importantly, the coefficient of MFi is significant at 10% significance level, which implies that the probability of being recovered is 0.41 higher for microfinance members than

non-members. Hence, this is further confirmed that the disaster management activities of MFIs in the region Table 2 have a positive impact on household recovery. Moreover, excessive use of savings for reconstruction and rehabilitation purposes indicates that disaster victims have some reasonable amount of accumulated saving.

Table 6: Determinants of Household Recovery after One Year of the Flood - 2008

	Dummy for Household Recovery from Flood after One Year (Recovered=1)
Age	-0.0380 (-0.819)
Age Square	0.000541 (1.094)
Sex Dummy (If Household Head is a Male=1)	0.445* (1.696)
Primary Education Dummy (If Maximum Educational Attainment of Household Head is Primary=1)	-0.420 (-1.146)
Secondary Education Dummy (If Maximum Educational Attainment of Household Head is Secondary=1)	0.150 (0.557)
Insurance Dummy (If Household has any Type of Insurance=1)	-0.131 (-0.432)
Dummy for Microfinance Membership (Yes=1)	0.413* (1.727)
If Household Member has a Fixed Income Source (Yes=1)	-0.325 (-1.320)
Dummy for Compensations (If not Compensated=1)	-0.449** (-2.422)
Regional Dummy 1 (Bulathsinghala=1)	-0.0535 (-0.200)
Regional Dummy 2 (Palindanuwara=1)	-0.540* (-1.905)
Household Asset Damages Dummy (yes=1)	-0.528*** (-3.095)
House Damage Dummy 1 (Minor Damage=1)	-0.241 (-1.248)
House Damage Dummy 2 (Major Damage=1)	-0.498** (-2.148)
House Damage Dummy 3 (Fully Damage=1)	-0.251 (-0.772)

Observations	56
Log Likelihood	-21.761
Prob > chi2	0.005
Pseudo R2	0.439

Notes: Figures in parentheses are robust z-statistics.
**significant at 10% level; ** significant at 5% level; ***significant at 1% level*

Source: Compiled by the Author based on Survey Data 2009

Availability of this accumulated saving may be due to the presence of MFIs in the region. In addition, those who experienced severe damages on house and household assets are less likely to be recovered. If any household experienced some damages on household items, the probability of being recovered is 0.53 lower than a family who did not experience any severe damages. Similarly, if house damages are severe, the probability of being recovered is 0.50 lower. Moreover, households that received any compensation are more likely to recover than others. More specifically, if the household received any compensation, the probability of being recovered is 0.45 higher than a family who was not compensated.

Conclusions

The literature review suggested that direct and indirect disaster management measures of MFIs help to increase the capacity of its members compared to non-members. Indirect measures are the generally accepted microfinance activities; poverty alleviation programs, income diversification initiatives, SME development, promoting regular saving, improving access to finance, and women empowerment activities, that increase the capacity of disaster vulnerable people. In addition to the indirect measures, MFIs should directly involve in disaster management to ensure its long-term sustainability because MFIs have an adverse selection of highly vulnerable group as their clients. In the pre-disaster management phase, MFIs can utilize four main tools, namely, disaster mitigation loans, disaster awareness programs, disaster micro insurance and disaster saving accounts, to reduce the disaster-related risk of microfinance members. Disaster communication, disaster-related deposits and emergency relief activities are the tools that can be employed in the disaster occurrence stage, whereas loan

rescheduling, rehabilitation loans and reconstruction loans serve as the post-disaster management tools.

The case study revealed that MFIs in the Kalutara district have shown some exposure into the direct disaster management activities. Post-disaster rehabilitation loans are the most frequently operationalized tool by MFIs in the region. Although we find some exposure of microfinance activities in pre-disaster management and disaster occurrence management phases, the frequencies remained comparatively low. The vulnerability analyses witnessed our finding in the literature review. Accordingly, elders, children and women are more vulnerable for flood-related diseases. Further, uneducated and elderly house heads have a higher probability of using post-disaster borrowing as a coping strategy. Finally, and most importantly, the findings convinced that the probability of being recovered is higher for the microfinance members than non-members. It implies that microfinance members in the three villages are more resilient against disaster. Microfinance members could accomplish this extra resilience due to the indirect and direct disaster management measures that have been employed by MFIs in the region. Therefore, we conclude that MFIs in Kalutara District have been effectively involved in disaster management activities.

Shylendra and Bhirdikar (2009) stress that saving, credit and insurance are the most effective tools that should be implemented in microfinance - based disaster mitigation projects. However, in our opinion, risk management (pre-disaster) is more effective than crisis management (post-disaster) in any disaster management program. Therefore, it is recommended to implement risk management strategies such as micro insurance, disaster awareness programs and disaster mitigation loans to get more effective outcomes of the disaster management activities of MFIs.

References

Ariyabandu, M. M. (2003). Bringing together disaster and development-concepts and practices: Some experience from South Asia. In P. Shani & M. M. Ariyabandu (Eds.), *Disaster risk reduction in South Asia* (pp. 26-36). New Delhi: Prentice-Hall.

Armendariz, B. & Morduch, J. (2007). *The economics of microfinance.* London: MIT Press.

Asghar, S., Alahakoon, D., & Churilov, L. (2006). A comprehensive conceptual model for disaster management. *Journal of Humanitarian Assistance,* Retrieved July 12, 2006, from http://sites.tufts.edu/jha/

Brown, W. & Nagarajan, G. (2000). *Bangladesh experience in adapting financial services to cope with floods: Implication for the microfinance industry*. Washington, DC: Development Alternatives Inc.

Cannon, T. (1994). Vulnerability analysis and the explanation of natural disasters. In A. Varley (Eds), *Disasters, Development and Environment* (pp. 13-31). New York: John Wiley.

Fernando, N. A . (2008). Managing microfinance risks: Some observations and suggestions. *Asian Journal of Agriculture and Development, 4* (2), 1-21.

Few, R. (2007). Health and climatic hazards: Framing social research on vulnerability, response and adaptation. *Global Environmental Change, 17,* 281–295.

Kabeer, N. (2005). Is microfinance a "magic bullet" for women's empowerment?: Analysis of findings from South Asia. *Economic and Political weekly, 40* (44-45), 4709-4718.

Khalily, M. A. B. (2004). Quantitative approach to impact analysis of microfinance programs in Bangladesh-what have we learned? *Journal of International Development, 16,* 331-353.

Khan, H. U. & Kurasoki, T. (2007). *Vulnerability of microfinance to natural disasters: Evidence from the 2005 Pakistan Earthquake.* [Mimeo]. Retrieved January 07, 2012, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.118.3349&rep= rep1&type=pdf

Khan, H., Vasilescu, L. G., & Khan, A. (2008). Disaster management cycle - A theoretical approach. *Journal of Management and Marketing, 6* (1), 43-50.

Kumar, T. S. A., & Newport, J. K. (2005). Role of microfinance in disaster mitigation. *Disaster Prevention and Management, 14* (2), 176-182.

Matul, M., & Tsilikounas, C. (2004). Role of microfinance in the household reconstruction process in Bosnia and Herzegovina. *Journal of International Development, 16* (3), 429-466.

Mechler, R., Linnerooth-Bayer, J., & Peppiatt, D. (2006). *Disaster insurance for poor?: A review of microfinance for natural disaster risks in developing countries*. Geneva : Pro Vention Consortium.

Morduch, J. (1999). The microfinance promise. *Journal of Economic Literature, 36,* 1569-1614.

Nagarajan, G., & McNulty, M. (2004). *Microfinance amid conflict: Taking stock of available literature*. Washington DC: United States Agency for International Development (USAID).

Pantoja, E. (2002). *Microfinance and disaster management experiences and lesson learned*. Washington DC: World Bank.

Parker, J. & Nagarajan, G. (2000). *Can microfinance meet the poor's financial needs in times of natural disaster?* Bethesda MD: Development Alternatives Inc. (DAI).

Pitt, M., Khandker, S.R. & Cartwrightl, J. (2006). Empowering women with microfinance: Evidence from Bangladesh. *Economic Development and Cultural Change, 54* (4), 791–831.

Rautela, P. (2006). Risk management for vibrant economic growth and sustained development. *Journal of Disaster Prevention and Management, 15* (4), 586-597.

Ray-Bennett, N. S. (2009). The influence of caste, class and gender in surviving multiple disasters: A case study from Orissa, India. *Environmental Hazard, 8,* 5-22.

Ray-Bennett, N. S. (2010). The role of microcredit in reducing women's vulnerabilities to multiple disasters. *Disasters, 34* (1), 240-260.

Ronchi, P. E. (2004). Microfinance: a new way of development? Retrieved January 21, 2012, from http://www.microfinancegateway.org/gm/document-1.9.24183/37.pdf

Sanyal, P. (2009). From credit to collective action: The role of microfinance in promoting women's social capital and normative influence. *American Sociological Review, 74,* 529–550.

Sawada, Y. & Shimizutani, S. (2008). How do people cope with natural disasters?: Evidence from the Great Earthquake in 1995. *Journal of Money, Credit and Bank 40* (2–3), 463–488.

Sharma, V. K. (2001). Managing disasters in new millennium. In P. Sahni, A. Dhameji &, U. Medury (Eds), *Disaster mitigation, experiences and reflections* (pp.15-21). New Delhi: Prentice-Hall.

Shaluf, I. M. (2007). Disaster types. *Journal of Disaster Prevention and Management, 16* (5), 704-717.

Shylendra, H.S. & Bhirdikar, K. (2009). Microfinance-based disaster mitigation: A study of two donor supported projects in Kutch, Gujarat (India). *Journal of Social and Economic Development, 11* (1), 46-67.

Shoji, M. (2007). *Evaluation of flexible repayment system in microfinance: A case study from natural disaster in Bangladesh*. (COE discussion paper foreign language series, COE-DP F-190), Tokyo: University of Tokyo. Retrieved December 21, 2011, from http://www2.e.u-tokyo.ac.jp/cemano/research/DP/documents/coe-f-190.pdf

Shoji, M. (2010). Does contingent repayment in microfinance help the poor during natural disasters? *Journal of Development Studies, 46* (2), 191-210.

Zaman, H. (1999). *Assessing the poverty and vulnerability impact of micro-credit in Bangladesh: A case study of Bangladeshi Rural Advancement Committee (BRAC)*. Washington DC: World Bank.