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Establishing Parameters for Identification of Vulnerable Occupations in a Disaster Scenario in Gujarat, India

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Natural disasters in developing countries have direct and indirect economic effects, which impact the persons from all economic strata. While some can recover, many are left stranded in the aftermath of the disaster, deprived of earning opportunities. An effectual policy targeting this population, mostly engaged in low-income jobs or the informal sector of the economy, can be formulated only if the impact on these occupations can be competently computed. This paper establishes parameters to identify vulnerable occupations and gives direction to devise the strategy for "occupational resilience." The paper also shares the results of a preliminary study conducted in Ahmedabad, Gujarat, India, involving 40 disaster hit communities; victims of urban floods in the last decade, spatially distributed over urban, peri-urban and rural areas and validates the previously laid parameters at the field level. It also gives an insight into the communities' survival strategies and the issues that link the employment and urban-rural linkage elements to the disaster.

KEY WORDS: disaster recovery, vulnerable occupations, occupational resilience, urban-rural linkages, poverty

Introduction

The world has been facing economic inequality and its related perils since a long time. Nevertheless, there has been considerable improvement in the lives of the economically backward population in the last two decades. The percentage of people living on less than $1.25 a day fell from 47 in 1990 to 24 in 2008—a reduction from over 2 billion to less than 1.4 billion (UN, 2012). Nevertheless, we have to address the survival needs of one-fifth of the world's population. Additionally, if the regional scenarios are concerned millions of people have sunk deep into poverty in sub Saharan Africa, where the poor are getting poorer. The situation is worsened by the fact that the employment to populations ratio is going down for both developed (from 57 to 55 percent) and developing regions (from 63 to 62 percent) (UN, 2013). International Labor Organization (ILO) states that 60.9 percent of developing world's workforce remained poor or "near poor" in 2011, living on less than $4 a day (UN, 2013). In the last decade, the United

Nations highlighted the issue of poverty through the Millennium Development Goals in which Goal 1 was stated as to eradicate extreme poverty and hunger (UN, 2005).

Simultaneously, there has been a rise in both the number and magnitude of impact of natural disasters. In the decade from 2002 to 2011, 4,130 disasters were recorded worldwide, victimizing more than a million people, with an estimated economic damage of at least USD1.195billion (UNISDR, 2012). This increased frequency has reduced the natural resilience to the impact of disasters, delayed the recovery time, weakened the resource base, and thereby has caused a systematic degradation of environment and increased socio-economic vulnerability. Moreover, World Disaster Report (2012) (IFRC, 2012) predicts that there would be an increase in extreme weather events in the coming years, which would pose increased danger to the lives of 3.5 billion people living in cities, throughout the world (IFRC, 2010).

The disasters have an inseparable and detrimental relationship with poverty as the risk to the poor is of a magnanimous scale. When disasters strike, poor people often lose their assets on which their survival depends. At the same time, their limited resources, lack of access to education and health services can increase their exposure to risks (UN, 2012). Being poor ascribe one to be at risk, which is intensified by an increase in population and urbanization, and compounded by the climate change effects, and environmental degradation. The developing countries are more exposed to the risks of disasters as their inhabitants often lack the ability to cope with, or adapt to such events, especially in the case of re-occurring disasters.

There has been limited focus on safeguarding the interests of the population engaged in marginal occupations, who arguably suffer the most in an event of a disaster. In a country like India where 29.8 percent of the population lives under the national poverty line (World Bank, 2010), it becomes increasingly important to revive the earning capacities of those who have been hit hard the most. Barring few non-government organizations (NGOs), most of the stakeholders involved in the recovery process neglect this aspect of disaster damage. Additionally, the damage is not only limited to economic recovery but also expands to the secondary effects of social and environmental concerns, which can be severely complex to comprehend. For example, climate induced disasters such as famine, and flood may cause poverty which may lead to an increase in drop-out rates from schools, especially among female students, thereby disturbing the social balance of the whole region.

Most of the ongoing disaster research concentrates on the "physical wave" (Bamdad, 2005); that is the loss to properties and infrastructure, and the medical wave; that is provision of medical attention to those who need it during the emergency, while ignoring the "social wave," that is, the force that damages the structures and functions of a community's social order. The organizational studies are mainly restricted to find the direct economic losses due to disaster. It is true that in a post disaster phase the provision and restoration of physical infrastructure is required, and it directly or indirectly benefits one and all, but at the same

time restoring livelihood is also essential. A city or a village, hit by a disaster, can be restored to normalcy if its citizens are provided with opportunities to earn, immediately after the disaster. For the same reason, it needs to be understood to what extent a particular occupation is vulnerable to a disaster. There is a strong need to lay down the factors that identify the occupational vulnerability due to a disaster. The same parameters would also help in determining the issues that will help the occupations to be more resilient against the disaster.

This paper interlinks the aspects of employment and disaster over the geographical domain through the urban–rural linkages approach. It primarily elaborates on the underlying characteristics of vulnerable occupations and introduces the new concept of occupational resilience. The parameters of occupational resilience are stressed upon, considering the key role it can play in post-disaster economic recovery. The paper also identifies the coping strategies taken up by the communities, to minimize the effects of floods on their economic activities and speed up the recovery process. A strong case is put forth for adopting occupation based post disaster recovery.

Background

A city is exposed to primarily two types of risks: shocks and stresses (Sharma, Surjan, & Shaw, 2011). Shocksare the sudden events such as a natural hazard (earthquake, tsunami, cyclone/typhoons, or flood) and man-made hazard (fire, bomb blast, or an unexpected accident), while stresses can be slow onset low impact processes such as poverty, slumming, seal level rise, or soil salinity. Urban communities fail to gather resources to withstand a shock while stresses erode resilience and increase vulnerability of the population in a slow manner, over a long period of time. At the same time, the villages are becoming vulnerable as well, due to lack of infrastructure, scattered population, lack of disaster management capabilities and limited alternative employment opportunities. The following sub-sections try to analyze the complex linkages between the shocks and stresses of disasters in urban and rural areas, which affect displacement and employment.

Employment and Disaster in India

Local economy gets adversely affected when a natural hazard or a disaster strikes. Not only are lives lost to these disasters, but also loss of livelihood sources and productive assets. People find it hard to recover from the mental abasement caused. Additionally, disasters influence normal life for an extended period of time, through "ripple effects" such as unemployment, inflation, and overall production (Banuri, 2005). Major occupations such as farming, fishing, small trade, micro, and small enterprises in the formal and informal sector, all get hit and paralyzed. The damage is maximum for self-sustaining small scale industries relying on indigenous infrastructure. The economic and social environment suffers a virtual collapse with the enterprises running on loans, find it hard

to repay their loans, thereby experiencing a halt to income generation (FAO-ILO, 2009).

Bhuj earthquake, 2001 in the Kutch region of the Gujarat state serves as a good example to comprehend the impact of a disaster on the local economy. Approximately 10,000 small and medium scale industrial units were shut down due to the damage to plants, factories and machinery. For example, the major victims were ceramic units in Morbi and Surendranagar, art and small tools industry in Kutch, thousands of salt pans in the coastal areas, and diesel engine manufacturing and the machine and tools industry in Rajkot. Additionally, more than 50,000 craftsperson from Bhuj, Anjar, Rapar, and Hodka lost their livelihood to the damage (Vatsa, 2001).

The urban and rural poor, mostly relying on daily wages, are most vulnerable to disaster. They are deprived of their employment due to loss to their productive assets to earn, closure of the factories, enterprises, or non-availability of raw materials for agriculture or industries. Due to their small earnings, they fail to amass savings to sustain themselves through the disrupted days. Another issue is that there is often only one sole earner in these families and due to demise of this principal earner the dependent family members find themselves without support. In most of the cases, these small earners are not identified by government agencies as they mostly belong to informal sector of economy, and hence are omitted from most of the beneficiary programmes or development objectives. With the diversification of jobs in India, there has been immense growth in number of jobs in informal sector in the cities. For example, a study in 1997–98, on the income and employment in the city of Ahmedabad indicates faster growth of employment in informal sector than the formal sector (Rani & Unni, 2002). Even the assistance from government and non-government organizations for the population engaged in petty occupations in informal sector has failed to cast an impact in the long run. Therefore, the right strategy to minimize the effect of disasters would be to make occupations more resilient which would lead to economic empowerment of the poor sections. This would help them to break away from the cycle of poverty. Only then would the benefits of the development be shared and sustained by all.

The key linkages between the issues related to employment and disasters in India are:

1. There is an existence of a large informal sector in urban areas unrecognized by the formal institutions of government. This segment often is not considered by recovery and relief plans by the government.
2. The village economy is mainly based on primary sector like agriculture. Therefore disruption in agriculture and allied activities due to disaster paralyzes the livelihood base for a large part of the rural population.
3. The majority of rural, peri-urban and urban population in India is linked with household industries in the absence of ample formal jobs. Disaster at times disrupts the production in these industries by damaging the assets used to earn a living.

Disaster and Displacement

Disasters in developing regions often lead to the migration of people toward safer places. This can be a consequence of loss of living space and livelihood, and the impact on agriculture, sanitation, and lack of water-food supplies (Swain, 1996). The migration and mobility of the affected population play a key role in the wake of urbanization and changing employment patterns. The flow of population is often directed from the rural areas toward the urban area in search of employment. Srivastava and Shaw (2012) postulates that majority of the migration in India during the decade of 1991–2001, was for employment, after setting aside the migration of women due to marriage.

Belcher and Bates (1982) states that there is an addition to the existing squatter settlements in the prime urban locations owing to rural to urban migration immediately after the disaster. As a result both urban–rural balance (such as demographic structure) and intra urban balance (such as infrastructure capacity) are disturbed. "Migration can thus be seen as an intervening variable in the relationship between urbanization and industrialization on the one hand and the strength of informal ties on the other" (Hendrix, 1976).

The lack of access to assistance and protection, both social and material; lack of access to employment or other income sources for recovery, the scale of damage to property and livelihood assets, the issue of safety and security, and unavailability of natural resources, act as push factors for the out migration of the victims. Previous migratory patterns and pre-existing socio-economic and political context also influence the migration. Belcher and Bates (1982) reinforce the fact that the population living under poverty line needs reason and opportunity to break shackles from their existing condition. The event of a disaster is seen as an opportunity to move and as a catalyst for personal betterment. For example, in an event of drought in the Bolangir district of Orissa, India in the year 2000, nearly 60,000 people migrated to the neighboring state of Andhra Pradesh in search of employment and food (Naik, Stigter, & Laczko, 2007). Similarly, an annual flooding event in Bangladesh, causes people to temporary migrate to urban areas or abroad in search of better opportunities (Naik et al., 2007).

Additionally most of the reports on the after effects of disasters suggest that due to intensification of traditional poverty in the villages of origin, most of the migrants were compelled to search for employment outside the zone of influence of disaster. It is however important to observe that in most cases migration is a response to the increase in poverty and limited employment opportunities caused by natural disasters, and not directly by the hazard itself (Naik et al., 2007). The migration is often the last resort in case of disaster. As in the case of Orissa, India in the drought of 2003 where most of the households sold off their personal assets like utensils, animals and productive seeds and finally moved to other states like Andhra Pradesh, Chhattisgarh, and Maharashtra (Julich, 2011). These types of migration oftenhappen due to inadequacy or inefficiency of employment policies in post disaster scenario.

Importance of Urban Rural Linkages with Respect to Disaster

Urban rural linkages exist in numerous forms. These interactions are defined as "key components of livelihoods and local economies" and "engines of economic, social and cultural transformations" (Tacoli, 1998), owing to the important role they play in determining the future growth of the urban–rural region. Furthermore, even though the scenario in urban and rural areas may be different, they are interrelated to an extent that one has influence over the other, predominantly after a disaster. In India, similar to other developing countries, the urban, peri-urban and rural areas have a hierarchical relationship with the urban area at the helm of this structure. The gap between the two areas can be ascertained by the fact that in India the rural poverty rate is 33.8 while the urban poverty rate is 22.9 (World Bank, 2010).

Cutter et al. (2008) opines that the community resilience to natural disasters is defined by six dimensions: ecological, social, economic, institutional, infrastructure, and community competence. These dimensions vary for both urban and rural communities. Wilson (2010) simply puts the rural community resilience as the multi-functionality of economic, social, and environmental capitals. Based on the completeness of this multi-functionality, these rural systems can be strongly, moderately or weakly resilient. Since the actions and responses of individuals and households within a rural community shape a community's overall resilience, such resilience can be scaled down to the household and individual level. Needless to say that economic aspect of the rural communities is important in providing strong resilience. Rigg (2006) and Chaskin (2008) highlighted that the poverty is one of the most important constraint for rural development and, therefore, makes a rural community less resilient, as most of the population's economic activities are focused on raising sufficient income for survival (Parnwell, 2007).

Additionally, changing rural–urban interactions affect the livelihoods of low income and vulnerable groups in urban and rural settlements. This is an important rationale in considering rural–urban interactions in understanding employment and disaster together. There is a scenario of urban biases in this relationship, which needs to be changed to a homogeneous network relationship to assist urban and rural areas together sustain the stress caused by disasters. The developmental growth of metropolitan areas, vulnerable to natural hazards, can be sustained if, in addition to the consideration of the attributes of the relationship of development and urban–rural linkage, there is emphasis on how these linkages behave in disaster situations. Urban and rural areas share their vulnerability through a number of inter-linkage elements, namely; people, natural resources, product, financial, waste, information, social interactions, and governance (Srivastava & Shaw, 2013). Furthermore, it has been widely recognized in the recent past that urban–rural linkages provide opportunities and constraints for poverty reduction and regional development (Braun, 2007; Cali & Menon, 2009; Srivastava & Shaw, 2013; Zeleke & Trutmann, 2006). One of the important linkages between the urban and rural areas is the element of people

(Srivastava & Shaw, 2013). The flow of people between these spatial limits provide for occupations, predominantly for the rural poor. It is an important factor in determining the well-being of the population during normal scenario as "standard of living, disposable income, savings, education, health, and overall psyche of the society is determined by current levels of employment and unemployment" (Sharma & Krishna, 2007). These basic constituents either get disturbed or paralyzed during the time of disaster. Moreover, people with different incomes have different resilient capacities against disaster (Surjan & Shaw, 2009). Resilience is usually higher for people with higher income capacities. As economic sustenance for individual holds paramount importance during a disaster, the human resources linkage needs special attention.

The Concepts of Vulnerable Occupation and Occupational Resilience

Resilience and vulnerability are often considered diagrammatically opposite of each other (Cannon, 2008; Kasperson & Kasperson, 2001; Sapountzaki, 2012). High levels of vulnerability suggest low levels of resilience and vice versa (Cannon, 2008). Vulnerability which was earlier termed as a concept that included only loss of life and material, later expanded to include other dimensions as well. Cutter (1996) and Cutter, Boruff, and Shirley (2003) categorized vulnerability as exposure, as social condition, and as spatial dimension of "integration of potential exposures and societal resilience." It involves complex processes at several temporal and spatial scales, and the interdependencies at these scales (Hufschmidt, 2011). However, there is an absence of standardized methodology for measuring vulnerability (Birkmann & Wisner, 2006; Gall, 2007; Hufschmidt, 2011; Villagran, 2006). Where applicable, often the impact of disasters on urban poverty is also underestimated, with the general absence of the metrics that include low-income groups in their assessment of disaster impact (UNISDR, 2009).

The economies of South Asia have largely held up well during the recent recession in 2008–09 and the region resumed rapid economic growth in 2010. Yet the region has the highest rate of vulnerable employment in the world, at 78.5 percent of total employment in 2009 (ILO, 2010). International Labor Organization (ILO) states that the "vulnerable employment" indicator is defined as the sum of own-account workers (those workers who work on their own account or with one or more partners and hold the type of job defined as self-employed) and unpaid family workers as a percentage of total employment (ILO, 2010). Vulnerable employment has been a term used in the context of normal economic activities and there is a need to take the normal definition to disaster domain. Nevertheless, it is a valuable indicator in determining the vulnerable population, through the estimation of population dependent on these occupations.

Vulnerable employment is often characterized by: inadequate earnings, less likely to have formal work arrangements, low productivity, lack decent working conditions, lack adequate social security, and lack effective representation by trade unions and similar organizations. The total number of such vulnerable

workers worldwide is estimated at between 1.48 and 1.59 billion (ILO, 2010). The estimation takes into account the normal scenario. In an event of disaster, all the economic activities become vulnerable. Additionally, the above-mentioned characteristics can be relative to the context of the geography and economics of the country and the household. Also, the characteristics define the vulnerabilities of the economic activities during the normal time while there exists a different set of aspects, which might be helpful in determining the vulnerabilities of the occupations in an event of disaster.

Development of Parameters to Identify Vulnerable Occupations

Global assessment report on disaster risk reduction (2009) (UNISDR, 2009) underlines the importance of "deconstructing disaster" that is, to identify risk patterns and poverty trends at the local level. As Jigyasu (2011) states that a great number of tools and methodologies exist to assess the macro-economic losses; both direct and indirect, however it is very difficult to ascertain and assess the loss at the micro-economic level and loss to livelihoods, with differential losses across sectors, and varied vulnerability and recovery time.

The following existing methodologies have tried to assess the impacts of disaster on livelihood. FAO-ILO (2009) has developed a toolkit for analyzing the impact of disasters on the livelihoods of the people, based on Sustainable Livelihood Framework, and focusing on assets (natural, social, physical, human, and financial capital) based assessment. The comprehensive methodology relies on three major steps of data collection: livelihood baseline (prior to the disaster), initial livelihood (immediately after the disaster) and final livelihood assessment (30 days after the disaster). It is modeled for sudden-onset disasters, thereby discounting the slow onset disasters and places with no disaster history. It serves its purpose for big disasters and for cities, which can maintain huge inventory of data, but for small disasters it is a cumbersome process. Nevertheless, the toolkit identifies the importance in assessment of following factors: seasonal impact of disasters, need for social transfers, poverty and income levels, key informants and institution for livelihood support. The initial estimates of impact includes employment loss in the form of wage workers dismissed without remuneration, loss of capital and loss of access to public infrastructure (electricity or roads). The other aspect in this regard is the additional demand for casual jobs due to loss of usual employment.

UNNATI (2007) came up with a participatory framework for assessing the damage after disasters. In certain disasters a particular occupation might be impacted more than the others, that is, the contextual relation of occupations with the disaster type. Also, families with same occupation might have differential impact due to varying access to assets and resources, different poverty level, the loss of economic assets, social vulnerability, and reduction in income (UNNATI, 2007). It suggests the use of wealth ranking tool which help communities to build up their own criteria based on factors like land holding, livestock, other assets, and regularity of income.

Bull (1994) (in Pelling, Ozardam, & Barakat, 2002) in their study on macro-economic impact of disasters, lists disruption to economy as one of the consequences of disasters. The measure includes number of working days lost and volume of production lost, while "social disruption" consequence includes number of displaced persons. Other consequences like deaths, injuries, physical damage, emergency operations, and environmental impact are also mentioned, but are not directly related to the occupations. Similarly, Charvériat (2000) states that there are three categories of impacts on a household welfare: physical integrity, assets, and income. It further posits that the impact on the employment is largely unknown, and the impact on unemployment depends primarily on the degree of destruction of income-generating assets and the period of disruption of flows of goods and services. The impacts are magnified as the disasters occur at a time when individuals are out of their familiar environment lacking the community solidarity and public services are severely disrupted.

Parameters to Identify Vulnerable Occupations

Combining the indicators from the above mentioned methodologies and the background literature on employment-disaster linkages, and the disaster–displacement relationships on a spatial basis (urban and rural) as mentioned in Section 2, we get three prominent characteristics of the indicators. These can be termed as following factors:

i. **migration**; the displacement of population,
ii. **economics**; the effect on an individual's and local economy, and
iii. **social capital**; the changing social interactions among communities.

A change in any of these factors affects the attributes of livelihood of an individual. The factors can be further chiseled into the following aspects, which contribute towards the vulnerability of occupations.

Loss of Productive Asset. There is a segment of population, which is engaged in occupations based on assets such as agriculture and household industries. They rely on their assets for production of goods. Due to a disaster, this population might lose such assets and hence an opportunity to earn (UNNATI, 2007). These assets can range from land, machinery, tools, or workplace. Carter and Barrett (2006) recognize the benefits of adopting the asset-based poverty determination in designing strategies for poverty reduction. Such analysis makes it possible to distinguish deep-rooted, persistent structural poverty from poverty that passes naturally with time due to systemic growth processes.

Displacement. The displacement of population after disaster can be temporary or seasonal or permanent. This can be attributed to any of the other parameters. As stressed earlier, the displacement due to a disaster might also have an effect on social linkages within a community. Another dimension would be the percentage of people within a community being displaced due to disasters. This gives an

idea about the vulnerability of the community. The inter-linkages of disaster, displacement, and employment have been asserted by Hendrix (1976), Swain (1996), Belcher and Bates (1982), and Srivastava and Shaw (2012) and established in Section 2.2.

Loss of Employment. In most of the cases the victims of disaster are left with no job to accomplish their economic needs. There is a loss of employment by one or more earning members of the household and there are no alternate income sources available for the victims. Even after various attempts they may be unable to find an opportunity to earn for a long duration after the disaster. Belcher and Bates (1982) establishes that the disaster causes loss of employment and thus induces migration. Therefore employment and disaster have an inseparable association.

Decline in Productivity. In situations where the victim does not lose his/her job, there are high chances that there is decline in productivity. This can be either decline in human capacity to produce at the same pace as before the disaster, or can be a decline in the overall production of the goods produced by the affected population. This can be due to hindrance in carrying out the normal economic activities.

Reduced Income. This can be due to one or more of the other parameters. Additionally, a person may lose income due to change in circumstances in the disaster affected region, such as change in local economy, and reduced wages. The impact can be deciphered through the scale of change in income and the duration of time for which it was reduced.

Workforce Participation. Workforce participation is calculated as the number of days a person is employed in a year. It is an indicator of economic well-being. During the course of or after a disaster, there may be an effect on the work participation days. The workforce participation is reduced due to lack of job opportunities all the year round, especially immediately after a changed scenario in the wake of disaster, and restricted capacity to compete for the limited jobs.

Change in Occupation. Sometimes since the pre-disaster job is hard to find again or since the wages have dropped, the population may change their occupation. This change may be temporary or seasonal or permanent. The change would be negative most of the time rather than being positive.

Effect on Social Structure. The social structure that is, interrelationship of an individual to the community, changes drastically in the event of a disaster, either due to change of community or change within community itself. The interrelationship within the community changes due to change of circumstances, such as increased or decreased cohesion. Dynes (2002) and Nakagawa and Shaw (2004), rally in favor of adopting social capital approach for disaster recovery. Often this

aspect is ignored in analyzing the vulnerability of a community, but its importance cannot be undermined.

Recovery Time. The time to restore the livelihood to the pre-disaster level is the recovery time. People try to reduce their recovery time through various strategies; individual and community strategies. People who bounce back and takes less time to recover have more occupational resilience than those who take more time.

Using the above nine aspects the vulnerability of occupations for the population at the local level can be determined, taking into account the local conditions. These conditions and disaster characteristics would determine whether a particular aspect is considered or not. All the nine aspects try to cover different yet related aspects of vulnerable occupations. The indicators are classified as both qualitative and quantitative (see Table 1). These indicators need to be developed into an index to quantitatively measure the vulnerability of an occupation.

Occupational Resilience

The concept of occupational resilience is the key to achieve overall resilience of the community. The authors adapt the definition of resilience by UNISDR (United Nations International Strategy for Disaster Risk Reduction) to define occupational resilience, which is, the ability of an occupation exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of providing livelihood to its erstwhile employees. An occupational resilience based disaster recovery would be a sustainable model of recovery as it strengthens the assets and capabilities to earn by provision of economic opportunities.

An occupational resilience based disaster recovery requires the strategies to consider the market demand and be contextually appropriate. While providing for employment opportunities, the existing skills, and experience of the local population must be considered. Eventually it should enhance the dignity and options for the population engaged in vulnerable occupations (WRC, 2009). Therefore the objectives of occupational resilience should be to:

i. Provide occupational opportunities with stable income through support to agrarian interventions; microfinance interventions and enterprise development.
ii. Rebuilding of assets for improved productivity and income
iii. Limit migration to nearby or distant places in search of employment
iv. Minimize the recovery time
v. Uplift the social status in the community

Such strategy would require the partnerships of local governments, non-government organizations, civil society organizations, community-based organizations, and the private sector. The solutions can range from the provision of

Table 1. Parameters to Identify Vulnerable Occupations with Indicators

Factors	S. No.	Parameters	Qualitative and Quantitative Indicators
Migration Economic Social Capital	1	Loss of productive asset	1. Classification in major, average or low loss to productive assets (land, machinery, resources, etc.)
	2	Displacement and migration	1. Economic activity before and after migrating from the original place of stay, 2. Percentage of people in a region being displaced due to disasters
	3	Loss of employment	1. No income source after disaster, 2. Number of family members losing jobs
	4	Decline in productivity	1. Hindrance in carrying out normal economic activities, 2. Decline in production with same productive assets
	5	Reduced income	1. By what percentage, 2. The affected duration of time
	6	Workforce participation	1. Comparison of the duration of working days in a year, pre and post disaster, 2. Comparison of working members in a household pre and post disaster
	7	Change in occupation	1. Change of occupation is temporary or permanent, 2. The scale of change in income, 3. Distance to new occupation
	8	Effect on social structure	1. Effect on social life, such as no more part of earlier community, 2. Decline in social status due to reduced income
	9	Recovery time	1. The duration of time for restoration to same level of income as prior to disaster

training and placement programmes, to for-work programs: cash-for-work and food-for-work; and building in-camp economies.

Results of Key Informant Survey: Migration, Social Capital and Economic Factors

This section presents the results of the preliminary study conducted in Ahmedabad district of Gujarat, India to validate the identified aspects, if they are capable to gauge the effects on the occupations. The authors understand that these aspects would behave differently in different cases and therefore this study is an exercise in testing, redefining, and refining the theory of parameters at the community level. This study examines a small scale yet recurring disaster, to observe the effects on 40 communities based in flood zones of Greater

Ahmedabad. These communities have been victims of urban floods in urban and peri-urban areas and river floods in the rural areas in the last decade, almost every alternate year since 2001. The recurring nature of disaster throws the life out of gear for these communities, countermining their resilience. The key informant survey included the interviews of representatives from 40 communities located in 12 locations in Greater Ahmedabad (see Table 2). Other objective of the study was to identify the coping strategies taken up by the communities to minimize the effects of floods on their economic activities and speed up their recovery process. The findings of the survey have been evaluated qualitatively for the three spatial locations.

Study Area and the Preliminary Results

The state of Gujarat is situated on the north-west coast of India bordered by the Arabian Sea in the west, state of Rajasthan in the north and north-east and by Maharashtra in the south and south-east. It has a population of 60 million people, out of which 34 million are rural and close to 26 million urban (Census, 2011). The stage is set for equilibrium of urban–rural population, in the near future, as the urban population growth was approximately 36 percent against the 9 percent rural growth from year 2001 to 2011. Gujarat is a state, which has seen natural disasters such as earthquake (Bhuj earthquake, 2001), cyclones, as well as other climate-related disasters such as frequent floods and droughts. These disasters occur with alarming regularity. As the onus of urbanization on urban areas is increasing day by day in India, the need to accommodate exploding population is also increasing. Greater Ahmedabad is one such region, which has certain well-developed regions with urban, sub urban, and hinterland character with multi-hazard profile. This area has developed around the city of Ahmedabad on the banks of river Sabarmati (Fig. 1).

The study follows four-stage methodology: 1. Preliminary questionnaire based on the literature, 2. Stakeholders' opinion, 3. Mapping of observed parameters and identification of vulnerable occupations spatially, and 4. Identification of parameters. The methodology is illustrated in detail in Figure 2. The interviewed communities include 20 urban, 5 peri-urban, and 15 rural communities, which have experienced floods, being situated on the banks of river Sabarmati. These areas were selected on the basis of data provided by Flood Control cell of Gujarat Government on the flood prone areas. The authors wanted to examine the relationship between the spatial characteristics of the three areas and their community resilience. The respondents included the head of the villages (*Sarpanch*) and slums, the elderly, the community representative/s, NGO workers in slums, female heads of the households, and hawkers. The respondent by stakeholder type is provided in Table 2. None of the 40 communities have suffered deaths in the recent years due to floods, yet the reconnaissance survey shows that there has been little or poor growth of the communities and individuals suffering from floods.

Table 2. Characteristics of Locations and Stakeholder Type Among the Respondents

Study Locations	Location	Occupation	Hazard	No. Of Communities	Respondent Type
Urban					
U1 Dariyapur	Central	Primarily Daily Laborer, Hawkers and engaged in Other occupations. Also comprise of Construction laborer, Government Sector, Private Sector	Local Flooding (and River Flooding)	4	Community Leader-1, Woman Head of Household-1, Cottage Industry Worker-1, Hawker-1
U2 Behrampura	South		River Flooding and Local Flooding	4	Community Leader-1, Woman Head of Household-1, Cottage Industry Worker1, Hawker-1
U3 Mangal Talawadi	South		Local Flooding	4	Community Leader-1, Woman Head of Household-1, Cottage Industry Worker-1, Hawker-1
U4 Sabarmati	North		Local Flooding (and River Flooding)	4	Community Leader-1, Woman Head of Household-1, Cottage Industry Worker-1, Hawker-1
U5 Ramapir Tekro	North		Local Flooding	4	Community Leader-1, Woman Head of Household-1, Hawker-2
Peri Urban					
P1 Parvati Nagar	North	Majorly daily labor with others engaged in government sector and Other private jobs	Local Flooding	2	Community leader-1, Woman Head of Household -1
P2 Guptanagar	South		Local Flooding	3	Community leader-1, Woman Head of Household -1, Hawker-1
Rural					
R1 Shahpur	North	Majorly Agricultural Labor and Small landholder Cultivator with few engaged in daily labor, household industry, and hawking	Occasional River Flooding	3	Sarpanch (village leader)-1, Youth Leader-1, Farmer-1

Table 2. Continued

Study Locations	Location	Occupation	Hazard	No. Of Communities	Respondent Type
R2 Randesan	North		Occasional River Flooding	2	Sarpanch (village leader)-1, Farmer-1
R3 Saroda	South		River Flooding	4	Sarpanch (village leader)-1, Community Leader-1, Farmer-1, Service man-1
R4 Mota Chhapra	South		River Flooding	3	Sarpanch (village leader)-1, Community Leader-1, Farmer -1
			River Flooding	3	Sarpanch (village leader)-1, Youth Leader-1, Animal Husbandry-1
R5 Mahijda	South				
Total				40	Community Leader-9, Sarpanch (village leader)-5, Farmer-4, Animal Husbandry - 1, Service- 1, Hawker- 7, Woman Head of Household -7, Cottage Industry Worker-4, Youth Leader-2

The following paragraphs deals with the results under the three factors of migration, social capital, and economics.

Migration. In all three spatial locations; urban, peri urban, and rural, migration is not a major issue. It is non-existing in urban and peri urban areas while in rural areas the few cases of permanent migration is seen, while the population with minimum assets of land and otherwise, migrate temporarily to urban areas in search of jobs. Floods are also seen as an opportunity by the people engaged in vulnerable occupations, to enhance the quality of life with a better job than their existing ones. With the dearth of non-agriculture based jobs in rural areas, the rural population has to rely on urban areas for better opportunities. This causes a shift in the local economy and its workforce distribution.

Social Capital. There is a positive trend among communities in urban areas where self-help groups are being formed to help each other financially to cope with the aftermath of floods. In peri urban areas, on the outskirts of urban areas, there is increased acceptance that the education will improve their accessibility to urban jobs, thereby bringing economic stability. With the migration of male population

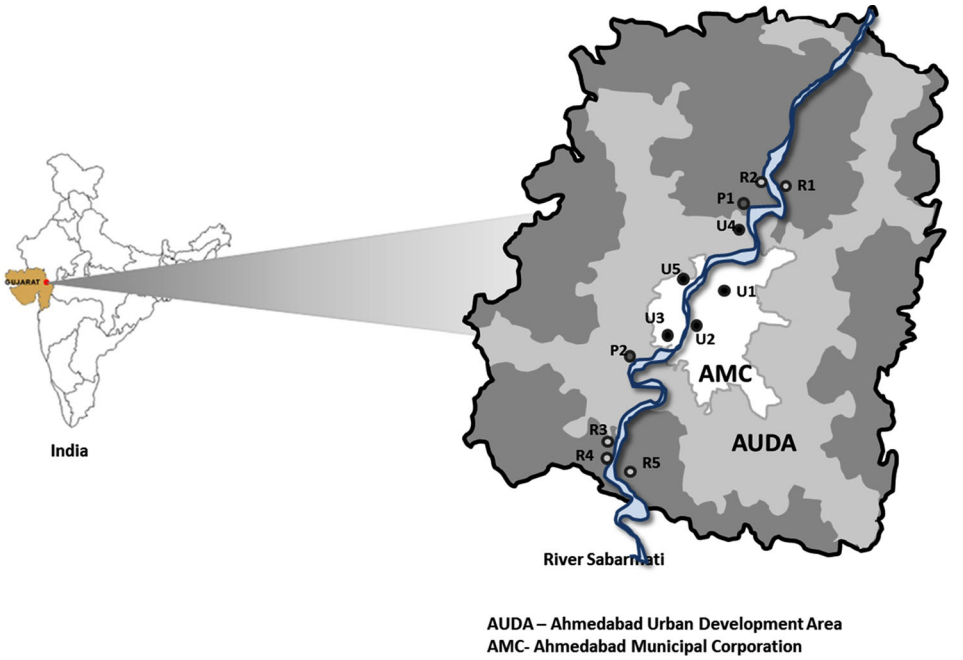

Figure 1. Locations of Respondents in Greater Ahmedabad Area (see Table 2 for Location Characteristics).

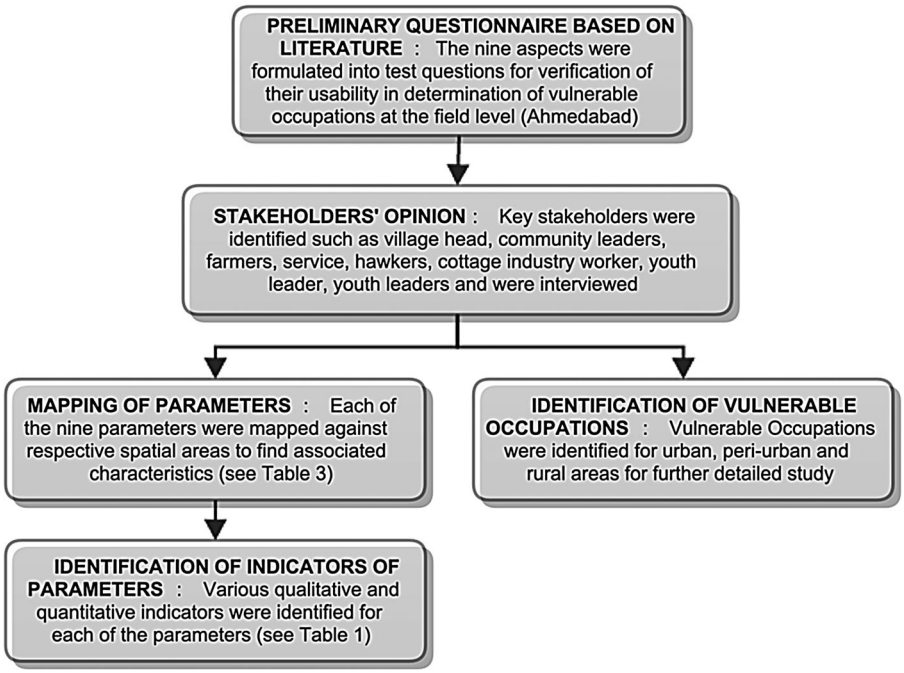

Figure 2. Research Methodology of the Study at Greater Ahmedabad.

from the villages there is imbalance caused in the social structure. The underprivileged sections of the society often reside in the low-lying areas in the villages, which suffer maximum damage to land and houses. Often population from these sections is engaged in petty jobs and work as laborers in the agricultural fields of the land owners. Reliance on insufficient sources of income in all the three areas contributes to slow recovery even in the case of a small hazard like floods in Ahmedabad.

Economic. The financial capabilities and capacities of the people engaged in vulnerable occupations is affected by (a) decline in productivity and (b) loss of productive assets; such as land, animals, and stored granary (rural areas), stored goods, and submergence of workplace (urban and peri urban areas), (c) loss of employment; due to loss of access to jobs, relocation of a community, damage to agricultural fields, and production, (d) reduced income; due to increased availability of laborers after a flood event as result of influx of migrants from rural and peri urban areas. Overall this scenario derails the recovery of the majority of the population and pushes them into the cycle of poverty, worsened by the next disaster.

The urban rural linkages exist in more than one form. Fifty-five percent communities' citizens send remittance to their home villages. This financial security, which is embedded in a different spatial location than the place of residence and work, gives a huge sense of security to the rural habitants. Secondly, 60 percent of urban habitants said that they will go to their villages in an event of disaster for security as an urban survival strategy. Similarly, 47 percent rural respondents said that they would go to urban areas in the case of a disaster. Seventy percent of urban dwellers want to own the land in their native villages to improve their economic condition. The potential hidden in these linkages needs to be understood to provide for resilient communities.

Other Common Issues from the Survey

Perceived Potential Role of Stakeholders. An overwhelming 92.5 percent of the respondents, either blame it on the government for their poor state during floods or believe the government can take various steps to improve their occupational status and provide them livelihood. Conforming to this, 80 percent of the respondents fail to identify their role in reducing the risk. The role of governance cannot be undermined, but there is a need to make these communities realize that through their own initiatives, their households can be better resilient against disasters.

Existing Coping Strategies. The individual coping strategies during floods are limited to (i) moving to higher grounds such as school, temple, playground, etc. (92.5 percent) and (ii) storing food supply for the flood season (65 percent). Barring a few communities there is no community coping strategy against floods,

as there is no proper networking of the communities. Even when the association exists in slums, they do not have technical knowledge to deal with floods. The most flawed is the government's way of dealing with floods. Their role is to supply food packets to the victims during flood days, through NGOs. Such initiatives do provide the required nutrition for a certain number of days, but do not address the livelihood issues.

High Priority Needs to Tackle the Disaster. The basic understanding of resilience through economic empowerment is known to a majority of the communities. 82.5 percent of respondents believe that permanent jobs would provide them with the means to survive the floods. These respondents were of the opinion that with stable jobs they could take care of other basic needs like housing, food, and clothing. Housing is the next chosen priority (17.5 percent) by the communities after employment.

The major impacts of floods in Ahmedabad on livelihood occupation were household disruption, community and neighborhood changes, reduced agricultural production and uncertain agricultural prospects, disruptions to transport, and other infrastructure support. The three spatial typologies exhibit different characteristics for each of the nine aspects based on the existing conditions of employment, education, and community network, in each of these urban, peri-urban, and rural areas. Table 3 summarizes the findings with respect to each of the parameters. This preliminary study tests two facets of these nine aspects: (i) their relevance in measuring vulnerability of the occupations and (ii) their existence in this particular case. It also helps in identification of vulnerable occupations associated with each spatial area, and the parameters are tested at the field with identification of qualitative and quantitative indicators for each one of them. This provides for a detailed further study and would also be helpful in analyzing the effects and efforts required for recovery, prevention, and mitigation.

Potential of Post Disaster Employment and its Policies in Disaster Recovery

It is difficult to predict the most affected segment of population, in an event of disaster, but it is widely accepted that the low-income population is bound to be affected more than others. Also, through the understanding of the parameters it can be argued that one of the worst sufferers of disasters is the population engaged in occupations distinguished as vulnerable occupations. These occupations demand enhanced attention from the policy makers, so these occupations once identified can attain occupational resilience.

Usability of Parameters for Communities

Communities play the dual role of both a victim and also a rescuer in a disaster recovery phase. The rescuer's role can be expanded to the enabler of recovery, where the quick recovery of communities' livelihood can speed up the overall recovery phase. This will be primarily due to the flow of income and

Table 3. Observed Characteristics Associated with the 9 Parameters in Affected Urban, Peri-Urban, and Rural Communities in Greater Ahmedabad (*N* is the Sample Size)

S.No.	Parameters	Urban Communities ($N = 20$) *Primarily low income settlements with major occupations such as employed in cottage industries, informal jobs like hawkers, masons, construction laborers, domestic help etc.*	Peri-urban Communities ($N = 5$) *Communities living on the outskirts of the urban area in primarily rural setting, with easy access to urban areas*	Rural Communities ($N = 15$) *Communities living in rural setting distant from the urban area, and primarily dependent on agriculture and agro-based labor. Few villagers travel to peri-urban service industries*
1	Loss of productive asset	Loss of workplace and goods stored for household industries	Assets like land and animals suffer a major loss	Assets like land, animals and fodder suffer major loss
2	Displacement and migration	No migration	No migration	Few cases of permanent migration; temporary migration in search of jobs after the disaster for economic recovery
3	Loss of employment	Yes, due to loss of access to the jobs. Loss of employment is due to relocation of a community from a flood prone area to a no flood area	Since the peri urban communities have marginal land holdings, the loss of employment in agro-based sector is smaller compared to rural communities	Agriculture and agro-based jobs come to standstill for a period of 30 days. Loss of transportation to the service industries located in urban and peri urban area
4	Decline in productivity	Due to loss of assets, reduction in the number of working members in a household, and psychological effects of the floods		
5	Reduced income	There is a reduction in the income in alternative jobs due to high availability of laborers, with influx from peri-urban and rural areas	The income does not suffer much due to dependence on service sector jobs and labor opportunities in urban areas	The income suffers due to loss of jobs, assets, and working days and reduced demand of agriculture during the floods
6	Workforce participation	The marginal workers and the daily workers are the major sufferers. The workforce participation gets further reduced	The multiple occupational opportunities available to a household avoids the reduction in working days	The agricultural laborers are losing on working days because of flooding in the agricultural fields.
7	Change in occupation	Few of the habitants get alternative jobs; mostly in the informal sector of economy	Alternative jobs based on school education are bringing in more income	Agricultural laborers migrate to urban areas to enter the informal sector of the urban areas

(*Continued*)

S.No.	Parameters	Urban Communities ($N = 20$) *Primarily low income settlements with major occupations such as employed in cottage industries, informal jobs like hawkers, masons, construction laborers, domestic help etc.*	Peri-urban Communities ($N = 5$) *Communities living on the outskirts of the urban area in primarily rural setting, with easy access to urban areas*	Rural Communities ($N = 15$) *Communities living in rural setting distant from the urban area, and primarily dependent on agriculture and agro-based labor. Few villagers travel to peri-urban service industries*
8	Effect on social structure	Some of the communities have started to form self help groups to help each other monetarily	Positive effect: With better understanding of the flood situation, communities have started to give more importance to education and seek for white collared jobs in the urban areas	Underprivileged sections of the community residing in low lying areas suffer most; gets dependent on the privileged class for food and shelter; male migration to cities causes imbalance in the social structure
9	Recovery time	The flood situation may be present only for 2–15 days but for the poor segment of the society it takes around 2 months to return to the same state of earning. Additionally, the period drains all the savings		

purchasing of goods by the community, which in turn revives the economy of the region. Therefore, the change in social structure needs to be identified to ascertain whether an individual can rely on his/her community for recovery, or whether a community is well structured to carry out the relief and recovery with little or no help from the external agencies. In case of Ahmedabad, the communities assume that the responsibility of risk reduction rests with the government and the community itself is inutile in case of disaster. This is mainly due to lack of education and technical knowledge in both urban and rural areas. The simplicity for the parameters enables the community to evaluate their own damage and design for their recovery, as also envisioned by UNNATI (2007).

The methodology stated in the Section 3, tries to determine the impact of disaster on the people engaged at the micro economic level. In Gujarat, approximately 68 percent of the workers in the tertiary sector and 43 percent of workers in the secondary sector were engaged in the informal sector in 1998 (Rani & Unni, 2002). The informal sector generated 47 percent of the total city income engaging 77 percent of total employed (Rani & Unni, 2002). As part of the informal sector, this study included all own account workers and workers in enterprises with less than ten workers. Also, close to 26 percent people living

below poverty line relying on low wage daily earnings are bound to be impacted if there is stagnation to the formal sector on which informal sector relies heavily. This establishes the strong linkage between the macro and micro economy of the city and disruption to the lives of the vulnerable segment plays a negative role on the overall economy at the macro level, at both state and city levels. As highlighted in Table 3, these frequent floods consume the workplace of the household industries and impact the local economy relying on these industries. On the other hand the hazard like urban floods gives an opportunity to the affected rural populace to enrich their economic status by engaging in non-traditional jobs. However, the migration might shift the onus on the city to expand its informal base and include the influx of the unskilled labor. Here, the identification of skills relevant to the local economy would facilitate to provide for such skills, which will help the macro economy and absorb the micro enterprises in its fold.

In the case of recurring hazards, the communities come up with their coping strategies, both at individual and community levels, in urban and rural scenarios. Ellis (2000) in a study on developing countries concludes that rural livelihoods should be diverse to be less vulnerable and therefore the policies should encourage adoption of multiple livelihood strategies. Ellis (2000) also classifies livelihood diversification as either "diversification of necessity" or "diversification by choice," where the former is an involuntary mechanism, a last resort for survival, while the latter is voluntarily and proactively selected to diversify the income. Even though the urban, peri-urban, and rural communities differ in their characteristics, they may face similar constrictions in their occupations, which demands common strategy for better resilience of the occupations. This requires economic relief and promotion of micro-entrepreneurship rehabilitation.

The rural community resilience has certain positive characteristics. In the communities studied, there are certain villages, which are adopting "diversification by choice" (Ellis, 2000) by recognizing the importance of education and therefore educating their children to improve their chances in non-farm jobs. Also, village communities are resorting to seasonal wage earning opportunities, to make for the loss in working days during monsoon, utilizing modern technology like mobile to find possibilities. For example, a certain villager gets call on his mobile to attend to complaints of electrical faults in far flung villages.

A significant population in urban, peri-urban, and rural area is linked with household or cottage industries, and disaster at times disrupts the functioning of these units and affecting the assets to earn. This is prevalent in urban areas where cottage industries and micro enterprises trades like incense stick manufacturing, kite making, traditional stich work, and other textile ancillary works suffers as the workplace is lost during the days of calamity. In other cases, the loss of finished or raw material has also resulted in heavy losses to the families. This stresses on the need of provision of safer workplace and storage for such communities. Another aspect of cottage industries is that the major proportion of the population possesses the skills, as against the assets, to run these enterprises and should be considered in policies pertaining to employment based on skills.

Usability of Parameters for Policymakers

There is a need for tackling the problem through the adoption of a dual approach; part to whole and whole to part. The former approach requires empowering the employment at each constituent level, which is a pre-disaster role for the policy makers. The latter approach focuses on post disaster role of rehabilitating of economic opportunities for quick recovery. In urban and rural areas there is a loss to livelihood opportunities after disaster, as shown in Table 3. This presents a large opportunity to engage affected communities through employment programmes, and has the potential to play an important role in post disaster recovery. However, it requires the determination of vulnerable population, based on their occupations, through the established parameters and thus provide for asset-based and skill-based occupational recovery.

Government of India has various anti-poverty, employment generation and basic services programmes in operation since a long time, such as Prime Minister's Employment Generation Programme (PMEGP), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Food for Work Programme, Sampoorna Grameen Rozgar Yojana, Swarna Jayanti Gram Swarozgar Yojana (SYGSY), and Swarnajayanti Shahari Rozgar Yojana (SJSRY). Most of these schemes are adopted by the state governments. MGNREGA have been successful in providing employment to more than 50,000 households in Ahmedabad district in 2009–10 (GOI, 2010). Among the permissible works of water conservation, afforestation, land development and construction of roads and canals, there is provision of employment for flood control and protection works including drainage in water logged areas. That is the only reference to disaster in the scheme. In urban areas, schemes like PMEGP are in place to provide employment opportunities in rural as well as urban areas through setting up of new self-employment ventures, projects or micro enterprises. These are positive endeavors but all the good work done by such schemes in a year can be undone by one flood by draining of resources of the affected population. In major disasters, the restoration of infrastructure provides job opportunities, but in the case of smaller hazards like the one in Ahmedabad, there is no such demand for labor. Therefore either the existing employment schemes should make provision for post disaster employment schemes or specific new schemes should be devised to deal with this specific scenario. There is need to link disasters to employment and poverty.

The threat to livelihood can also be seen from other perspective of environmental degradation such as deforestation, overgrazing and land degradation, which causes the damage to ecosystems and exasperate the risks of disasters such as floods or landslides. This causes increased threat to lives and livelihood of the vulnerable class. Another aspect to be taken into account is the gender profiling of the respondent. Women in developing countries suffer considerably more than men, since they have less access to social, political and economic resources to protect against disasters and recuperate from its effects. Often, women are either dependent on men for their survival or engaged in under-paying irregular jobs. This segment,

especially women headed household, also needs to be targeted specifically by the post disaster employment policies.

The main objective of vulnerability assessment is to identify the weak links in the present scenario and guide the adaptation strategies of both individuals and institutions. Several literatures corroborate the absence of a standardized methodology to measure vulnerability (Birkmann & Wisner, 2006; Gall, 2007; Hufschmidt, 2011; Villagran, 2006). It is understandable as vulnerability assessment metrics should contain "both human well-being and recognize the relative and perceptual nature of vulnerability" (Adger, 2006). Often the assessments of impacts of disasters sideline the low-income groups and there is absence of such metric, which can estimate the loss at grass root level (Adger, 2006; UNISDR, 2009). In coherence with Cutter's (1996) and Cutter et al.'s (2003) view of aggregating the social and spatial dimensions of exposure and resilience, this method of assessment takes the first step in assessing the impacts of the disasters on the low income strata of society spread over distinct geographical areas.

Conclusion

It is essential to treat the vulnerable occupations as a separate category for disaster impact assessment, particularly for the low-income population in developing countries. It is acceptable that the unemployed population needs the utmost attention, but it also needs to be understood that vulnerable occupations can serve as a vehicle for faster disaster recovery; else there would be addition of unemployed population with every disaster. The overall resilience of the community can be achieved through occupational resilience. This would allow the upliftment of the lower income segments of societies without any requirement of focused strategies for recovery. This would not only quicken the recovery process but also make the communities better equipped to tackle the disaster. Strengthening of local economics would make the region resilient to the effects of disasters, especially the recurring disasters. It would enable the community to devise their own coping strategies over a period of time.

The strategies for occupational resilience must consider the livelihood and gender issues together. This can be used as an opportunity to redefine and re-negotiate the traditional gender roles and target greater mutual respect between men and women. This requires that the baseline data for vulnerable occupations must be gender-aggregated so that income generating opportunities for both men and women can be developed. Additionally, the recovery process should also target the unemployed population prior to disaster. Disaster should be used as an opportunity to rebuild and revive the economy.

In the current scenario it is accepted that disaster prevention and preparedness should get the bulk of focus in disaster management. However, it needs to be acknowledged that a disaster recovery based on economics would provide resilience to the communities and the individual to be better prepared for the next disaster.

It is difficult to earmark the division of low income and informal economic activities into distinguished categories. This becomes all the more challenging in the case of developing countries when a typical household is considered where the family members may be engaged in diverse economic activities to meet their needs. In such a case the economic and social analysis becomes a problem for policy formulation. The policy intervention should directly address the issues of livelihood, not relying on the indirect effects of economy to percolate on its own to the lower income segment of the population. At the same time, as a mitigation exercise, the policy should address the occupations to be more resilient against disasters. Policy should facilitate rather than inhibit diversity. Diverse rural livelihoods are less vulnerable than undiversified ones.

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