



Research Article

MAPPING LIVELIHOOD VULNERABILITY IN SLUM HOUSEHOLDS: A GENDER PERSPECTIVE ANALYSIS

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Abstract: Climate change remains a major development challenge for cities in the developing world due to their limited capacity to prepare for and to cope with its implications. It is recognized that the impact of this phenomenon will be distributed differently among regions, ages, and income groups. This study attempts to examine the livelihood vulnerability status of slum households from a gender perspective. Further, the study also tries to identify the main factors that are responsible for a higher degree of livelihood vulnerability at the district as well as the national level. The study uses household-level data of the 69th NSSO round and indicator approach. The findings suggest that female-headed households are highly vulnerable in many districts of states, viz., Uttar Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, and West Bengal. Seven indicators have major influence over livelihood vulnerability like, slum located in a fringe area, unserviceable *Katcha* house, *Katcha* road in the slum premises, *Katcha* approach road, untreated water for drinking, no facility of garbage collection, and distance of more than 5 km of a government hospital. The results provide useful guidelines for identifying region-specific vulnerable hotspots that need policy intervention in strengthening and securing livelihoods.

Keywords: *Livelihood vulnerability, Indicator approach, Gender, GIS, Slums*

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Introduction

Climate change impacts could accelerate the processes of urbanization by displacing a greater number of poor people from hazard-prone areas to the cities [1]. Low socio-economic status of the urban poor accompanied with their low adaptive capacity can make them far more vulnerable to the health impacts of climate change [2]. Further, informal urban settlements are a space where physical and social vulnerability coincide, and caste-based exclusion was found to be a major determinant of vulnerability [3]. The poor and migrants in the informal sector are vulnerable specifically to livelihood uncertainties such as loss of livelihood spaces, resources, and assets in the face of climate change [4]. It is predicted that the physical and social impacts of climate change will worsen existing urban problems [5], and cities will become more vulnerable to natural, anthropogenic hazards. Factors such as population growth and high population density, lack of access to safe housing, or other public services have enhanced the vulnerability levels of the urban poor [6]. In India, climate change, together with urbanization is predicted to increase the rate of migration from remote agrarian villages and hazard-prone regions of the country to the cities [7]. According to the census (2011), 377 million people (more than 30% population) lived in cities, out of these, 65 million (27% of the urban population) lived in slums. The census also revealed that the number of slum blocks in the country to be 1,10,000. While the number of households in each of these slum blocks varies between 86,000 households in Dharavi (Mumbai, Maharashtra), to 1,300 households in Nochikuppam (Chennai, Tamil Nadu). The level of public services in these areas remains visibly poor everywhere, as far as the livelihood status of the households is concern, only 42% of having a drainage facility. More than 40% of households bring water from outside their communities, while 26% do not have access to clean drinking water, more than 50% live in one-room houses with an average family size of over four people, 34% have no public toilets in their communities and two electricity outages occur per day [8]. This challenge is not unique to India; 863 million people around the world live in similar squatter settlements [9].

The issue of gender inequality for women slum-dwellers cannot be ignored as the number of people migrating from rural to urban landscape in India trends upwards year-on-year, most of whom are women [10]. These women are deprived of adequate living standards, respect, and dignity. Women slum dwellers face a heavy burden of housekeeping (as these women need to collect water, and woods, cook and look after their children). Further, they have no ownership of assets except for dowry they brought into their marriage; and they have no purchasing or decision-making power within the household other than petty household purchases, which in turn impacts their children's nutrition, survival and literacy levels. Gender inequality further leads to the inefficient composition of labour, where positive benefits of female education and employment are not fully utilized and women's political participation remains unjust.

With these pieces of evidence, this study attempted to examine the livelihood vulnerability status of slum households from a gender perspective. Further, the study also tries to identify the major factors affecting a higher degree of livelihood vulnerability at the district as well as country level.

Materials and Methods

Data Source

For analyzing the scenario, the National Sample Survey Office (NSSO) unit level (household) data of 69th round (July 2012-December 2012) has been used. The survey comprised inquiries on (i) drinking water, sanitation, hygiene and (ii) conditions of urban slums. This survey aimed to examine the condition of urban slums such as ownership of house, area type, structure, living facilities like types of road/land/ constructed path within the slum, type of approach road/ lane/constructed path to the slum, electricity, drinking water, latrine, sewerage, drainage, garbage disposal, distance from nearest motorable road and distance of slums from the nearest government primary school and government hospital. Further, out of 3835 sample blocks 3, 832 blocks were surveyed of 881 slums. The estimated number of slum households was 88,09,007.

Estimation Method

Indicator based approach was adopted for this study after an intensive review of various approaches for sustainable livelihood security assessment [11-18]. Further, appropriate indicators were chosen, keeping in the view their relevance in the study area and availability of the data. Since indicators were measured in different units, they, therefore, subjected to normalization in different units, they used within the comparable range between zero (0) and one (1) [19-21] and [11]. Normalization is based on the functional relationship among indicators with targeted index- livelihood vulnerability. If a positive relationship exists (increase in the target index with an increase in the value of the indicator), the indicators are normalized using [Equ-1].

$$Y_{ij} = \frac{K_{ij} - \text{Min}(X_{ij})}{\text{Max}(X_{ij}) - \text{Min}(X_{ij})} \quad (1)$$

Where, Y_{ij} is the index for the i^{th} indicator related with j^{th} district, K_{ij} is the actual/observed value of i^{th} indicator for the j^{th} district, $\text{Max}(X_{ij})$ and $\text{Min}(X_{ij})$ is the maximum and minimum value of i^{th} indicator among all the L ($L = 1, \dots, 43$) districts, respectively. If the variable has a negative functional relationship, then [Equ-2] was used.

$$Y_{ij} = \frac{\text{Max}(X_{ij}) - K_{ij}}{\text{Max}(X_{ij}) - \text{Min}(X_{ij})} \quad (2)$$

Weight

The assignment of an appropriate weight for different components is an important issue in the construction of an index. A large number of earlier studies based on the indexing approach have given equal weightage to all the components of the index. However, a rather restrictive approach is adopted here considering the relative importance of economic, ecological, and social aspects varies across regions [22-27] methodology [Equ-3 & 4].

$$[W_i = \frac{K}{\sqrt{\text{Var}(Cid)}}] \quad (3)$$

Where,

$$K = \frac{1}{\left\{ \sum_{i=1}^n \sqrt{\text{Var}(Cid)} \right\}} \quad (4)$$

Where, 'W_i' denotes the weight, Var(Cid) is variance of Y_{ij} . Weight is multiplied in the index value calculated in [Equ-1] or [Equ-2] as follows.

$$Z_j = \frac{\sum_i^k Y_{ij} * W_i}{\sum_i^k W_i} \quad (5)$$

Z_j is the index score for the j^{th} district; W_i is the weight corresponding to i^{th} indicator; k is the total number of indicators; and $\sum_i^k W_i$ is the summation of weights. Finally, district-level livelihood vulnerability indices for male and female-headed households were calculated. The quintile estimation was used for quantification of livelihood vulnerability. Therefore, districts were divided into three categories, viz., 0 to 33rd percentile (low), values above 66th percentile were classified as High and the remaining districts were classified as medium.

Livelihood vulnerability index was constructed using socio-economic characteristics of the slum households, i.e., (i) ownership of slum, (ii) surrounding area of slum, (iii) location of slum, (iv) physical location of slum, (v) water logging in slums, (vi) waterlogged approach road, (vii) access of electricity, (viii) structure of houses, (ix) nature of road in the slum premises, (x) nature of approach road in the slum premises, (xi) distance from the motorable road, (xii) source of drinking water, (xiii) latrine facility, (xiv) sewerage system, (xv) drainage system, (xvi) garbage collection, (xvii) frequency of garbage collection, (xviii) distance from nearest government primary school, (xix) distance from nearest government hospital, (xx) slum households having membership of association, and (xxi) households benefitted from Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Moreover, STATA statistical software version 13 and QGIS version 3.6.2 were used to analyze the data.

Results

Descriptive Statistics

Descriptive statistics of slum dwellers revealed that about 8.8 million households lived in slums, about 5.6 million in notified and 3.2 million in non-notified slums. Maharashtra, with an estimated 7723 slums, accounted for about 23 percent of all

slums in urban India, followed by Andhra Pradesh, accounting for 14 percent and West Bengal, which has a share of about 12 percent. Further, an average slum size is 263 households. About 39 percent of all slums had an area in the range 0.05 to one (1) hectare, about 21 percent were in the 1-2 hectares range, and 15% were less than 0.05 hectares in size. Nearly 30 percent of slums were located in open spaces or parks, 23 percent along Nallahs or drains, and 9 percent along railway lines. As far as socioeconomic characteristics are concerned, the majority of the houses have Pucca structures in nearly 60 percent of slums. Taps were the major source of drinking water in nearly 71 percent of all slums. About 68% of slums had electricity both for household use and for streetlights. In 15 percent of notified slums, 42 percent of non-notified slums, and 31 percent of all slums taken together, no latrine was used by most of the residents. About 44 percent of notified, but only 18 percent of non-notified slums had an underground sewerage system. An estimated 31 percent of slums had no drainage system. Nearly 27 percent of slums had no arrangement for garbage disposal. The problem of water-logging (due to rainfall) is severe in a lot of slums.

Rural-urban Population Composition

In 1901, only 10.80 percent of the population lived in urban areas as compared to 89.2 percent of the rural population [Fig-1]. A rapid increase in the urban population has been reported in subsequent years. In 1931, the share of urban population increased to 12 percent; this further rose to 17.3 percent in 1951 against the rural population of 82.7 percent. The share of the urban population increased to 23.30 percent in 1981 against 76.7 percent of the rural population. In 2001, the urban population reached to the level of 28.5 percent of the total population, and in 2011, the urban population increased to 31.2 percent against the 68.8 percent rural population. This continuous growth of the urban population created alarming problems related to health and wealth in the urban area of the country. Committee on slum reported that nearly 25 percent of the urban population still subsists on income that is below the poverty line. The majority of this percentage lives in slums, in inhuman conditions that deny their right to basic civic amenities or social services such as proper health care utilization, sanitation, education, and adequate diet, etc. It is predicted that as urbanization grows, the share of slum population to the total urban population also simultaneously grows.

Extent of Livelihood Vulnerability

There have been large-scale inter-district variations in livelihood vulnerability of households lived in urban India [Table-1]. Based on the district level estimation, the number of districts with a high range of livelihood vulnerability in 164 (34.02%). Low level of livelihood vulnerability has percolated to the extreme position in 164 districts of many states, like Andaman and Nicobar, Meghalaya, Mizoram, Orissa, Punjab, Sikkim, Tripura and Pondicherry (2 districts), Andhra Pradesh and Arunachal Pradesh (5 districts), Assam and Maharashtra (7 districts), Bihar (16 districts), Goa (1 district), Gujarat (7 districts), Haryana, Uttaranchal and Himachal Pradesh (4 districts), Jammu & Kashmir (9 districts), Karnataka and Rajasthan (8 districts), Kerala (6 districts), Madhya Pradesh (18 districts), Manipur (8 districts), Nagaland (3 districts), Tamil Nadu (10 districts), Uttar Pradesh (16 districts) and West Bengal (6 districts). Further, number of districts with medium ranges of livelihood vulnerability reported in 158 districts in the states, viz., Andhra Pradesh (7 districts), Arunachal Pradesh, Karnataka and West Bengal (3 districts), Assam (14 districts), Bihar (16 districts), Gujarat, Jammu & Kashmir, Nagaland (4 districts), Haryana (8 districts), Himachal Pradesh, Punjab (6 districts), Madhya Pradesh (13 districts), Maharashtra (9 districts), Meghalaya, Uttaranchal (2 districts), Orissa, Tamil Nadu (5 districts), Rajasthan (11 districts) and Uttar Pradesh (24 districts). Moreover, number of districts with high ranges of livelihood vulnerability reported in 160 districts of states, i.e. Andhra Pradesh (11 districts), Arunachal Pradesh, Assam and Uttaranchal (3 districts), Bihar, Karnataka, Rajasthan (10 districts), Chandigarh, Dadar, and Nagar Haveli, Daman, Delhi, Manipur, Meghalaya, Mizoram, Pondicherry and Goa (1 district), Gujarat (9 districts), Haryana, Jammu & Kashmir (4 districts), Himachal Pradesh, Sikkim (2 districts), Kerala (7 districts), Madhya Pradesh (15 districts), Maharashtra, Uttar Pradesh (14 districts), Orissa, Tamil Nadu (6 districts), Punjab (5 districts) and West Bengal (8 districts).

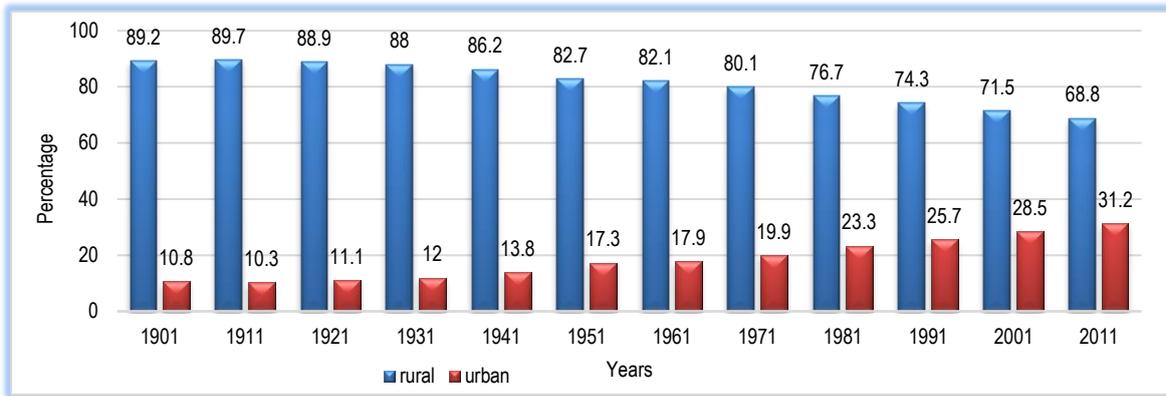


Fig-1 Shift in rural-urban population composition during 1901-2011 [Source: Estimated from Census, 2011]

The district-level data on livelihood vulnerability reflects an increasing proliferation of vulnerability and fragmentation at the district level *vis-a-vis* country level. The extent of livelihood vulnerability among the male and female-headed households also has revealed that female-headed households were highly vulnerable and have the least livelihood security at the district level as well as country level.

Table-1 District wise Extent of Livelihood Vulnerability in India

Ranges	Male-HHs Vulnerability	Female – HHs Vulnerability	Total (male+ Female)
Low	164 (34.02)	90(18.67)	169(35.06)
Medium	158(32.78)	112(23.24)	156(32.37)
High	160(33.20)	280(58.09)	157(32.57)
Total	482(100.00)	482(100.00)	482(100.00)

Source: 69th NSSO Data. Note: 0 to 33rd percentile (Low), values above 66th percentile were classified as High and the remaining districts were classified as Medium.

Livelihood Vulnerability in Slum Households: A Gender Perspective

The constructed livelihood vulnerability revealed that the districts on low and medium latitudes are highly vulnerable. On the other hand, districts in high latitudes are least vulnerable. Gender analysis provides the extent of vulnerability in male and female-headed households. The majority of the female-headed households are moderate to highly vulnerable compared to male-headed households. We find that out of 21 indicators, seven (7) indicators are most influencing indicators for higher livelihood vulnerability, *viz.*, slum located in fringe area, unserviceable kutcha house, kutcha road in the slum premises, *Katcha* approach road, untreated water for drinking, no facility of garbage collection, and distance of more than 5 km of government hospital. Additionally, female-headed households' livelihood status revealed that sanitation, drinking facility, garbage collection, drainage, sewerage, location of slums, and structure of house were main influencing indicators for the persistence of higher livelihood vulnerability.

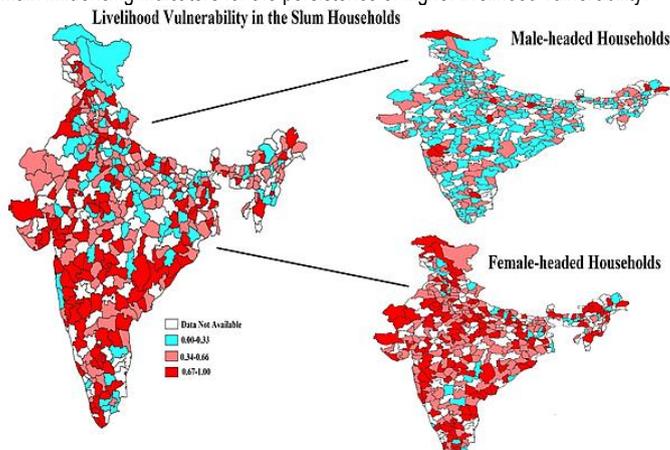


Fig-2 Gender wise Livelihood Vulnerability Status

Conclusion and Policy Recommendations

Though India's planning process has made constant efforts in addressing various social and economic barriers, regional disparities continue to persist. The present

study uses household-level data obtained from 69th NSSO round. This study concludes that female-headed households are highly vulnerable in districts of states, *viz.*, Uttar Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, and West Bengal. The study's findings revealed that out of 21 indicators, seven (7) indicators are most influencing factors for higher livelihood vulnerability. Urban resource management in India; however, has initially ignored many of livelihoods security aspects. For a long-time, it focused only on basic amenities and the public distribution system, while investment in slums is prerequisite. As far as policy intervention are concern, issues relating to livelihood security, micro-credit, provision for training and skills upgrading, institutional support and health benefits to the workers from the low-income households need immediate attention. In order to secure their living standard socio-economically, their income should be stable. In the absence of employment security, women and children are faces food and nutrition insecurity. Therefore, there is need of a holistic social and economic development plan to arrest livelihood vulnerability among the most fragile and vulnerable population, *i.e.*, slum population. This study's results provide useful guidelines for identifying region-specific vulnerable hotspots that need policy intervention in strengthening and securing livelihoods.

Application of research: A gender-sensitive livelihood vulnerability index was calculated and mapped using QGIS software

Research Category: Livelihood vulnerability

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