CAPACITY BUILDING & RISK PREPAREDNESS OF URBAN COMMUNITY- AN ANALYSIS ON COMMUNITY-BASED DISASTER RISK MANAGEMENT IN SILCHAR (INDIA)

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ABSTRACT:

Disaster Management practitioners have unanimously agreed on the role played by the community in Disaster Risk Reduction and capacity building to handle disaster impacts. Emphasis is laid on the participation of the community at the local level for risk assessment, vulnerability reduction and capacity building for disaster resilience. Understanding community requirements, adaptability, preparedness and vulnerability in the eventuality of disaster are of immense importance before the formulation of proper Disaster Management policies. This justifies the need and purpose of Community Based Disaster Risk Management (CBDRM). This paper studies the preparedness and capacity level of an urban population of Silchar Town in South Assam, India. The geographical disposition of the town makes it vulnerable to hazards like earthquakes and floods. Moreover, being the second largest town of Assam, rapid urbanization has made it susceptible to urban floods and fire. The study is the first of its kind involving the urban community of the area. Prior studies are institutional level based on a top-down approach. However, the bottom-up approach adopted in the study differs in some instances from institutional reports. Consequently, the existing institutional plans and policies need some modification to bridge the existing gaps and make it people-friendly.

Keywords: **Disaster, Community, Preparedness, Capacity, Risk, Urban Community**

INTRODUCTION:

From time immemorial, the planet Earth has witnessed various kinds of a disaster causing cascading impacts on the environment, climate, flora, fauna and mankind mostly altering the geopolitical and socio-economic structure of civilizations. However, humanity survived, thrived and adapted to the challenges despite the degrading impact and loss, by sheer chance or for that matter, through the blend of traditional and acquired knowledge skewed toward domains of innovation, science and technology. In this epoch of the Holocene, humans have disproportionately outnumbered other species and hence have upset the ecological balance through unstainable development practices precipitating unknown and uncertain hazards to which the world is now exposed. Researches indicate that spatial spread, frequency and intensity of both natural and human-induced disasters are not only on the rise but have become more erratic and often unpredictable. In urban centres, inadequate public infrastructure, growing needs of rising population, unplanned and unsustainable development and livelihood practices are acting as disaster risk multipliers for citizens and various communities which pose a great challenge for local risk governance. As most of the factors are anthropocentric and focus on the development of a sustainable environment for survival, efforts are made towards Disaster Management (DM) of developed areas, thereby, often ignoring remote locations.

Disasters related to hazards, vulnerabilities of the exposed elements, risks associated and coping capacities of society to deal with them. Unequivocally, disasters affect communities, which act as the most crucial element of investigation and understanding of impact by exploring the dynamics of interaction between disaster risk and vulnerabilities together with appropriate reduction measures as communities are direct victims of disasters

Globally, since the 1980s, a change in approach is observed in Disaster Management and the role of communities thereof, influenced by themes of civil protection. Researchers and practitioners opine that a pragmatic understanding of social dynamics together with elements of hazardous exposure, vulnerabilities and resilience is possible if and only if the knowledge formation process is from within and by those affected. Traditional knowledge and understanding of local culture are necessary besides scientific knowledge. However, evidence from studies suggests that lack of resources, capacities and technical knowledge interfere with the spontaneous Community Based Disaster Risk Management (CBDRM) process. CBDRM is considered a participatory process. Communities actively participate in identification, evaluation and planning to mitigate various kinds of hazards and vulnerabilities (Krummacher, 2014). The process aims to develop the skills and capacities of people for strengthening resilience (Norris et al., 2008). Communities occupy the core of this process. CBDRM address local issues, challenges and problems that the community witnesses.

The competence of a community in building capacity is measured by its problem-solving strategies, skills, and flexibility. Another important aspect of capacity building is the flow of information within the community and the infrastructure necessary to ease out flow of communication in the community. The distribution of economic resources within the community in an event of an emergency also helps in building up the capacity of the community. Bruneau et al. (2003) identify that capacity and resilience building depend on robustness, redundancy, rapidity and resourcefulness. Robustness is defined as the ability to handle stress without suffering any kind of degradation (Norris et al. 2008). Robustness refers to the quality and strength of resources under stress during disasters. Redundancy deals with the sustainability extent of resources and emphasizes the requirement for alternatives in case of a disaster. Alternative resources aid the community to maintain primary activities and maintain functioning. For example, Cutter et al. (2010) highlight that, abundant evacuation routes, the capacity of shelters and hospitals have a positive effect on disaster resilience. Rapidity is defined by Bruneau et al. (2003) as the capacity of a community to handle priorities and achieve goals in proper time to contain loss due to disaster to avoid any sort of future disruption. Resourcefulness is the capability to use physical and human resources to meet up priorities. The principle of adaptive capacity is based on a combination of these four attributes in Disaster Management. Cutter et al. (2008) explain adaptive capacity about floods. When a community faces floods very frequently, the community naturally learns to adapt to new conditions and spends more resources to build their preparedness for such future events. This process of adapting to cope with changing threats can take place at the individual level, organizational level and community level. Individual learning is about an individual's own experience and observation. Previous literature reveals that there exist various resources that frame up the components required to build resilience during disasters. Some of these resources are social capacity, economic and physical capacity; information and communication together with community competence (Brody et al. 2010; Cutter et al. 2010; Longstaff et al. 2010; Norris et al. 2008; Paton, 2007; Sherreib et al. 2010). Resilience against disasters implies the capacity to bounce forward or back in the eventuality of a stressor event that is confronted by the community (Godschalk, 2003; Longstaff et al. 2010). The concept of disaster preparedness pertains to measures aimed at enhancing life safety during a disaster. It also includes enhancing the ability to undertake emergency actions to protect life and property; limit damage and disruption from disaster as well as the ability engage in post-disaster recovery and restoration activities. Preparedness is considered as activities consisting of improving response and coping capabilities. For effective preparedness, hazard, risk and vulnerability assessment are important.

In this paper, a case study of Silchar Town in Assam, India applying CBRDM methodology is undertaken to explore the preparedness and capacity of the people of Silchar Town to tackle disasters.

THE STUDY AREA:

Silchar Town has a history of being affected by natural disasters such as earthquakes, cyclones and riverine floods due to its geographical location. Moreover, it is also prone to artificial hazards like road accidents, urban floods and fire due to rapid unplanned urbanization, inadequate public infrastructure, poor solid waste management, weak risk governance by local authorities, high population density to name a few. All these factors make the town vulnerable to various kinds of hazards. There exists a necessity to systematically manage disaster risks to save and protect life, livelihood and property in the eventuality of disasters.

The geographic location and the geological disposition of Silchar Town make it very vulnerable to earthquakes. Silchar is located in the southern part of Assam is bounded in the North and East by the Himalayan Frontal Thrust and Naga Thrust. These thrusts are very much instrumental in making Assam prone to earthquakes. Silchar Town in Assam lies in Zone V, the zone of the highest seismic risk. Silchar has a history of being inflicted by earthquakes since 1548. Although much is not known about it, recurrent earthquakes are recorded over subsequent years of 1596, 1601, 1642, 1663, 1696, 1756, 1772, 1838. (Silchar Atlas, 2014-15). The first recorded earthquake in Silchar dates back to 1869, followed by 1897, 1923, 1930, 1940, 1947, 1950, 1984, 1985 and 1988. As per the information available from the District Disaster Management Authority (DDMA), Cachar, Assam, most of these earthquakes had a magnitude of 7 and above with as high as 8.7 in 1950. Most of these earthquakes had their epicentre in the vicinity of Assam, thereby, causing direct or indirect damage to Silchar Town.

Silchar Town witnessed urban floods due to water logging in the rainy season and riverine floods caused by the inundation of flood plains by the river Barak and its tributaries. The town has been ravaged by floods in 1986, 1991 and 2004. The topography of the intricate river system makes it suspectable to flood. The topography of the intricate river system makes it suspectable to flood. Figure 1.3 shows the Z-flood survey of flood hazards in Silchar Town. Flood waters in wash corridors and floodplains are obstructed in their flow path due to unplanned houses, building, streets etc. Silchar Town, of late, is frequently affected by urban flood in the rainy season paralyzing life in the town for several hours and even days in a few wards caused by sudden heavy precipitation, choking and blocking of drainage systems laden with silt and non-degradable waste materials due to unscientific disposal mechanisms practised by citizens leading to an urban flood.

Being the second largest town in the state of Assam, the town has undergone rapid and unplanned urbanization especially in the last two decades resulting in higher urban population growth, changes in land usage, inadequate and stressed public infrastructure, illegal encroachment and construction, violation of safe building rules, traffic congestion, improper waste disposal mechanism, informal settlements etc. thereby elevating disaster risk and exposure of the citizens to several natural and artificial hazards.

METHODOLOGY:

The target population of this case study research is the people of Silchar town in Assam residing within the defined 28 municipal wards and its immediate periphery of 1km grouped in dummy ward no. 29. A population count of 2,00,000 formed the universe of the study with approximately 1,80,000 residing within 28 municipal wards and the rest 20,000 in the periphery of 1 km obtained by corroborating Govt. census data 2010 and voter list 2015-17. Considering the universe to be of about 2,00,000 people, 1500 people from the described area are initially targeted representing as an individual, member of the family, ward and the Silchar Town per se forming the urban community under study. The data collection method comprises of participatory research technique of CBDRM by a semi-structured interview. Field Survey cum Focus Group Interview of each member is conducted for obtaining data. Each group comprised of average 30 members and 22 such Focus Group Interviews were conducted, thereby obtaining 660 respondents. Out of these 660 responses 600 are retained based on the missing value test. Guided Personal Interview is carried out with 840 respondents from 29 wards considering each ward as a stratum from where respondents are selected randomly with an average of 30 people from each ward. Out of 840 responses, 301 responses are retained for the study based on the missing value test. Thus, a sample size of 901 is considered for the study derived from Focus Group Interview and Guided Personal Interview.

Preparedness and capacity assessment at individual, family and community levels is attempted in this chapter. Analysis of preparedness and capacity of people of Silchar Town for the mentioned hazards are performed in three steps for better understanding and interpretation viz. a) assessment by computing quantitative values through statical modelling, formulation and descriptive statistics b) indexing and c) mapping with colour index, geographical North and in the scale of approximately 1cm = 1km.

To assess disaster preparedness of people for the considered hazards, the considered aspects-

a) Members of the family understand the impacts of considered hazards;

b) Citizens are aware of the history of the hazards;
c) People understand Early Warning System and can respond to it;
d) Citizens can access authentic Early Warning System;
e) Families possess emergency kits for these hazards;
f) People are aware of vulnerable areas in the ward;
g) Families of the town possess a hazard-specific emergency evacuation plan;
h) Families have household tools and equipment for rescue;
i) Water supply of family is protected in event of hazards;
j) Families can protect important documents and moveable assets to a safer place during hazards;
k) Family members know escape routes;
l) Families are aware of safe spots inside the house;
m) Members of the family are conversant with emergency numbers and have an emergency kit in the family.

The above aspects in Section E of the questionnaire (Appendix A), where each question from Q1 to Q13 is ordinal and dichotomously scaled as Yes (1) and No (0) which refer to a variable determining disaster preparedness of people of Silchar Town on earthquake, flood, urban flood and fire hazard from family level. Q14 represents a multi-grouped variable which is further dichotomously classified as Yes (1) and No (0) for suitable statistical analysis. Q1 attempts to understand knowledge of respondent on impacts of considered hazards represented by variable names (implication of variables given in Appendix B) Fpimpeq, Fpimpf, Fpimuf and Fpimpfr; while Q2 for measuring knowledge on history of these hazards represented by variable names Fphiseq, Fphisf, Fphisuf and Fphisfr; Q3 to assesses ability to discern early warning message and respond thereto denoted by variable names Fpwrngmsgeq, Fpwrngmsgf, Fpwrngmsguf and Fpwrngmsgfr; Q4 to elicit response on access to various communication media for early warning message expressed by variable names Fpaccwrngeq, Fpaccwrngf, Fpaccwrnguf and Fpaccwrngfr; Q5 on readiness with family emergency kit labelled by variable names Fpgncykiteq, Fpgncykitf, Fpgncykituf and Fpgncykitfr; Q6 on information about identification of vulnerable areas in ward susceptible to disaster risks given by variable names Fpvuleq, Fpvulf, Fpvuluf and Fpvulfr; Q7 regarding emergency evacuation plan for hazards with variable names Fpgncyvaceq, Fpgncyvacf, Fpgncyvacuf and Fpgncyvacfr; Q8 on availability of household tools required for search and rescue represented by variable names Fphheqpeq, Fphheqpf, Fphheqpuf, and Fphheqpfr; Q9 on ability to protect water supply sources from impacts of hazards denoted by variable names Fpwtrsplyeq, Fpwtrsplyf, Fpwtrsplyuf and Fpwtrsplyfr; Q10 regarding ability to protect important documents and moveable assets expressed by variable names Fpdoceq, Fpdocf, Fpdocuf and Fpdocfr; while Q11 intends to measure response on knowledge of escape routes in emergency situations given by variable names Fpescrteq, Fpescrtf, Fpescrtuf, Fpescrtfr; Q12 to measure ability of respondents in knowing safe spots of their housing structures with respect to the considered hazards denoted by variable names Fpsafspteq, Fpsafsptf, Fpsafsptuf, Fpsafsptfr; Q13 on respondent’s knowledge of emergency contact numbers expressed by variable names Fpgncynoeq, Fpgncynof, Fpgncynouf and Fpgncynofr and finally Q14 to elicit response on contents of emergency kit for earthquake, flood, urban flood and fire hazard grouped into eight categories representing an unique variable name for each item in kit which is dichotomously classified further into Yes (1) and No (0) expressed in variable names Fpgncykit1, Fpgncykit2, Fpgncykit3, Fpgncykit4, Fpgncykit5, Fpgncykit6, Fpgncykit7 and Fpgncykit8 respectively. All variables described above are considered to be linearly associated which is expressed by mathematical formulation given by Eqn. 1 to Eqn. 4 to determine preparedness for each hazard type through statistical modelling by IBM SPSS 21. Preparedness of people of Silchar Town for each hazard type is represented by variable names earthquake - PRDQ1, flood - PRDFL1, urban flood - PRDUFL1 and fire - PRDFR1 respectively.

PRDQ1=Fpimpeq+Fphiseq+Fpwrngmsgeq+Fpaccwrneq+Fpgncykiteq+Fpvuleq+Fpgncyvaceq+Fphheqpeq+Fpwtrsplyeq+Fpdoceq+Fpescrteq+Fpsafspteq+Fpgncynoeq+Fpgncykit1+Fpgncykit2+Fpgncykit3+Fpgncykit4+Fpgncykit5+Fpgncykit6+6*Fpgncykit7-6*Fpgncykit8. (1)

PRDFL1=Fpimpf+Fphisf+Fpaccwrngf+Fpwrngmsgf+Fpgncykitf+Fpvulf+Fpgncyvacf+Fphheqpf+Fpwtrsplyf+Fpdocf+Fpescrtf+Fpsafsptf+Fpgncynof+Fpgncykit1+Fpgncykit2+Fpgncykit3+Fpgncykit4+Fpgncykit5+Fpgncykit6+6*Fpgncykit7-6*Fpgncykit8 (2)

PRDUFL1=Fpimpuf+Fphisuf+Fpwrngmuf+Fpaccwrnguf+Fpgncykituf+Fpvuluf+Fpgncyvacuf+Fphheqpuf+Fpwtrsplyuf+Fpdocuf+Fpescrtuf+Fpsafsptuf+Fpgncynouf+Fpgncykit1+Fpgncykit2+Fpgncykit3+Fpgncykit4+Fpgncykit5+Fpgncykit6+6*Fpgncykit7-6*Fpgncykit8 (3)

PRDFR1=Fpimpfr+Fphisfr+Fpwrngmsgfr+Fpaccwrngfr+Fpgncykitfr+Fpvulfr+Fpgncyvacfr+Fphheqpfr+Fpdocfr+Fpescrtfr+Fpsafsptfr+Fpgncynofr+Fpgncykit1+Fpgncykit2+Fpgncykit3+Fpgncykit4+Fpgncykit5+Fpgncykit6+6* Fpgncykit7- 6* Fpgncykit (4)

To assess the disaster capacity of people, the parameters considered are -

a) Type of house;
b) Occupancy type;
c) Height of house;
d) Maintenance of house;
e) Roof material type;
f) Wall material type;
g) Building material type;
h) Distance between adjacent buildings;
i) Drain type;
j) Flow capacity of drain;
k) The main source of energy;
l) Cooking energy;
m) Utilities available in house;
n) Road type in the vicinity of the house;
o) Accessibility of road in the vicinity of the house;
p) Plinth level.

Further, it is required to understand whether -

A) boundary walls exist around the house;
B) open space is available in the vicinity of the house;
C) trees exist around the house;
D) drain is cleared;
E) waste is disposed of in drain;
F) smoke detectors are available in house;
G) fire extinguishers are available in house;
H) emergency exit doors are present in the house.

Moreover, it needs to be known from people regarding ward what is the -

a) Topography of ward;
b) Major land use in the ward;
c) Housing density in the ward;
d) Distance of river barak or major kahal from ward;
e) Drinking water source and other purpose water source of the ward.

And whether -

F) water bodies are present in the ward;
G) hospitals are available in the ward;

H) emergency medical service is present in the ward;
I) power supply is available in all areas of the ward;
J) relief camp exists in the ward;
K) facilities and support services are available in the ward.

A few of the above parameters related to capacity is included in Section D of the questionnaire (Appendix A). In Section D, Q6 to Q11 which are ordinally scaled with each category is further classified into dichotomous variables of Yes/Presence (1) and No/Absence (0). Q6 refers to the availability of hospitals with response values of Yes (1) and No (0). Variable names are expressed by Whospy1-acute care, Whospy2-primary care, Whospy3-speciality care, Whospy4-psychiatric care and Whospn-no hospital. Q7 refers to availability of emergency medical service providers in ward represented by variable names Wemgncysp1-Nurse or paramedics, Wemgncysp2-doctors, Wemgncysp3-ambulance, Wemgncysp4-chemists, Wemgncysp5-medical volunteers, Wemgncysp6-all of these and Wemgncysp7-none of these, while Q8 for evaluating the availability of drinking and other purpose water assigned in variable names Wwtrsrc1-for civic supply, Wwtrsrc2-deep tube wells, Wwtrsrc3-wells, Wwtrsrc4-river, Wwtrsrc5-pond; Q9 elicits a response on availability of power supply in all places of ward given by Wpwrspp; Q10 on availability of relief camp measured by variable Wrlfcmp and lastly Q11 on facilities or support system available in ward expressed by engineering services-Wfacli1, rescue equipment-Wfacli2, skilled rescue personnel-Wfacli3, volunteers-Wfacli4, mass shelter-Wfacli5, all of these- Wfacli6 and none of these-Wfacli7. Some capacity related questions are in Section C of the questionnaire. These questions pertain to house related resources, measured by category variables represented as a type of house in Q1 by Htyp, Q3 regarding house height by Hhght, Q4 on the age of house by Hage, Q5 refers to maintenance frequency of house by Hmain, Q7 on wall material Hwmat, Q8 on earthquake-resistant building material Hbmat1, Q10 about sufficient open space given by variable name Hopnspc, Q12 to measure response on the distance between adjacent houses denoted by variable name Hdisadj, Q19 about utilities available like television and radio by Hutlavl1, mobile by Hutlavl2, internet by Hutlavl3, two-wheeler by Hutlavl4, three wheeler-by Hutlavl5, four-wheeler by Hutlavl6, heavy vehicle by Hutlavl7; Q22 on availability of emergency exit door denoted by variable Hemrgnext, Q23 addresses type of road connected to house given by Hroadtyp and Q24 regarding the accessibility of road by different vehicles assigned as Hrdacess. As preparedness is an integral part of capacity, its implication towards capacity building is obtained from variable PRDQ1, given by Eqn. 1. The variables described above for capacity assessment are considered to be linearly associated and is expressed by mathematical formulation given by Eqn. 5 for earthquake hazard.

CAPCTYQ1=Whospy1+Whospy2+Whospy3+Whospy4-4*Whospn+Wemgncysp1+Wemgncysp2+
Wemgncysp3+Wemgncysp4+Wemgncysp5+5*Wemgncysp6-
5*Wemgncysp7+Wwtrsrc1+Wwtrsrc2+Wwtrsrc3-Wwtrsrc4-
Wwtrsrc5+Wpwrspp+Wrlfcmp+Wfacli1+Wfacli2+Wfacli3+Wfacli4+Wfacli5+5*Wfacli6-5*Wfacli7+Htyp-
Hhght+Hage+Hmain+Hwmat+Hbmat1+Hopnspc+Hdisadj+Hutlavl1
+Hutlavl2+Hutlavl3+Hutlavl4+Hutlavl5+Hutlavl6+Hutlavl+Hemrgnext+Hroadtyp+Hrdacess+PRDQ1 (5)

The capacity of people for flood expressed by CAPCTYFL1 is again a multi-variable function defined by variables derived from Q6 to Q11 of Section D of the questionnaire and similar to that of the earthquake while few additional relevant questions are included. From Section C of the questionnaire some previously mentioned variables of the earthquake are retained while few are rejected. Some new variables defined are Q8 on flood-resistant building material given by variable name Hbmat2, followed by dichotomous variable Htree for the sufficient number of trees, Q14 refers to flow capacity of drain given by Hflwcpc, Q25 regarding plinth level of the house given by Hplnth. Preparedness for flood - PRDFL1 is given by Eqn. 2. Thus, capacity for flood CAPCTYFL1 formulates into a multi-variate linear function of variables given by Eqn. 6.

Capacity for urban flood represented by CAPCTYUFL1 is formulated by linear expression of determining variables of flood and some new variables specific to urban flood from Section C of the questionnaire such as Q13 on drain type given by variable name Hdrnty, Q15 given by variable name Hdrnclr ascribes to drain clearance and Q16 on waste thrown in drains is denoted by Host. Preparedness is an essential component of capacity which is denoted by the variable name PRDUFL1 presented in Eqn. 3. Thus, capacity for urban flood CAPCTYUFL1 formulates into a multi-variate linear function of all described variables inclusive of common and some specific variables are given by Eqn. 7.

For, the assessment of capacity for fire hazard represented by CAPCTYFR1 some new variables are introduced in the model from Section C of a questionnaire for proper analysis and interpretation. Q8 on fire-resistant building material given by variable name Hbmat3; Q20 is on the installation of smoke detectors represented by Hsmkdet and Q21 on availability of fire extinguisher assigned in variable name Hfrextng. Preparedness for fire PRDFR1 is given by Eqn. 4. Preparedness is factored to capacity for fire CAPCTYFR1 which formulates into a multi-variate linear function of all described variables inclusive of fire specific variables given by Eqn. 8.

CAPCTYFL1=Whospy1+Whospy2+Whospy3+Whospy4-4*Whospn+Wemgncysp1+Wemgncysp2+Wemgncysp3+Wemgncysp4+Wemgncysp5+5*Wemgncysp6-5*Wemgncysp7+Wwtrsrc1+Wwtrsrc2+Wwtrsrc3-Wwtrsrc4-Wwtrsrc5+Wpwrspp+Wrlfcmp+Wfacli1+Wfacli2+Wfacli3+Wfacli4+Wfacli5+5*Wfacli6-5*Wfacli7+Htyp+Hhght+Hwmat+Htree+Hbmat2+Hflwcpc+Hutlavl1+Hutlavl2+Hutlavl3+Hutlavl4+Hutlavl5+Hutlavl6+Hutlavl7+Hplnth+PRDFL1 (6)

CAPCTYUFL1=Whospy1+Whospy2+Whospy3+Whospy4-4*Whospn+Wemgncysp1+Wemgncysp2+Wemgncysp3+Wemgncysp4+Wemgncysp5+5*Wemgncysp6-5*Wemgncysp7+Wwtrsrc1+Wwtrsrc2+Wwtrsrc3-Wwtrsrc4-Wwtrsrc5+Wpwrspp+Wrlfcmp+Wfacli1+Wfacli2+Wfacli3+Wfacli4+Wfacli5+ 5*Wfacli6-5*Wfacli7+Htyp+Hhght+Hwmat+Htree+Hbmat2+Hdrnty+Hdrnclr-Hwst+Hflwcpc+Hutlavl1+Hutlavl2+Hutlavl3+Hutlavl4+Hutlavl5+Hutlavl6+Hutlavl7+Hplnth+PRDUFL1 (7)

CAPCTYFR1=Whospy1+Whospy2+Whospy3+Whospy4-4*Whospn+Wemgncysp1+Wemgncysp2+Wemgncysp3+Wemgncysp4+Wemgncysp5+5*Wemgncysp6-5*Wemgncysp7+Wwtrsrc1+Wwtrsrc2+Wwtrsrc3+Wwtrsrc4+Wwtrsrc5+Wpwrspp+Wrlfcmp+Wfacli1+Wfacli2+Wfacli3+Wfacli4+Wfacli5+5*Wfacli6-5*Wfacli7+Htyp-Hhght+Hage+Hmain+Hwmat+Hbmat3+Hopnspc+Hdisadj+Hutlavl1+Hutlavl2+Hutlavl3+Hutlavl4+Hutlavl5+Hutlavl6+Hutlavl7+Hsmkdet+Hfrextng+Hemrgnext+Hroadtyp+Hrdacess+PRDFR1 (8)

DATA ANALYSIS AND INTERPRETATION:

The mathematical formulations given by Eqn. 1 to Eqn. 4 construe that, preparedness is a multi-variable function associated linearly. But, how variance in each preparedness variable of the right-hand side of Eqn. 1 to 4 influences the variance in preparedness for each type of hazard is to be determined. Thus, the obtained dataset is subjected to multiple regression analysis configuring a statistical model with preparedness as the dependent variable and all other described variables originating from Q1 to Q14 as independent variables to infer statistically significant standardised coefficients and transform into new preparedness equations involving new preparedness variables PRDQ1R, PRDFL1R, PRDUFL1R and PRDFR1R respectively as given by Eqn.9 to Eqn. 12 based on standardised coefficients of regression analysis. Through multiple linear regression analysis, the relationship amongst each predictor variable with the outcome variable from the ANOVA test and how variance in each independent variable uniquely affect the variance in the prediction of the dependent variable from t-test at a significant level is obtained. For earthquake preparedness, the model summary and ANOVA table are presented in Table 1 (a) and Table 1 (b) respectively

Table 1(a) and Table 1(b) here

Standardised coefficients of preparedness due to earthquakes are presented in Table 2.

Table 2 here

It is observed from Table 1 (a), Table 1 (b) and Table 2 that, F (21, 880) = 1396.997, $p < 0.05$ with adjusted $R^2 = 0.966$ indicating high goodness of fit for the model. About 96.6% of the variance in the dependent variable is explained by the variance in considered independent variable data. F-test at $p < 0.05$ explain statistically significant variance in dependent variable PRDQ1 by variance of independent variables taken as a whole through Analysis of Variance (ANOVA) test, while t-test result reveals that, variance in PRDQ1 is significantly explained by unique variance of each independent variable of the model. The standardised coefficient from Table 2 is considered for homogeneity in units of measurement and comparison for prediction. Part correlation shows a positive correlation of all predictors except Fpgncykit8 (No emergency kit) and also multicollinearity is absent as observed from tolerance and Variance Inflation Factor values in Table 2. Fpgncykit7 (All items in the emergency kit) explains the most positive effect while Fpgncykit8 indicates the diminished effect on the outcome variable PRDQ1. The regressed equation with standardised coefficients is given below with new preparedness for earthquake variable labelled as PRDQ1R by Eqn..9.

PRDQ1R=0.079*Fpimpeq+0.078*Fphiseq+0.079*Fpwrngmsgeq+0.078*Fpaccwrneq+0.069*Fpgncykiteq+0.081*Fpvuleq+0.082*Fpgncyvaceq+0.085*Fphheqpeq+0.084*Fpwtrsplyeq+0.082*Fpdoceq+0.068*Fpescrteq+0.080*Fpsafspteq+0.075*Fpgncynoeq+0.048*Fpgncykit1+0.083*Fpgncykit2+0.082*Fpgncykit3+0.085*Fpgncykit4+0.085*Fpgncykit5+0.075*Fpgncykit6+0.452*6*Fpgncykit7-0.191*6*Fpgncykit8 (9)

For flood preparedness, the model summary and ANOVA table are given in Table 3 (a) and Table 3 (b) respectively.

Table 3(a) and Table 3(b) here

Standardised coefficients of preparedness due to flood are presented in Table 4.

Table 4 here

From Table 3 (a), Table 3 (b) and Table 4 it is observed that, F (21, 880) = 1400.245, $p < 0.05$ with adjusted R^2 = 0.936 represent high goodness of fit for the model. F-test at $p < 0.05$ significantly explain variance in the dependent variable PRDFL1 by variance of independent variables taken in the group while t-test significantly also explain the variance in PRDFL1 by unique variance of each independent variable of preparedness for flood considered in the model. Standardised coefficients from Table 4 are considered for prediction. Part correlation shows a positive correlation of all predictors except Fpgncykit8 (No emergency kit) and also tolerance and Variance Inflation Factor values in Table 4 indicate the absence of multicollinearity amongst independent variables. Fpgncykit7 (All items in the emergency kit) explains the most positive effect while Fpgncykit8 indicates the diminished effect on the outcome variable PRDFL1. The regressed equation with standardised coefficients is given below with new preparedness for flood variable labelled as PRDFL1R by Eqn. 10.

PRDFL1R=0.243*Fpimpf+0.084*Fphisf+0.089*Fpaccwrngf+0.089*Fpwrngmsgf+Fpgncykitf+0.069*Fpvulf+0.096*Fpgncyvacf+0.090*Fphheqpf+0.098*Fpwtrsplyf+0.093*Fpdocf+0.079*Fpescrtf+0.091*Fpsafsptf+0.096*Fpgncynof+0.056*Fpgncykit1+0.097*Fpgncykit2+0.096*Fpgncykit3+0.099*Fpgncykit4+0.099*Fpgncykit5+0.087*Fpgncykit6+ 0.527*6* Fpgncykit7 -0.223*6* Fpgncykit8

(10)

Also, for urban flood preparedness analysis, the model summary and ANOVA table are shown in Table 5 (a) and Table 5 (b) respectively.

Table 5(a) and Table 5(b) here

Standardised coefficients of preparedness due to urban floods are presented in Table 6.

Table 6 here

Table 5 (a), Table 5 (b) and Table 6 reveal that, F (21, 880) = 1399.337, $p < 0.05$ with adjusted R^2 = 0.939 indicating high goodness of fit for the model designed to explain the cause-effect relationship between predictors and the predicted variable. ANOVA table shows F-test value at $p < 0.05$ implying variance in the dependent variable PRDUFL1 by the variances of independent variables significantly in the model. Also, the t-test significantly explains the variance in PRDUFL1 by the unique variance of each independent variable of urban flood preparedness. The standardised coefficient for each independent variable of the regression equation is obtained from Table 6. In this model also, part correlation shows positive correlation of all predictors with PRDUFL1 except Fpgncykit8 (No emergency kit), tolerance and Variance Inflation Factor values in Table 5.6 shows the absence of multicollinearity amongst independent variables. Fpgncykit7 (All items in the emergency kit) explains the most positive effect while Fpgncykit8 indicates the diminished effect on the outcome variable PRDUFL1. The regressed equation with standardised coefficients is given below with new preparedness for fire variable labelled as PRDUFL1R given by Eqn. 11.

PRDUFL1R=0.060*Fpimpuf+0.086*Fphisuf+0.089*Fpwrngmuf+0.089*Fpaccwrnguf+0.083*Fpgncykituf+0.067*Fpvuluf+0.095*Fpgncyvacuf+0.092*Fphheqpuf+0.096*Fpwtrsplyuf+0.092*Fpdocuf+0.071*Fpescrtuf+0.091*Fpsafsptuf+0.094*Fpgncynouf+0.055*Fpgncykit1+0.096*Fpgncykit2+0.095*Fpgncykit3+0.098*Fpgncykit4+0.098*Fpgncykit5+0.086*Fpgncykit6+0.521*6*Fpgncykit7-0.221 *6*Fpgncykit8 (11)

For fire preparedness analysis, the model summary and ANOVA table are given by Table 7 (a) and Table 7 (b) respectively.

Table 7(a) and Table 7(b) here

Standardised coefficients of preparedness due to fire are presented in Table 8.

Table 8 here

It is observed from Table 7 (a), Table 7 (b) and Table 8 that, F (20, 881) = 1101.657, $p < 0.05$ with adjusted R^2 = 0.917 showing high goodness of fit for the model as about 91.7% variance in preparedness for fire is explained by given set of independent variables taken in the model. ANOVA table shows F-test value at $p < 0.05$ which explain significant variance in the dependent variable PRDFR1 by the variance of independent variables taken as a group in the model. Also, the t-test significantly explains the variance in PRDFR1 by the unique variance of each independent variable of urban flood preparedness. A standardised coefficient for each independent variable is considered for the regression equation. From this analysis also part correlation shows positive correlation of all predictors with PRDFR1 except Fpgncykit8 (No emergency kit), tolerance and Variance Inflation Factor values in Table 8 validates absence of multicollinearity amongst independent variables. Fpgncykit7 (All items in the emergency kit) explains the most positive effect while Fpgncykit8 indicates the diminished effect on the outcome variable PRDFR1. The regressed equation with standardised coefficients is given below yielding new preparedness for fire preparedness variable labelled as PRDFR1R given by Eqn. 12

PRDFR1R=0.079*Fpimpfr+0.082*Fphisfr+0.081*Fpwrngmsgfr+0.080*Fpaccwrngfr+0.068*Fpgncykitfr+0.083*Fpvulfr+0.084*Fpgncyvacfr+0.086*Fphheqpfr+0.083*Fpdocfr+0.084*Fpescrtfr+0.084*Fpsafsptfr+0.085*Fpgncynofr+0.048*Fpgncykit1+0.084*Fpgncykit2+0.084*Fpgncykit3+0.086*Fpgncykit4+0.086*Fpgncykit5+0.076*Fpgncykit6+6*0.459*Fpgncykit7–6*0.194*Fpgncykit8
(12)

Table 9 depicts the ward wise mean and standard deviation of preparedness of people of different wards of Silchar Town for four hazards viz. earthquake, flood, urban flood and fire. The predicted value of preparedness is calculated for each respondent from the obtained regression equation and then ward wise mean value with a standard deviation of each preparedness variable is obtained. In Eqn. 9 to Eqn. 12, PRDQ1R, PRDFL1R, PRDUFL1R and PRDFR1R are the new variable names that denote preparedness for earthquake, flood, urban flood and fire respectively obtained by multiple regression analysis and transformation of the basic linear mathematical formulation of preparedness for the considered hazards given by PRDQ1, PRDFL1, PRDUFL1 and PRDFR1.

Table 9 here

Table 10 shows preparedness indices of each ward due to earthquake, flood, urban flood and fire hazard based on their statistical mean. Preparedness variables corresponding to earthquake, flood, urban flood and fire hazard are PRDQ1R, PRDFL1R, PRDUFL1R and PRDFR1R respectively. The indices are grouped into three categories low, medium and high. Low is colour-coded as green, medium as yellow and high as red. In the case of an earthquake, low indicates preparedness ranging from 0.5388 to 1.1970, medium 1.971 to 1.8522 and high 1.8553 to 2.5136. For flood, low indicates preparedness ranging from 1.0997 to 1.9256, medium from 1.9257 to 2.7515 and high from 2.7516 to 3.57775. For urban flood, preparedness of 0.6550 to 1.3857 is low, 1.3858 to 2.1164 is medium and 2.1165 to 2.8471 is high. In case of fire, 1.7893 to 3.1181 is low, 3.1182 to 4.4469 is medium and 2.1165 to 2.8471 is high preparedness.

Table 10 here

Based on indices, the preparedness of each ward is labelled as low, medium or high for earthquake, flood, urban flood and fire hazard. Table 11 depicts the ward wise preparedness levels and also for Silchar Town.

Table 11 here

Based on measured value and indices of preparedness of people for four hazards, preparedness mapping for Silchar Town is done showing inter ward changes. Colour-code is assigned to each index for mapping. Green is assigned to low preparedness, yellow for a medium level of preparedness and red depicts high preparedness. Fig. 1 to Fig. 4 represents preparedness mapping of Silchar Town for earthquake, flood, urban flood and fire hazard.

Figure 1 to 4 here

From Table 11 and Fig 1 to Fig 4, it is observed that preparedness of people for earthquake hazard is low in wards 1, 6, 8, 13, 27 and medium in wards 3, 4, 5, 9, 10, 11, 12, 14, 15, 16, 17, 18, 20, 24, 28 and 29. High preparedness is inferred for wards 2, 7, 19, 21, 22, 23, 25 and 26. Also, the preparedness of the people of Silchar Town as a whole for earthquake hazards is found medium. For flood hazard, low preparedness of people of Silchar Town is observed in wards 1, 6, 8, 13, 15, 17, 27 and a medium level of preparedness in wards 2, 3, 4, 5, 7, 9, 10, 11, 12, 14, 16, 18, 19, 20, 21, 22, 23, 24, 26, 28 and 29 is inferred. High preparedness is observed in ward 25 only. Preparedness of people of Silchar Town for flood hazard is also found medium. Preparedness of people for urban flood hazards is low in wards 1, 8 and 13. Wards 3, 4, 5, 6, 9, 10, 11, 12, 14, 15, 16, 17, 18, 20, 24, 27, 28 and 29 show medium level of preparedness. High urban flood preparedness is observed in wards 2, 7, 19, 21, 22, 23, 25 and 26. Silchar Town is assigned medium level preparedness of people for urban flood hazards. Preparedness of people for fire hazards is low in wards 1, 4, 6, 8, 17 and medium in wards 2, 5, 9, 10, 11, 13, 14, 15, 20, 26, 28 and 29 while high preparedness levels are observed in wards 3, 7, 12, 16, 18, 19, 21, 22, 23, 24, 25 and 27. Preparedness of people of Silchar Town for fire hazard is found medium.

Because of multivariate linear association and inter dependency of described variables with preparedness and capacity variables for earthquake, flood, urban flood and fire hazard given by formulations, multiple linear regression analysis is applied on the dataset. Eqn. 13 to Eqn. 16 are regressed equations of capacity due to earthquake, flood, urban flood and fire hazard respectively. Model summary and ANOVA table for capacity towards earthquake are presented in Table 12 (a) and Table 12 (b) respectively.

Table 12(a) and Table 12(b) here

Standardised coefficients of capacity for an earthquake are presented in Table 13.

Table 13 here

Table 12 (a), Table 12 (b) and Table 13 reflect that F (44, 857) = 649.738, $p < 0.05$ with adjusted R^2 = 0.869 present high goodness of fit for the model indicating that about 86.9% variance in capacity for earthquake variable CAPCTYQ1 is explained by the given set of independent variables taken in the model. ANOVA table depicting F-test value at $p < 0.05$ validates statistically significant variance in the dependent variable which independent variables explain through the model. Also, the t-test significantly explains variance in CAPCTYQ1 by the unique variance of each independent variable of earthquake capacity. Standardised coefficients for homogeneity of units in independent variables ignoring constant are considered for prediction obtained from the regression equation. In Table 13, part correlation shows a positive correlation of all predictors of CAPCTYQ1 except Hhght (house height), Whospn (none of these - hospitals available in the ward), Wemgncysp7 (none of these - emergency medical service providers in the ward), Wwtrsrc4 (river - water source in the ward), Wwtrsrc5 (pond -water source in the ward) and Wfacli7 (none of these - facilities available in the ward). Tolerance and Variance Inflation Factor values in Table 13 justify the absence of multicollinearity amongst independent variables. PRDQ1 (preparedness for earthquake) shows the most positive effect followed by Hage (house age), Hmain (house maintenance), Hdisadj (distance between adjacent buildings) while Whospn, Wemgncysp7, Wfacli7 and Hhght indicate a diminished effect on the outcome variable CAPCTYQ1. The regressed equation with standardised coefficient is given below with new earthquake CAPCTYQ1R

CAPCTQ1R= 0.014*Whospy1 +0.076* Whospy2 +0.030* Whospy3 +0.001* Whospy4-0.161*4Whospn+0.022*Wemgncysp1+0.044*Wemgncysp2+0.038*Wemgncysp3+0.035*Wemgncysp4+0.033*Wemgncysp5+0.083*5*Wemgncysp60.094*5*Wemgncysp7+0.025*Wwtrsrc1+0.038*Wwtrsrc2+0.013*Wwtrsrc3-0.025*Wwtrsrc4+0.005*Wwtrsrc5+0.011*Wpwrspp+0.030*Wrlfcmp+0.019*Wfacli1+0.016*Wfacli2+0.009*Wfacli3+0.037*Wfacli4+0.013*Wfacli5+0.053*5*Wfacli6-0.176*5*Wfacli7+0.074*Htyp-0.093*Hhght+0.150*Hage+0.141*Hmain+0.089*Hwmat+0.024*Hbmat1+0.043*Hopnspc+0.120*Hdisadj+0.037*Hutlavl1+0.021*Hutlavl2+0.042*Hutlavl3+0.044*Hutlavl4+0.012*Hutlavl5+0.036*Hutlavl6+0.007*Hutlavl7+0.046*Hemrgnext+0.094*Hroadtyp+0.077* Hrdacess+0.543* PRDQ1
(13)

Model summary and ANOVA table of flood capacity are presented in Table 14 (a) and Table 14 (b) respectively.

Table 14(a) and Table 14(b) here

Standardised coefficients of flood capacity are presented in Table 15.

Table 15 here

It is observed from Table 14 (a), Table 14 (b) and Table 15 that, F (40, 861) = 717.512, $p < 0.05$ with adjusted R^2 = 0.891 indicating high goodness of fit for the model. In other words, about 86.9% variance in capacity for flood variable CAPCTYFL1 is explained by the given set of independent variables taken in the model. ANOVA table shows F-test value at $p < 0.05$ implying statistically significant variance in the dependent variable which independent variables explain. Also, the t-test significantly explains the variance in CAPCTYFL1 by the unique variance of each independent variable of flood capacity. From the regressed equation, a standardised coefficient for independent variables without constant is considered. In Table 15, part correlation shows a positive correlation of all predictors of CAPCTYFL1 except Whospn (none of these - hospitals available in ward), Wemgncysp7 (none of these - emergency medical service providers in the ward), Wwtrsrc4 (river - water source in the ward), Wwtrsrc5 (pond - water source in the ward), Wfacli7 (none of these - facilities available in the ward). Tolerance and Variance Inflation Factor values in Table 15 indicate the absence of multicollinearity amongst independent variables. PRDFL1 (flood preparedness) shows the most positive effect followed by Hplnth (house plinth level), Hhght (house height) and Hwmat (house wall material) while Whospn, Wemgncysp7 and Wfacli7 indicate diminished effect on the outcome variable CAPCTYFL1. The regressed equation with standardised coefficient is presented below with new capacity for flood variable labelled as CAPCTYFL1R given by Eqn. 14.

CAPCTYFL1R=0.017*Whospy1+0.095*Whospy2+0.038*Whospy3+0.001*Whospy4-0.202*4*Whospn+0.028*Wemgncysp1+0.056*Wemgncysp2+0.047*Wemgncysp3+0.044*Wemgncysp4+0.042*Wemgncysp5+0.104*5*Wemgncys6-0.117*5*Wemgncysp7+0.031*Wwtrsrc1+0.048*Wwtrsrc2+0.016*Wwtrsrc3-0.032*Wwtrsrc4-0.007*Wwtrsrc5+0.013*Wpwrspp+0.037*Wrlfcmp+0.024*Wfacli1+0.020*Wfacli2+0.011*Wfacli3+0.046*Wfacli4+0.016*Wfacli5+0.066*5*Wfacli6-0.220*5*Wfacli7+0.093*Htyp+0.116*Hhght+0.111*Hwmat+0.056*Htree+0.040*Hbmat2+0.080*Hflwcpc+0.047*Hutlavl1+0.027*Hutlavl2+0.053*Hutlavl3+0.055*Hutlavl4+0.015*Hutlavl5+0.045*Hutlavl6+0.009*Hutlavl7+0.0126*Hplnth+0.584*PRDFL1
(14)

Model summary and ANOVA table of capacity for urban flood are presented in Table 16 (a) and Table 16 (b) respectively.

Table 16(a) and Table 16(b) here

Standardised model coefficients of capacity for urban floods are presented in Table 17.

Table 17 here

It is observed from Table 16 (a), Table 16 (b) and Table 17 that, F (43, 858) = 665.158, $p < 0.05$ with adjusted R^2 = 0.857 implying high goodness of fit i.e. about 85.7% variance in capacity for urban flood variable CAPCTYUFL1 is explained by the given set of independent variables taken in the model. F-test at $p < 0.05$ explains statistically significant variance in the dependent variable CAPCTYUFL1 by variance of independent variables taken as a whole inferred from ANOVA table. Also, the t-test significantly explains variance in CAPCTYUFL1 by the unique variance of each independent variable of urban flood capacity. In the regressed equation, a standardised coefficient for homogeneity of units in independent variables without constant is considered. In Table 5.17, part correlation shows a positive correlation of all predictors of CAPCTYUFL1 except Whospn (none of these - hospitals available inward), Wemgncysp7 (none of these - emergency medical service providers inward), Wwtrsrc4 (river - water source inward), Wwtrsrc5 (pond - water source inward), Wfacli7 (none of these - facilities available inward) and Host (waste thrown in the drain). Tolerance and Variance Inflation Factor values in Table 5.15 indicate the absence of multicollinearity amongst independent variables. PRDUFL1 (urban flood preparedness) shows the most positive effect followed by Hdrnty (house drain type) and Hplnth (house plinth level) while Whospn, Wemgncysp7, Wwtrsrc4, Wwtrsrc5, Wfacli7 and Hwst indicate a diminished effect on the outcome variable CAPCTYUFL1. The regressed equation with standardised coefficient is given below with the new urban flood capacity variable labelled as CAPCTYUFL1R given by Eqn. 15.

CAPCTYUFL1R=0.018*Whospy1+0.095* Whospy2+0.038* Whospy3+0.001* Whospy4-0.203*4* Whospn+0.028*Wemgncysp1+0.056*Wemgncysp2+0.048*Wemgncysp3+0.044*Wemgncysp4+0.042* Wemgncysp5+0.104*5*Wemgncysp6-0.118*5*Wemgncysp7+0.031*Wwtrsrc1+0.048*Wwtrsrc2+0.016*Wwtrsrc3-0.032*Wwtrsrc4-0.007*Wwtrsrc5+0.013*Wpwrspp+0.037*Wrlfcmp+0.024*Wfacli1+0.020*Wfacli2 +0.012*Wfacli3+0.046*Wfacli4+0.016*Wfacli5+0.067*5*Wfacli6-0.221*5*Wfacli7+0.094*Htyp+0.117* Hhght+0.112*Hwmat+0.057*Htree+0.040*Hbmat2+0.157*Hdrnty+0.058*Hdrnclr+0.054*Hwst+0.081 *Hflwcpc+0.047*Hutlavl1+0.027*Hutlavl2+0.053*Hutlavl3+0.056*Hutlavl4+0.015*Hutlavl5+0.046*Hutlavl6+0.009*Hutlavl7+0.126*Hplnth+0.594*PRDUF1
(15)

Model summary and ANOVA table for capacity for fire are presented in Table 18 (a) and Table 18 (b) respectively.

<u>Table 18(a) and Table 18(b) here</u>

Standardised coefficients of capacity for fire are presented in Table 19.

<u>Table 19 here</u>

It is observed from Table 18 (a), Table 18 (b) and Table 19 that, F (46, 855) = 4023.671, $p < 0.05$ with adjusted R^2 = 0.890 implying high goodness of fit. In other words, about 89.0% variance incapacity for fire variable CAPCTYFR1 is explained by the given set of independent variables taken in the model. F-test at $p < 0.05$ explains statistically significant variance in the dependent variable CAPCTYFR1 by variance of independent variables taken as a whole given in ANOVA table. Also, the t-test significantly explains the variance in CAPCTYFR1 by the unique variance of each independent variable of fire capacity. In the regressed equation, standardised coefficient ignoring constant is considered. In Table 19, part correlation shows a positive correlation of all predictors of CAPCTYFR1 except Whospn (none of these - hospitals available inward), Wemgncysp7 (none of these - emergency medical service providers inward), Wfacli7 (none of these - facilities available inward) and Hhght (house height). Tolerance and Variance Inflation Factor values in Table 19 indicate the absence of multicollinearity amongst independent variables. PRDFR1 (fire preparedness) shows the most positive effect followed by Hage (house age), Hmain (house maintenance), Hdisadj (distance between adjacent house) while Whospn, Wemgncysp7, Wfacli7 and Hhght indicate a diminished effect on the outcome variable CAPCTYFR1. The regressed equation with standardised coefficient is given below with a new fire capacity variable labelled as CAPCTYFR1R by Eqn. 16.

CAPCTYFR1R=0.014*Whospy1+0.077*Whospy2+0.030*Whospy3+0.001*Whospy4-0.164*4*Whospn+ 0.023*Wemgncysp1+0.045*Wemgncysp2+0.038*Wemgncysp3+0.036*Wemgncysp4+0.034* Wemgncysp5+0.084*5*Wemgncysp6-0.095*5*Wemgncysp7+0.025*Wwtrsrc1+0.039*Wwtrsrc2+ 0.013*Wwtrsrc3+0.026*Wwtrsrc4+0.005*Wwtrsrc5+0.011*Wpwrspp+0.030*Wrlfcmp+0.020*Wfacli1+0.016*Wfacli2+0.009*Wfacli3+0.037*Wfacli4+0.013*Wfacli5+0.054*5*Wfacli6-0.179*5*Wfacli7 +0.076*Htyp-0.095*Hhght+0.153*Hage+0.143*Hmain+0.090*Hwmat+0.026*Hbmat3+0.044*Hopnspc +0.122*Hdisadj+0.038*Hutlavl1+0.022*Hutlavl2+0.043*Hutlavl3+0.045*Hutlavl4+0.012*Hutlavl5+0.037*Hutlavl6+0.008*Hutlavl7+0.013*Hsmkdet+0.031*Hfrextng+0.047*Hemrgnext+0.096* Hroadtyp+0.079*Hrdacess+0.544*PRDFR1
(16)

Table 20 demonstrates ward wise mean and standard deviation of the capacity of people of different wards of Silchar Town due to four hazards viz. earthquake, flood, urban flood and fire. The predicted value of capacity is calculated for each respondent from the obtained regression equation and then ward wise mean value with a standard deviation of each variable is obtained. In Eqn. 13 to Eqn. 16. CAPCTYQ1R, CAPCTYFL1R, CAPCTYUFL1R and CAPCTYFR1R denote the capacity due to earthquake, flood, urban flood and fire hazard respectively obtained from multiple regression analysis of the linear mathematical formulation for four hazards expressed by CAPCTYQ1, CAPCTYFL1, CAPCTYUFL1 and CAPCTYFR1.

Table 20 here

Table 21 shows indices of the capacity of each ward due to earthquake, flood, urban flood and fire hazard based on the statistical mean. The capacity variables corresponding to earthquake, flood, urban flood and fire hazard are CAPCTYQ1R, CAPCTYFL1R, CAPCTYUFL1R and CAPCTYFR1R respectively. Indices are grouped into three categories low, medium and high. The low category is colour-coded as green, medium as yellow and high as red. In the case of an earthquake, low is assigned to mean capacity ranging from 7.4907 to 9.3426, medium from 9.3427 to 11.1945 and high from 11.1946 to 13.0464. For flood, low is assigned to mean capacity ranging from 8.071 to 9.4209, medium from 9.4210 to 10.7708 and high from 10.7709 to 12.1207. For urban floods, the mean capacity of 8.4038 to 9.9183 is low, 9.9184 to 11.4328 is medium and 11.4329 to 12.9473 is high. In case of fire, 6.7956 to 8.8443 is low, 8.8444 to 10.8930 is medium and 10.8931 to 12.9417 is high capacity.

Table 21 here

Based on indices, the capacity of each ward is labelled as low, medium or high for the four hazardous events viz. earthquake, flood, urban flood and fire. Table 22 depicts the capacity levels of people residing in various wards for the mentioned hazards.

Table 22 here

Based on the capacity level of each ward for the four hazardous events, capacity mapping of Silchar Town is done. Colour-code is assigned to each index of mapping. Green colour indicates low capacity, yellow for a medium level of capacity and red depicts high capacity. Fig. 5 to Fig. 8 represent the capacity mapping of Silchar Town for earthquake, flood, urban flood and fire hazard respectively.

Figures 5 to 8 here

Table 22 and Fig 5 to Fig 8 reveal that, capacity for earthquake hazard is low in wards 1, 3, 4, 5, 6, 7, 8, 17 and medium in wards 2, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 23, 26, 27, 28 and 29. A high capacity of people residing in wards 21, 22, 24 and 25 is found for earthquake hazard. The capacity of people of Silchar Town for earthquake hazard is inferred medium. For flood hazard, low capacity is observed in wards 1, 4, 6, 17 and medium capacity level of people residing in wards 2, 3, 5, 7, 8, 9, 11, 12, 13, 14, 15, 18, 20, 23, 26, 28 and 29. A high level of capacity is observed in wards 10, 16, 19, 21, 22, 24, 25 and 27. The capacity of people Silchar Town is also found a medium for flood hazard. The capacity of people for urban flood hazards is low in wards 1, 4, 6, 8, 17, 29 while wards 2, 3, 5, 7, 9, 10, 11, 13, 14, 15, 18, 20, 23, 26 and 28 show medium-capacity level. High capacity of people residing in wards 12, 16, 19, 21, 22, 24, 25 and 27 for urban flood hazard is observed. Silchar Town has a medium capacity for urban flood hazards. The capacity of people for fire hazards is low in wards 1, 4, 5, 6, 8, 9, 17 and medium in wards 2, 3, 7, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 23, 26, 28 and 29 while the capacity level is high in wards 21, 24, 25 and 27. For Silchar Town, the capacity of people for fire hazards is found medium.

Descriptive statistical analysis of preparedness factors of the study in frequency per cent for the whole sample N = 901, for earthquake, flood, urban flood and fire hazard of Silchar Town are given in Table 23

Table 23 here

The following inferences are drawn from Table 23 on preparedness factors of the study for earthquake, flood, urban flood and fire hazard.

1) 87% of people opined that their family understand the impact of the flood while 13% say that they do not understand the impact of the flood; 67.8% of people understand the impact of the earthquake while 32.2% do not understand its impact; 69.4% understand the impact of fire while 30.6% do not understand; 89.7% understand the impact of the urban flood while 10.3% do not understand the impact of the urban flood.
2) 27.9% cannot understand early warning messages for a flood, 31.2% cannot understand early warning messages for an earthquake, 32.2% cannot understand early warning messages for fire and 28.9% cannot understand early warning messages for an urban flood.
3) 71.8% have access to official warnings for flood while 28.2% do not; 69.1% have access to official warnings for an earthquake while 30.9% do not have access; 68.4% have access to official warnings for fire while 31.6% do not have access; 70.4% have access to official warnings for urban flood while 29.6% do not have access to official warnings for an urban flood.
4) 27.9% of respondents are prepared with a family emergency kit for flood while 72.1% are not prepared for the same; 20.6% of them are prepared with a family emergency kit for an earthquake while 79.4% are not prepared; 19.6% are prepared with a family emergency kit for fire while 80.4% are not and 23.3% of people are prepared with a family emergency kit for urban flood while 76.7% are not prepared with a family emergency kit for an urban flood.
5) 86% of people know vulnerable areas of their ward for flood while 14% do not know; 64.8% of people know vulnerable areas of their ward for an earthquake while 35.2% do not know; 63.8% of people know vulnerable areas of their ward for fire while 36.2% do not know and 86.4% of people know vulnerable areas of their ward for urban flood while 13.6% do not know.
6) 61.5% have an emergency evacuation plan for flood while 38.5% do not have; 37.5% have an emergency evacuation plan for an earthquake while 62.5% do not have; 37.5% have an emergency evacuation plan for fire while 62.5% do not have and 62.1% have an emergency evacuation plan for urban flood while 37.9% do not have.
7) 70.4% have household tools and equipment for search and rescue for flood while 29.6% do not have; 46.2% have household tools and equipment for search and rescue for an earthquake while 53.8% do not have; 47.5% have household tools and equipment for search and rescue for fire while 52.5% do not have and 67.4% have household tools and equipment for search and rescue for urban flood while 32.6% do not have the same.
8) 55.8% can protect water supply sources from the effect of the flood while 44.2% cannot; 57.1% can protect water supply sources from the effect of the earthquake while 42.9% cannot; 56.5% can protect water supply sources from the effect of fire

while 43.5% cannot and 59.1% can protect water supply sources from the effect of the urban flood while 40.9% cannot.

9) 67.1% can protect important documents, moveable assets etc. from the effect of the flood while 32.9% cannot; 62.5% can protect important documents, moveable assets etc. from the effect of the earthquake while 37.5% cannot; 64.1% can protect important documents, moveable assets etc. from the effect of fire while 35.9% cannot and 67.1% can protect important documents, moveable assets etc. from the effect of the urban flood while 32.9% cannot.
10) 80.1% of people know escape routes for flood while 19.9% do not know; 79.7% know escape routes for an earthquake while 20.3% do not know; 62.5% know escape routes for fire while 37.5% do not know and 84.4% of respondents know escape routes for urban flood while 15.6% do not know.
11) 68.8% of participants know safe spots in the house for flood while 31.2% do not know; 66.1% know safe spots in the house for an earthquake while 33.9% do not know; 61.8% know safe spots in the house for fire while 38.2% do not know and 68.1% know safe spots in the house for urban flood while 31.9% do not know.
12) 38.5% of people in Silchar Town know emergency numbers for flood while 61.5% do not know; 26.9% know emergency numbers for an earthquake while 73.1% do not know; 42.2% know emergency numbers for fire while 57.8% do not know and 35.2% know emergency numbers for urban flood while 64.8% do not know.

From Fig 9 it is observed that 91.4% of people do not have a first-aid box in an emergency kit, 60.5 % do not have medicines, 62.1% do not have candle and matchboxes, 52.5 % do not have food items, 49.5% do not have drinking water, 73.8% do not have torch and battery in their emergency kit. 26.9% of people have all these items in the emergency kit while 73.1% do not have all these items in their emergency kit.

Descriptive statistical analysis of capacity factors of people for the considered hazards is conducted on availability of hospitals, emergency medical service providers, drinking and other purpose water source, power supply, relief centre, facilities and support system inward. Measurement of capacity factors in frequency per cent for the entire sample N = 901 respondents are reported in Table 24 (a) below.

<u>Table 24(a) here</u>

For all considered hazards, type of house, building material and wall material of house are important capacity drivers. Table 24 (b) below shows descriptive statistics in frequency per cent for Silchar Town and N = 901.

<u>Table 24(b) here</u>

For earthquake and fire hazards, important capacity factors that need to be considered are the age of the house in years, availability of sufficient open space, distance between adjacent buildings, emergency exit doors, type of road. Descriptive statistics of these capacity factors in frequency per cent for the sample i,e N = 901 respondents are reported in Table 24 (c) below.

For flood and urban flood hazards, diagnostic factors considered for assessing capacity are flow capacity of drain and plinth level of the house. Descriptive statistics of these factors for the entire sample of study N = 901 respondents are reported in Table 24 (d) below.

<u>Table 24(d) here</u>

To assess the capacity of people of Silchar Town for urban flood hazards, diagnostic factors such as drain type, drain clearance and waste thrown in the drain are taken into account. Descriptive statistics of N = 901 respondents are reported in Table 24 (e) below.

Table 24(e) here

To assess the capacity of people for fire hazards, the availability and usage of smoke detectors and fire extinguishers are considered. Descriptive statistics of the sample N = 901 respondents for these two factors are described in Table 24 (f) below.

Table 24(f) here

CONCLUSION:

The analytical and inferential findings of preparedness and capacity level of people of Silchar Town for earthquake, flood, urban flood and fire hazard. It is observed from statistical models that, in measuring the preparedness level for the considered hazards, people have identified Fpgncykit7 - the presence of all items in the emergency kit as the most influencing factor for preparedness. In preparedness for flood, people have assigned understanding impact of the flood as the next most dominant factor influencing preparedness, possibly because many people of Silchar Town are frequently exposed to flood, thus have a good understanding of the impact of flood compared to other hazards. Preparedness, in other words coping capacity and adaptive capacity of people, is found to be the most positive influencing factor for assessment of capacity for the considered hazards. Age of house, maintenance frequency of house and distance between house are important drivers in increasing of capacity for an earthquake. House height, non-availability of the hospital, emergency medical service providers and various facilities or support systems inward are found to have a diminishing effect on the capacity for an earthquake. For flood capacity, besides preparedness, plinth level, height and wall material of house are significant increasing determiners. Proximity to water sources like rivers or ponds, the absence of hospitals, emergency medical service providers and different support facilities are identified by people as reducing factors of flood capacity. For urban flood, preparedness, plinth level and drain type of house are found to exert a significant positive effect on capacity while waste is thrown in the drain, proximity to a water source such as river or pond, absence of hospitals, emergency medical services, support services are found to reduce capacity values of the urban flood. In case of assessment of fire capacity, preparedness shows the highest positive impact on capacity followed by age of the house, maintenance of the house, the distance between adjacent house while the absence of hospital, emergency service provider, facilities or support system inward and height of the house is found to have a diminishing effect on capacity as revealed from statistical analysis of the response of people of Silchar Town.

It is also revealed from descriptive statistical analysis of preparedness and capacity factors for the considered hazards that, about one-third of respondents do not understand the impact of hazards and early warning messages. They neither have access to official warnings nor have any emergency evacuation plan. They are ignorant about escape routes, safety spots, hospitals and vulnerable areas in the ward. They cannot protect important documents or moveable assets and reside in a house with a plinth level below 2ft. Almost half of the population do not have household tools and equipment meant for primary level search and rescue. They also cannot protect water supply sources. About two-thirds population do not know emergency numbers and do not have a family emergency kit for the hazards. A sizeable number of the population opines that nurses, doctors, ambulances, chemists and medical volunteers are not easily available during emergencies. The majority of people do not have the first-aid box, torch, battery, medicines, candle and matchbox in their emergency kit. These people also do not have fire extinguishers, smoke detectors, emergency exit doors, open space around the house and do not know the location of a relief camp, mass shelter, rescue equipment and engineering service providers. The majority of people use civic supply and/or bore well as a source of water; have a house connected with electricity and undertake need-based maintenance of their house. More than half of the population say drain is not cleared and flow capacity of the drain is insufficient while two-thirds of people say waste is thrown in drains.

Based on indices and subsequent mapping of observed values of the present study conducted on CBDRM principles, preparedness and capacity of the people of Silchar Town residing in various wards and its periphery is categorised into low, medium and high for earthquake, flood, urban flood and fire hazard. This categorization is found to differ in some instances from the institutional methodology of the study in Silchar Atlas. The reason is assigned to the methodology of this study based on peoples' perception, knowledge, experience, that external agents do not study the phenomenon from a victim point of view, poor disaster literacy/awareness amongst people of Silchar Town or possible inferential error of this study which is minimal by design. Thus, there is some gap between findings reported in Silchar Atlas and inferences of this study based on CBDRM methodology. Consequently, the existing institutional plans and policies need some modification to bridge the existing gaps and make it people-friendly.

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APPENDIX-1: FIGURES:

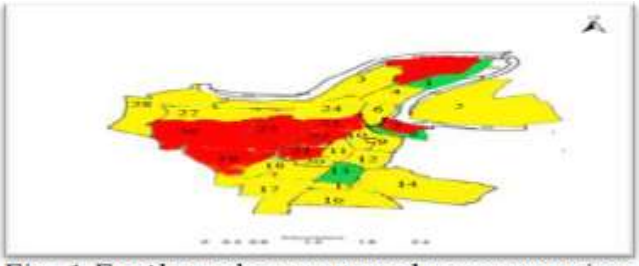

Fig. 1 Earthquake preparedness mapping

Fig. 2 Flood preparedness mapping

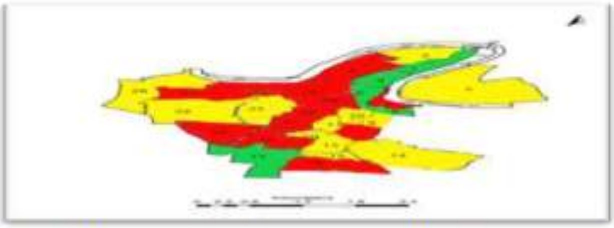

Fig. 3 Urban flood preparedness mapping

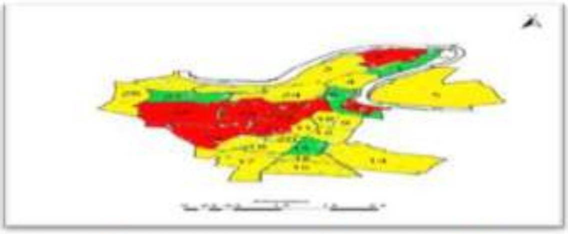

Fig. 4 Fire preparedness mapping

Low Medium High

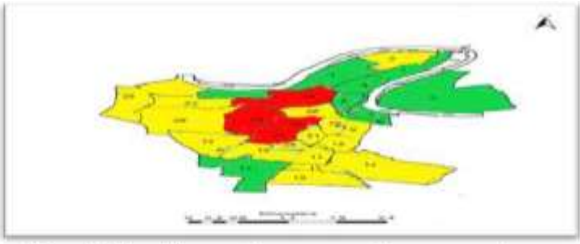

Fig. 5 Earthquake capacity mapping

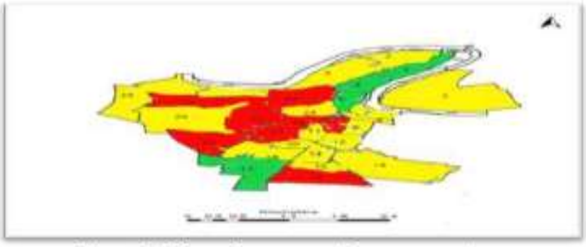

Fig. 6 Flood capacity mapping

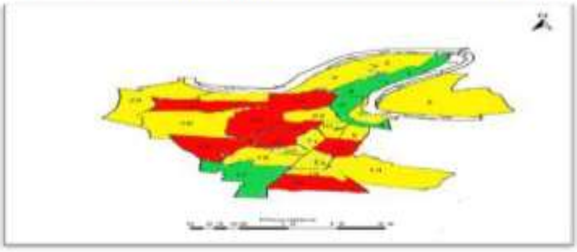

Fig. 7 Urban flood capacity mapping

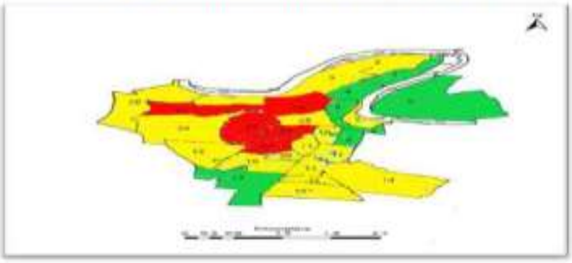

Fig. 8 Fire capacity mapping

Low Medium High

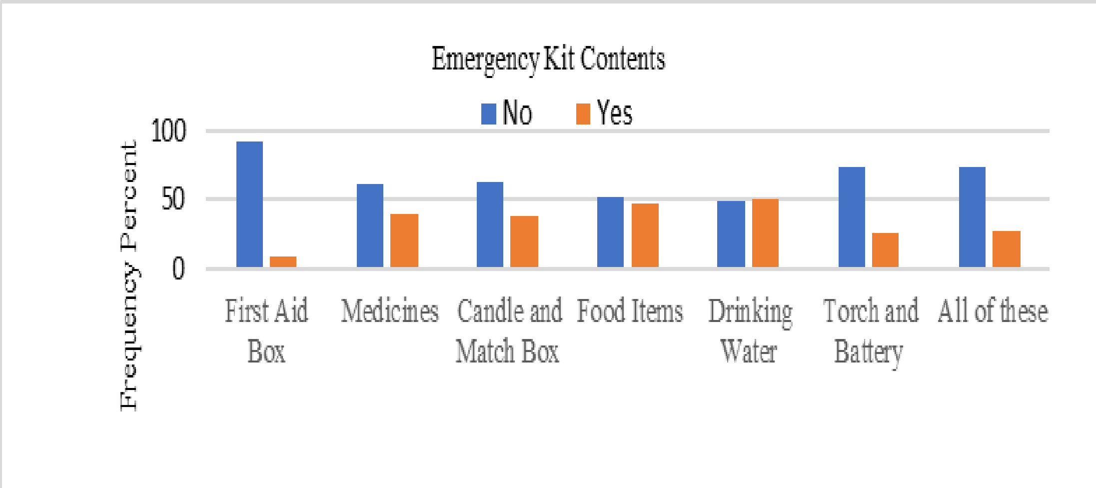

Fig. 9 Descriptive statistics on availability of emergency kit items

APPENDIX-2 TABLES:

Table 1 (a) Model summary for earthquake preparedness									
Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.971[a]	0.969	0.966	.00241	.969	1396.997	21	880	0.000
a.Predictors: (Constant), Fpgncynoeq, Fpgncykit6, Fpescrteq, Fpgncykiteq, Fpgncykit8, Fphheqpeq, Fpgncykit1, Fpgncykit2, Fpgncyvaceq, Fpgncykit5, Fpwrngmsgeq, Fpsafspteq, Fpdoceq, Fpvuleq, Fpgncykit3, Fpwtrsplyeq, Fphiseq, Fpimpeq, Fpaccwrneq, Fpgncykit4, Fpgncykit7									

Table 1 (b) ANOVA table for earthquake preparedness						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10443.947	21	497.331	1396.997	.000[b]
	Residual	313.318	880	0.3560		
	Total	10757.265	901			
a. Dependent Variable: PRDQ1						
b. Predictors: (Constant), Fpgncynoeq, Fpgncykit6, Fpescrteq, Fpgncykiteq, Fpgncykit8, Fphheqpeq, Fpgncykit1, Fpgncykit2, Fpgncyvaceq, Fpgncykit5, Fpwrngmsgeq, Fpsafspteq, Fpdoceq, Fpvuleq, Fpgncykit3, Fpwtrsplyeq, Fphiseq, Fpimpeq, Fpaccwrneq, Fpgncykit4, Fpgncykit7						

Table 2 Standardised coefficients for earthquake preparedness

Coefficients[a]

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Fpgncykit1	0.048	48.632	.000	0.035	0.539	1.856
	Fpgncykit2	0.083	12.089	.000	0.051	0.381	2.624
	Fpgncykit3	0.082	10.630	.000	0.049	0.355	2.818
	Fpgncykit4	0.085	13.445	.021	0.041	0.229	4.359
	Fpgncykit5	0.085	10.457	.000	0.039	0.215	4.645
	Fpgncykit6	0.075	19.981	.010	0.058	0.606	1.651
	Fpgncykit7	0.452	17.632	.000	0.192	0.180	5.558
	Fpgncykit8	-0.191	-14.003	.000	-0.161	0.709	1.411
	Fpimpeq	0.079	18.112	.000	0.040	0.250	4.007
	Fphiseq	0.078	19.734	.003	0.041	0.282	3.551
	Fpwrngmsgeq	0.079	18.467	.000	0.038	0.232	4.310
	Fpaccwrneq	0.078	19.608	.000	0.038	0.237	4.226
	Fpgncykiteq	0.069	18.042	.000	0.054	0.629	1.589
	Fpvuleq	0.081	16.664	.000	0.045	0.305	3.281
	Fpgncyvaceq	0.082	11.692	.000	0.060	0.534	1.874
	Fphheqpeq	0.085	10.634	.000	0.059	0.478	2.093
	Fpwtrsplyeq	0.084	12.780	.014	0.049	0.345	2.899
	Fpdoceq	0.082	16.328	.017	0.046	0.311	3.219
	Fpescrteq	0.068	54.322	.000	0.057	0.686	1.457
	Fpsafspteq	0.080	41.707	.000	0.051	0.405	2.472
	Fpgncynoeq	0.075	11.373	.000	0.061	0.651	1.535

a. Dependent Variable: PRDQ1

Table 3 (b) ANOVA table for flood preparedness

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7674.747	21	365.464	1400.245	.000[b]
	Residual	230.242	880	0.261		
	Total	7904.989	901			

a. Dependent Variable: PRDFL1

b. Predictors: (Constant), Fpgncykitf, Fpwtrsplyf, Fpgncykit1, Fpgncykit8, Fpvulf, Fpgncykit6, Fpgncynof, Fphheqpf, Fpescrtf, Fpgncykit2, Fpimpf, Fpgncyvacf, Fpsafsptf, Fpgncykit5, Fphisf, Fpgncykit3, Fpdocf, Fpaccwrngf, Fpgncykit4, Fpwrngmsgf, Fpgncykit7

Table 4 Standardised coefficients for flood preparedness

Coefficients[a]

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Fpimpf	0.243	40.822	.000	0.156	0.415	2.412
	Fphisf	0.084	45.658	.000	0.044	0.273	3.665
	Fpwrngmsgf	0.089	18.201	.000	0.036	0.168	5.942
	Fpaccwrngf	0.089	22.369	.000	0.038	0.181	5.525
	Fpvulf	0.069	32.007	.000	0.048	0.490	2.041
	Fpgncyvacf	0.096	10.067	.000	0.066	0.475	2.105
	Fphheqpf	0.090	21.709	.000	0.072	0.639	1.566
	Fpwtrsplyf	0.098	17.458	.000	0.061	0.389	2.574
	Fpdocf	0.093	35.381	.000	0.049	0.278	3.599
	Fpescrtf	0.079	28.889	.000	0.060	0.586	1.705
	Fpsafsptf	0.091	30.654	.000	0.059	0.419	2.387
	Fpgncynof	0.096	36.361	.000	0.075	0.600	1.665
	Fpgncykit1	0.056	29.401	.000	0.041	0.534	1.872
	Fpgncykit2	0.097	36.043	.000	0.052	0.292	3.426
	Fpgncykit3	0.096	34.792	.000	0.053	0.303	3.300
	Fpgncykit4	0.099	36.340	.000	0.046	0.216	4.639
	Fpgncykit5	0.099	39.705	.000	0.048	0.231	4.324
	Fpgncykit6	0.087	26.527	.000	0.065	0.552	1.810
	Fpgncykit7	0.527	44.222	.000	0.195	0.138	7.270
	Fpgncykit8	-0.223	-34.378	.000	-0.169	0.575	1.738
	Fpgncykitf	0.089	29.444	.000	0.066	0.561	1.784

a. Dependent Variable: PRDFL1

Table 5 (a) Model summary for urban flood preparedness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.958[a]	0.943	0.939	.00707	0.943	1399.337	21	880	.000

a. Predictors: (Constant), Fpgncynouf, Fphheqpuf, Fpgncykit2, Fpescrtuf, Fpgncykituf, Fpgncykit1, Fpimpuf, Fpgncykit6, Fpgncykit8, Fpvuluf, Fpwtrsplyuf, Fpgncyvacuf, Fpsafsptuf, Fpgncykit3, Fphisuf, Fpgncykit5, Fpdocuf, Fpaccwrnguf, Fpgncykit4, Fpgncykit7, Fpwrngmuf

Table 6 Standardised coefficients for urban flood preparedness

Coefficients[a]

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Fpgncykit1	0.055	15.740	.000	0.042	0.570	1.755
	Fpgncykit2	0.096	19.264	.000	0.052	0.297	3.364
	Fpgncykit3	0.095	20.492	.000	0.056	0.342	2.926
	Fpgncykit4	0.098	16.750	.003	0.045	0.215	4.642
	Fpgncykit5	0.098	16.225	.000	0.044	0.202	4.959
	Fpgncykit6	0.086	25.163	.000	0.068	0.626	1.597
	Fpgncykit7	0.521	7.810	.000	0.212	0.165	6.063
	Fpgncykit8	-0.221	-6.122	.000	-0.166	0.566	1.766
	Fpimpuf	0.060	15.809	.000	0.043	0.518	1.930
	Fphisuf	0.086	16.194	.032	0.044	0.259	3.855
	Fpwrngmuf	0.089	11.432	.000	0.031	0.122	3.211
	Fpaccwrnguf	0.089	13.205	.000	0.036	0.160	5.237
	Fpgncykituf	0.083	22.380	.000	0.061	0.537	1.861
	Fpvuluf	0.067	20.029	.000	0.054	0.653	1.532
	Fpgncyvacuf	0.095	26.010	.000	0.070	0.550	1.817
	Fphheqpuf	0.092	27.598	.000	0.075	0.664	1.506
	Fpwtrsplyuf	0.096	22.010	.000	0.060	0.384	2.605
	Fpdocuf	0.092	16.989	.000	0.046	0.250	3.994
	Fpescrtuf	0.071	19.514	.000	0.053	0.553	1.807
	Fpsafsptuf	0.091	19.901	.009	0.054	0.349	2.864
	Fpgncynouf	0.094	25.568	.000	0.069	0.549	1.823

a. Dependent Variable: PRDUFL1

Table 7 (a) Model summary for fire preparedness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.934[a]	0.920	0.917	.00563	0.920	1101.657	20	881	.000

a. Predictors: (Constant),Fpgncynofr, Fpgncykit3, Fpgncykit8, Fpgncykitfr, Fphheqpfr, Fpgncykit1,

Table 5 (b) ANOVA table for urban flood preparedness						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7846.086	21	373.623	1399.337	.000[b]
	Residual	235.382	880	0.267		
	Total	8081.468	901			
a. Dependent Variable: PRDUFL1						
b. Predictors: (Constant),Fpgncykitf, Fpwtrsplyf, Fpgncykit1, Fpgncykit8, Fpvulf, Fpgncykit6, Fpgncynof, Fphheqpf, Fpescrtf, Fpgncykit2, Fpimpf, Fpgncyvacf, Fpsafsptf, Fpgncykit5, Fphisf, Fpgncykit3, Fpdocf, Fpaccwrngf, Fpgncykit4, Fpwrngmsgf, Fpgncykit7						

Fpgncykit6, Fpescrtfr, Fpvulfr, Fpgncyvacfr, Fpgncykit4, Fpwrngmsgfr, Fpgncykit2, Fpsafsptfr, Fpimpfr, Fpdocfr, Fpaccwrngfr, Fpgncykit5, Fphisfr, Fpgncykit7

Table 7 (b) ANOVA table for fire preparedness						
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10113.229	20	505.661	1101.657	.000[b]
	Residual	404.529	881	0.459		
	Total	10517.758	901			
a. Dependent Variable: PRDFR1						
b. Predictors:(Constant), Fpgncynofr, Fpgncykit3, Fpgncykit8, Fpgncykitfr, Fphheqpfr, Fpgncykit1, Fpgncykit6, Fpescrtfr, Fpvulfr, Fpgncyvacfr, Fpgncykit4, Fpwrngmsgfr, Fpgncykit2, Fpsafsptfr, Fpimpfr, Fpdocfr, Fpaccwrngfr, Fpgncykit5, Fphisfr, Fpgncykit7						

Table 8 Standardised coefficients for fire preparedness

Coefficients[a]

Model		Standardized Coefficients	t value	Sig	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Fpgncykit1	0.048	30.580	.000	0.037	0.571	1.751
	Fpgncykit2	0.084	42.999	.000	0.052	0.373	2.682
	Fpgncykit3	0.084	40.272	.021	0.048	0.332	3.010
	Fpgncykit4	0.086	36.145	.000	0.043	0.253	3.960
	Fpgncykit5	0.086	32.685	.014	0.039	0.206	4.855
	Fpgncykit6	0.076	49.193	.000	0.059	0.603	1.660
	Fpgncykit7	0.459	46.155	.000	0.194	0.178	5.628
	Fpgncykit8	-0.194	-13.590	.000	-0.163	0.702	1.424
	Fpimpfr	0.079	30.415	.000	0.036	0.210	4.760
	Fphisfr	0.082	31.022	.000	0.037	0.207	4.830
	Fpwrngmsgfr	0.081	29.535	.000	0.035	0.193	5.194
	Fpaccwrngfr	0.080	32.582	.000	0.039	0.237	4.221
	Fpgncykitfr	0.068	45.267	.000	0.054	0.627	1.596
	Fpvulfr	0.083	43.800	.000	0.052	0.400	2.498
	Fpgncyvacfr	0.084	45.753	.003	0.061	0.529	1.889
	Fphheqpfr	0.086	46.878	.000	0.062	0.520	1.922
	Fpdocfr	0.083	35.432	.000	0.042	0.263	3.802
	Fpescrtfr	0.084	41.567	.000	0.050	0.355	2.816
	Fpsafsptfr	0.084	42.058	.000	0.050	0.361	2.769
	Fpgncynofr	0.085	47.651	.000	0.069	0.657	1.523

a. Dependent Variable: PRDFR1

Table 9 Ward wise mean value of preparedness with standard deviation for considered hazards

WARD NO.		PRDQ1R	PRDFL1R	PRDUFL1R	PRDFR1R
1 (N=30)	Mean	.5594	1.0997	.7676	2.9520
	Std. Deviation	.0104	.0088	.0151	.0687
2 (N=30)	Mean	1.9955	2.7438	2.3700	3.4031
	Std. Deviation	.0051	.0065	.0757	.0509
3 (N=30)	Mean	1.4385	2.1632	1.8119	4.8859
	Std. Deviation	.0032	.0008	.0270	.0853
4 (N=30)	Mean	1.6912	2.1266	1.9445	2.8359
	Std. Deviation	.0094	.0052	.0177	.0029
5 (N=30)	Mean	1.5935	2.7233	2.0610	3.6393
	Std. Deviation	.0041	.0076	.0770	.0368
6 (N=30)	Mean	1.1593	1.8279	1.5108	2.4705
	Std. Deviation	.0109	.0085	.0832	.0882
7 (N=30)	Mean	1.9390	2.4804	2.3075	4.6802
	Std. Deviation	.0077	.1812	.0107	.0429
8 (N=30)	Mean	.5388	1.8339	.6550	1.7893
	Std. Deviation	.0931	.0687	.0613	.0498
9 (N=30)	Mean	1.2325	2.1982	1.4676	3.4628
	Std. Deviation	.0068	.0874	.0425	.0013
10 (N=30)	Mean	1.3035	2.3442	1.4982	3.6194
	Std. Deviation	.0006	.0072	.0453	.1606
11 (N=30)	Mean	1.3397	2.1044	1.5869	4.4092
	Std. Deviation	.0593	.0757	.0344	.1008
12 (N=30)	Mean	1.6028	2.2960	1.9223	4.6489
	Std. Deviation	.0034	.0089	.0080	.1090
13 (N=30)	Mean	1.0815	1.7699	1.2661	3.5345
	Std. Deviation	.0065	.0093	.0077	.0601
14 (N=30)	Mean	1.5470	2.3377	1.8684	4.1178
	Std. Deviation	.0530	.0408	.0060	.0791
15 (N=30)	Mean	1.2707	1.8601	1.5259	3.9854
	Std. Deviation	.0416	.0469	.0808	.0985
16 (N=30)	Mean	1.6685	2.5356	1.9338	4.7071
	Std. Deviation	.0216	.0547	.0307	.0840
17 (N=30)	Mean	1.2170	1.7005	1.4219	1.9830
	Std. Deviation	.0294	.0911	.0300	.0908
18 (N=30)	Mean	1.4035	2.1307	1.6373	4.4642
	Std. Deviation	.0909	.0575	.0801	.0907
19 (N=30)	Mean	2.0919	3.2933	2.5525	5.1658
	Std. Deviation	.0995	.0860	.0879	.0937
20 (N=30)	Mean	1.3394	2.1197	1.6039	4.3259
	Std. Deviation	.0599	.0663	.0251	.0964
21 (N=30)	Mean	2.0303	2.8731	2.3345	5.3373
	Std. Deviation	.0944	.0444	.0586	.00000
22 (N=30)	Mean	2.1944	3.3330	2.6199	5.6528
	Std. Deviation	.0228	.0951	.0899	.0041
23 (N=30)	Mean	1.8573	2.4838	2.1224	4.7984
	Std. Deviation	.0416	.0503	.0032	.0328

24 (N=30)	Mean	1.6092	2.1628	1.7762	5.0062
	Std. Deviation	.0090	.0691	.0615	.0689
25 (N=30)	Mean	2.5136	3.5775	2.8471	5.7759
	Std. Deviation	.0594	.0348	.0441	.0697
26 (N=30)	Mean	2.1838	3.1656	2.5360	4.2470
	Std. Deviation	.0933	.0706	.0643	.0906
27 (N=30)	Mean	1.1641	1.6444	1.4336	4.7512
	Std. Deviation	.0957	.0713	.0698	.0039
28 (N=30)	Mean	1.3397	2.0026	1.5636	4.1488
	Std. Deviation	.0436	.0844	.0227	.0959
29 (N=61)	Mean	1.3895	2.2119	1.5675	3.3725
	Std. Deviation	.0253	.0978	.0899	.0153
Silchar (N=901)	Mean	1.5224	2.3115	1.8019	4.0492
	Std. Deviation	.0345	.0991	.0256	.0565

Table 10 Preparedness indices for considered hazards			
Variables	L	M	H
PRDQ1R	0.5388-1.1970	1.1971-1.8552	1.8553-2.5136
PRDFL1R	1.0997-1.9256	1.9257-2.7515	2.7516-3.57775
PRDUFL1R	0.6550-1.3857	1.3858-2.1164	2.1165-2.8471
PRDFR1R	1.7893-3.1181	3.1182-4.4469	4.4470-5.7759

Table 11 Ward wise preparedness for considered hazards					
WARD NO.		PRDQ1R	PRDFL1R	PRDUFL1R	PRDFR1R
1	Mean	0.5594	1.0997	0.7676	2.952
	Index	L	L	L	L
2	Mean	1.9955	2.7438	2.37	3.4031
	Index	H	M	H	M
3	Mean	1.4385	2.1632	1.8119	4.8859
	Index	M	M	M	H
4	Mean	1.6912	2.1266	1.9445	2.8359
	Index	M	M	M	L
5	Mean	1.5935	2.7233	2.061	3.6393
	Index	M	M	M	M
6	Mean	1.1593	1.8279	1.5108	2.4705
	Index	L	L	M	L
7	Mean	1.939	2.4804	2.3075	4.6802
	Index	H	M	H	H
8	Mean	0.5388	1.8339	0.655	1.7893
	Index	L	L	L	L
9	Mean	1.2325	2.1982	1.4676	3.4628
	Index	M	M	M	M
10	Mean	1.3035	2.3442	1.4982	3.6194

	Index	M	M	M	M
11	Mean	1.3397	2.1044	1.5869	4.4092
	Index	M	M	M	M
12	Mean	1.6028	2.296	1.9223	4.6489
	Index	M	M	M	H
13	Mean	1.0815	1.7699	1.2661	3.5345
	Index	L	L	L	M
14	Mean	1.547	2.3377	1.8684	4.1178
	Index	M	M	M	M
15	Mean	1.2707	1.8601	1.5259	3.9854
	Index	M	L	M	M
16	Mean	1.6685	2.5356	1.9338	4.7071
	Index	M	M	M	H
17	Mean	1.217	1.7005	1.4219	1.983
	Index	M	L	M	L
18	Mean	1.4035	2.1307	1.6373	4.4642
	Index	M	M	M	H
19	Mean	2.0919	3.2933	2.5525	5.1658
	Index	H	M	H	H
20	Mean	1.3394	2.1197	1.6039	4.3259
	Index	M	M	M	M
21	Mean	2.0303	2.8731	2.3345	5.3373
	Index	H	M	H	H
22	Mean	2.1944	3.333	2.6199	5.6528
	Index	H	M	H	H
23	Mean	1.8573	2.4838	2.1224	4.7984
	Index	H	M	H	H
24	Mean	1.6092	2.1628	1.7762	5.0062
	Index	M	M	M	H
25	Mean	2.5136	3.5775	2.8471	5.7759
	Index	H	H	H	H
26	Mean	2.1838	3.1656	2.536	4.247
	Index	H	M	H	M
27	Mean	1.1641	1.6444	1.4336	4.7512
	Index	L	L	M	H
28	Mean	1.3397	2.0026	1.5636	4.1488
	Index	M	M	M	M
29	Mean	1.3895	2.2119	1.5675	3.3725
	Index	M	M	M	M
Silchar	Mean	1.5224	2.3115	1.8019	4.0492
	Index	M	M	M	M

Table 12 (a) Model summary of capacity for earthquake

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.889[a]	.882	.869	.00023	.882	649.738	44	857	.000

a. Predictors: (Constant), PRDQ1, Wpwrspp, Hutlavl7, Hmain, Wfacli3, Wfacli6, Wemgncysp3, Whospy2, Wwtrsrc5, Wfacli2, Hbmat1, Wwtrsrc2, Whospy3, Wfacli5, Wemgncysp1, Wemgncysp5, Hutlavl4, Hutlavl5, Hopnspc, Wrlfcmp, Wemgncysp6, Whospy1, Wwtrsrc4, Hrdacess, Wemgncysp7, Hroadtyp, Wfacli1, Wemgncysp2, Hage, Hutlavl2, Hhght, Wfacli4, Hdisadj, Wwtrsrc3, Wwtrsrc1, Hutlavl6, Hemrgnext, Whospn, Wemgncysp4, Hutlavl1, Hwmat, Hutlavl3, Htyp, Wfacli7

Table 13 Standardised coefficients of capacity for earthquake

Model		Standardized Coefficients	t value	Sig.	Correlations	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Whospy1	0.014	10.666	.000	0.011	0.678	1.474
	Whospy2	0.076	12.346	.000	0.065	0.744	1.344
	Whospy3	0.030	15.231	.000	0.021	0.500	1.998
	Whospn	-0.161	-16.896	.033	-0.105	0.427	2.342
	Wemgncysp1	0.022	7.777	.000	0.019	0.701	1.426
	Wemgncysp2	0.044	19.348	.000	0.033	0.567	1.765
	Wemgncysp3	0.038	17.134	.000	0.032	0.729	1.371
	Wemgncysp4	0.035	15.980	.001	0.022	0.375	2.667
	Wemgncysp5	0.033	14.369	.000	0.026	0.623	1.606
	Wemgncysp6	0.083	16.897	.000	0.061	0.546	1.831
	Wemgncysp7	-0.094	-10.721	.000	-0.064	0.462	2.163
	Wwtrsrc1	0.025	8.562	.000	0.018	0.500	2.001
	Wwtrsrc2	0.038	14.56	.013	0.028	0.530	1.886
	Wwtrsrc3	0.013	11.375	.000	0.009	0.452	2.213
	Wwtrsrc4	-0.025	18.337	.000	-0.021	0.658	1.519
	Wwtrsrc5	-0.005	12.126	.000	-0.004	0.670	1.492
	Wpwrspp	0.011	18.863	.000	0.008	0.636	1.573
	Wrlfcmp	0.030	14.421	.005	0.023	0.631	1.585
	Wfacli1	0.019	20.222	.000	0.013	0.465	2.149
	Wfacli2	0.016	17.161	.000	0.011	0.484	2.065
	Wfacli3	0.009	19.546	.000	0.007	0.662	1.511
	Wfacli4	0.037	21.446	.000	0.017	0.212	4.709
	Wfacli5	0.013	13.609	.000	0.010	0.580	1.723
	Wfacli6	0.053	14.132	.000	0.039	0.550	1.817
	Wfacli7	-0.176	-19.191	.000	-0.067	0.145	6.882

	Htyp	0.074	10.636	.000	0.035	0.223	4.492
	Hhght	-0.093	-16.220	.000	-0.058	0.390	2.561
	Hwmat	0.089	13.897	.000	0.042	0.227	4.400
	Hutlavl1	0.037	16.367	.000	0.019	0.260	3.842
	Hutlavl2	0.021	19.367	.000	0.014	0.417	2.400
	Hutlavl3	0.042	15.653	.000	0.020	0.221	4.533
	Hutlavl4	0.044	20.000	.000	0.035	0.620	1.612
	Hutlavl5	0.012	15.836	.000	0.009	0.639	1.565
	Hutlavl6	0.036	9.626	.000	0.026	0.505	1.981
	Hutlavl7	0.007	16.400	.000	0.006	0.665	1.505
	Hage	0.150	25.556	.000	0.103	0.467	2.143
	Hmain	0.141	14.200	.000	0.098	0.483	2.069
	Hbmat1	0.024	13.567	.015	0.022	0.788	1.270
	Hopnspc	0.043	19.359	.000	0.033	0.583	1.715
	Hdisadj	0.120	14.235	.000	0.083	0.475	2.107
	Hemrgnext	0.046	18.765	.000	0.030	0.429	2.329
	Hroadtyp	0.094	14.321	.000	0.072	0.583	1.715
	Hrdacess	0.077	11.000	.000	0.056	0.524	1.909
	PRDQ1	0.543	10.9993	.000	0.276	0.257	3.886
	a. Dependent Variable: CAPCTYQ1						

Table 14 (a) Model summary of capacity for flood

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.910[a]	0.891	0.865	.00417	0.891	717.512	40	861	0.000

a. Predictors: (Constant), PRDFL1, Whospn, Hutlavl4, Wwtrsrc1, Hutlavl7, Wfacli5, Wemgncysp1, Wemgncysp5, Wfacli6, Wfacli1, Wpwrspp, Wwtrsrc5, Hflwcpc, Hbmat2, Wemgncysp3, Hhght, Wfacli3, Hutlavl5, Wrlfcmp, Wemgncysp6, Whospy2, Wemgncysp7, Htree, Whospy1, Hplnth, Hutlavl2, Wwtrsrc4, Wwtrsrc2, Wfacli2, Wemgncysp2, Wfacli4, Hutlavl6, Wwtrsrc3, Whospy3, Hutlavl1, Wemgncysp4, Hwmat, Htyp, Hutlavl3, Wfacli7

Table 14 (b) ANOVA table of capacity for flood

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22529.880	40	563.247	717.512	.000[b]
	Residual	675.896	861	0.785		
	Total	23205.776	901			

a. Dependent Variable: CAPCTYFL1

b. Predictors: (Constant), PRDFL1, Whospn, Hutlavl4, Wwtrsrc1, Hutlavl7, Wfacli5, Wemgncysp1, Wemgncysp5, Wfacli6, Wfacli1, Wpwrspp, Wwtrsrc5, Hflwcpc, Hbmat2, Wemgncysp3, Hhght, Wfacli3, Hutlavl5, Wrlfcmp, Wemgncysp6, Whospy2, Wemgncysp7, Htree, Whospy1, Hplnth, Hutlavl2, Wwtrsrc4, Wwtrsrc2, Wfacli2, Wemgncysp2, Wfacli4, Hutlavl6, Wwtrsrc3, Whospy3, Hutlavl1, Wemgncysp4, Hwmat, Htyp, Hutlavl3, Wfacli7

Table 15 Standardised coefficients of capacity for flood

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Whospy1	0.017	29.876	.000	0.015	0.706	1.416
	Whospy2	0.095	12.324	.000	0.082	0.751	1.331
	Whospy3	0.038	14.764	.000	0.027	0.504	1.983
	Whospn	-0.202	-22.764	.000	-0.132	0.429	2.329
	Wemgncysp1	0.028	23.123	.000	0.024	0.733	1.365
	Wemgncysp2	0.056	15.131	.000	0.042	0.557	1.797
	Wemgncysp3	0.047	13.543	.000	0.040	0.711	1.407
	Wemgncysp4	0.044	17.980	.031	0.027	0.382	2.619
	Wemgncysp5	0.042	18.888	.000	0.033	0.631	1.584
	Wemgncysp6	0.104	21.731	.000	0.078	0.560	1.785
	Wemgncysp7	-0.117	-12.431	.000	-0.080	0.469	2.134
	Wwtrsrc1	0.031	23.231	.000	0.023	0.535	1.868
	Wwtrsrc2	0.048	11.991	.000	0.035	0.519	1.928
	Wwtrsrc3	0.016	25.134	.000	0.011	0.461	2.167
	Wwtrsrc4	-0.032	-29.109	.000	-0.025	0.625	1.599
	Wwtrsrc5	-0.007	-11.987	.000	-0.006	0.691	1.447
	Wpwrspp	0.013	19.432	.000	0.011	0.669	1.495
	Wrlfcmp	0.037	12.098	.000	0.031	0.694	1.442
	Wfacli1	0.024	21.009	.000	0.017	0.495	2.018
	Wfacli2	0.020	13.132	.000	0.014	0.497	2.012
	Wfacli3	0.011	27.279	.000	0.009	0.681	1.468
	Wfacli4	0.046	23.210	.000	0.021	0.218	4.578
	Wfacli5	0.016	10.492	.000	0.012	0.585	1.709
	Wfacli6	0.066	21.459	.007	0.049	0.546	1.832
	Wfacli7	-0.220	-9.547	.000	-0.085	0.150	6.646
	Htyp	0.093	13.245	.000	0.046	0.243	4.114
	Hhght	0.116	15.174	.000	0.077	0.439	2.278
	Hwmat	0.111	16.164	.000	0.056	0.252	3.970
	Htree	0.056	18.665	.000	0.043	0.580	1.723
	Hbmat2	0.040	27.460	.020	0.034	0.746	1.340
	Hflwcpc	0.080	21.568	.000	0.060	0.563	1.777
	Hutlavl1	0.047	12.321	.000	0.024	0.269	3.719

	Hutlavl2	0.027	17.753	.000	0.018	0.445	2.248
	Hutlavl3	0.053	18.674	.000	0.025	0.224	4.467
	Hutlavl4	0.055	11.751	.000	0.045	0.655	1.528
	Hutlavl5	0.015	11.761	.000	0.012	0.649	1.542
	Hutlavl6	0.045	22.456	.000	0.033	0.523	1.911
	Hutlavl7	0.009	23.753	.000	0.008	0.693	1.442
	Hplnth	0.126	16.167	.000	0.098	0.612	1.634
	PRDFL1	0.584	10.150	.000	0.354	0.369	2.712
a. Dependent Variable: CAPCTYFL1							

Table 16 (a) Model summary of capacity for urban flood

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.892[a]	0.860	0.857	.00782	0.860	3744.098	43	858	0.000

a. Predictors: (Constant), PRDUFL1, Hbmat2, Whospn, Hwst, Wwtrsrc1, Hutlavl7, Wfacli5, Wfacli6, Wemgncysp5, Wemgncysp1, Wpwrspp, Wwtrsrc5, Wemgncysp3, Wfacli1, Wfacli3, Hflwcpc, Wrlfcmp, Hutlavl5, Hutlavl4, Whospy2, Hhght, Whospy1, Htree, Wemgncysp6, Hplnth, Wemgncysp7, Hutlavl2, Wwtrsrc4, Wwtrsrc2, Wwtrsrc3, Wemgncysp2, Hdrnty, Wfacli4, Hutlavl6, Wfacli2, Whospy3, Hdrnclr, Hutlavl1, Wemgncysp4, Hwmat, Htyp, Hutlavl3, Wfacli7

Table 16 (b) ANOVA table of capacity for urban flood

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22272.272	43	517.959	665.158	.000[b]
	Residual	668.168	858	0.7787		
	Total	22940.440	901			

a. Dependent Variable: CAPCTYUFL1

b. Predictors: (Constant), PRDUFL1, Hbmat2, Whospn, Hwst, Wwtrsrc1, Hutlavl7, Wfacli5, Wfacli6, Wemgncysp5, Wemgncysp1, Wpwrspp, Wwtrsrc5, Wemgncysp3, Wfacli1, Wfacli3, Hflwcpc, Wrlfcmp, Hutlavl5, Hutlavl4, Whospy2, Hhght, Whospy1, Htree, Wemgncysp6, Hplnth, Wemgncysp7, Hutlavl2, Wwtrsrc4, Wwtrsrc2, Wwtrsrc3, Wemgncysp2, Hdrnty, Wfacli4, Hutlavl6, Wfacli2, Whospy3, Hdrnclr, Hutlavl1, Wemgncysp4, Hwmat, Htyp, Hutlavl3, Wfacli7

Table 17 Standardised coefficients of capacity for urban flood

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	Constant						
	Whospy1	0.018	23.567	.000	0.015	0.693	1.442
	Whospy2	0.095	14.654	.000	0.082	0.737	1.357

	Whospy3	0.038	15.871	.009	0.027	0.500	2.000
	Whospn	-0.203	-9.561	.000	-0.133	0.427	2.341
	Wemgncysp1	0.028	13.642	.000	0.023	0.668	1.497
	Wemgncysp2	0.056	19.368	.000	0.042	0.557	1.796
	Wemgncysp3	0.048	17.511	.000	0.040	0.696	1.436
	Wemgncysp4	0.044	19.586	.000	0.027	0.377	2.656
	Wemgncysp5	0.042	10.563	.000	0.033	0.629	1.590
	Wemgncysp6	0.104	21.875	.000	0.076	0.532	1.881
	Wemgncysp7	-0.118	-28.439	.000	-0.079	0.451	2.219
	Wwtrsrc1	0.031	19.234	.000	0.023	0.535	1.868
	Wwtrsrc2	0.048	10.563	.000	0.035	0.519	1.926
	Wwtrsrc3	0.016	9.364	.000	0.011	0.459	2.177
	Wwtrsrc4	-0.032	-14.680	.000	-0.025	0.620	1.613
	Wwtrsrc5	-0.007	-11.681	.000	-0.006	0.683	1.465
	Wpwrspp	0.013	16.451	.000	0.011	0.647	1.545
	Wrlfcmp	0.037	21.853	.000	0.031	0.696	1.436
	Wfacli1	0.024	21.768	.001	0.017	0.487	2.053
	Wfacli2	0.020	16.658	.000	0.014	0.481	2.080
	Wfacli3	0.012	16.698	.000	0.009	0.667	1.500
	Wfacli4	0.046	19.620	.000	0.021	0.212	4.721
	Wfacli5	0.016	13.870	.000	0.012	0.556	1.798
	Wfacli6	0.067	17.456	.000	0.049	0.547	1.827
	Wfacli7	-0.221	-14.987	.000	-0.085	0.148	6.746
	Htyp	0.094	12.692	.000	0.044	0.219	4.572
	Hhght	0.117	19.789	.000	0.076	0.426	2.346
	Hwmat	0.112	11.865	.000	0.052	0.213	4.685
	Htree	0.057	16.858	.000	0.042	0.560	1.787
	Hbmat2	0.040	14.675	.000	0.034	0.727	1.375
	Hflwcpc	0.081	22.869	.000	0.053	0.432	2.314
	Hutlavl1	0.047	21.758	.000	0.024	0.266	3.754
	Hutlavl2	0.027	23.987	.000	0.018	0.453	2.209
	Hutlavl3	0.053	26.647	.000	0.025	0.212	4.724
	Hutlavl4	0.056	17.753	.000	0.044	0.628	1.593
	Hutlavl5	0.015	18.958	.000	0.012	0.625	1.600
	Hutlavl6	0.046	25.654	.000	0.033	0.510	1.962
	Hutlavl7	0.009	21.432	.000	0.008	0.693	1.442
	Hplnth	0.126	10.123	.022	0.098	0.600	1.666
	Hdrnty	0.157	14.475	.000	0.096	0.372	2.690
	Hdrnclr	0.058	28.279	.000	0.039	0.460	2.176
	Hwst	-0.054	-26.274	.000	-0.040	0.564	1.774
	PRDUFL1	0.594	8.768	.000	0.354	0.356	2.810

a. Dependent Variable: CAPCTYUFL1

Table 18 (a) Model summary of capacity for fire

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.920[a]	0.901	0.890	.00806	0.901	619.887	46	855	.000

a. Predictors: (Constant), PRDFR1, Wpwrspp, Hutlavl7, Hmain, Hbmat3, Hsmkdet, Wfacli3, Wemgncysp3, Wwtrsrc5, Whospy2, Wfacli6, Wfacli1, Wfacli5, Wwtrsrc2, Whospy3, Wemgncysp5, Hutlavl4, Hutlavl5, Wemgncysp7, Wrlfcmp, Hopnspc, Wemgncysp6, Wwtrsrc4, Whospy1, Hfrextng, Hutlavl2, Wemgncysp1, Hrdacess, Hroadtyp, Wemgncysp2, Wwtrsrc3, Hage, Wfacli4, Hdisadj, Wwtrsrc1, Hutlavl6, Wfacli2, Hemrgnext, Hhght, Whospn, Hutlavl1, Wemgncysp4, Htyp, Hutlavl3, Hwmat, Wfacli7

Table 18 (b) ANOVA table of capacity for fire

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34132.252	46	742.005	619.887	.000[b]
	Residual	1023.967	855	1.197		
	Total	35156.219	901			

a. Dependent Variable: CAPCTYFR1

b. Predictors: (Constant), PRDFR1, Wpwrspp, Hutlavl7, Hmain, Hbmat3, Hsmkdet, Wfacli3, Wemgncysp3, Wwtrsrc5, Whospy2, Wfacli6, Wfacli1, Wfacli5, Wwtrsrc2, Whospy3, Wemgncysp5, Hutlavl4, Hutlavl5, Wemgncysp7, Wrlfcmp, Hopnspc, Wemgncysp6, Wwtrsrc4, Whospy1, Hfrextng, Hutlavl2, Wemgncysp1, Hrdacess, Hroadtyp, Wemgncysp2, Wwtrsrc3, Hage, Wfacli4, Hdisadj, Wwtrsrc1, Hutlavl6, Wfacli2, Hemrgnext, Hhght, Whospn, Hutlavl1, Wemgncysp4, Htyp, Hutlavl3, Hwmat, Wfacli7

Table 19 Standardised coefficients of capacity for fire

Model		Standardized Coefficients	t value	Sig.	Correlation	Collinearity Statistics	
		Beta			Part	Tolerance	VIF
1	(Constant)						
	Whospy1	0.014	23.560	.000	0.012	0.668	1.498
	Whospy2	0.077	15.569	.000	0.065	0.717	1.394
	Whospy3	0.030	18.876	.000	0.021	0.492	2.034
	Whospn	-0.164	-24.986	.000	-0.107	0.427	2.340
	Wemgncysp1	0.023	15.621	.000	0.017	0.574	1.742
	Wemgncysp2	0.045	19.908	.016	0.034	0.552	1.812
	Wemgncysp3	0.038	17.178	.000	0.033	0.720	1.389
	Wemgncysp4	0.036	15.364	.000	0.022	0.372	2.689
	Wemgncysp5	0.034	12.531	.000	0.027	0.630	1.587

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	Wemgncysp6	0.084	27.164	.000	0.062	0.536	1.865
	Wemgncysp7	-0.095	-11.555	.000	-0.064	0.443	2.258
	Wwtrsrc1	0.025	10.978	.000	0.018	0.500	2.001
	Wwtrsrc2	0.039	25.625	.000	0.028	0.530	1.886
	Wwtrsrc3	0.013	24.432	.000	0.009	0.442	2.263
	Wwtrsrc4	0.026	17.432	.000	0.021	0.676	1.480
	Wwtrsrc5	0.005	17.364	.000	0.004	0.672	1.489
	Wpwrspp	0.011	11.638	.000	0.009	0.648	1.543
	Wrlfcmp	0.030	19.579	.008	0.024	0.616	1.623
	Wfacli1	0.020	16.344	.000	0.014	0.468	2.138
	Wfacli2	0.016	21.534	.000	0.011	0.476	2.102
	Wfacli3	0.009	27.173	.000	0.008	0.657	1.521
	Wfacli4	0.037	13.524	.000	0.017	0.213	4.690
	Wfacli5	0.013	12.243	.000	0.010	0.574	1.741
	Wfacli6	0.054	15.345	.000	0.039	0.524	1.908
	Wfacli7	-0.179	-26.879	.000	-0.068	0.145	6.895
	Htyp	0.076	28.572	.000	0.036	0.226	4.418
	Hhght	-0.095	-12.100	.000	-0.056	0.347	2.880
	Hwmat	0.090	8.716	.000	0.042	0.212	4.710
	Hutlavl1	0.038	10.386	.000	0.019	0.258	3.883
	Hutlavl2	0.022	13.479	.000	0.014	0.437	2.287
	Hutlavl3	0.043	14.169	.000	0.020	0.224	4.466
	Hutlavl4	0.045	19.871	.000	0.035	0.623	1.606
	Hutlavl5	0.012	23.456	.000	0.010	0.640	1.562
	Hutlavl6	0.037	17.987	.000	0.026	0.501	1.996
	Hutlavl7	0.008	18.561	.000	0.006	0.659	1.518
	Hage	0.153	21.134	.000	0.100	0.427	2.340
	Hmain	0.143	21.546	.000	0.099	0.476	2.101
	Hopnspc	0.044	15.898	.000	0.033	0.579	1.728
	Hdisadj	0.122	8.098	.000	0.084	0.471	2.123
	Hemrgnext	0.047	17.001	.000	0.031	0.447	2.238
	Hroadtyp	0.096	23.097	.010	0.073	0.575	1.739
	Hrdacess	0.079	26.156	.000	0.056	0.512	1.951
	Hbmat3	0.026	27.505	.000	0.022	0.744	1.345
	Hsmkdet	0.013	15.270	.000	0.011	0.674	1.483
	Hfrextng	0.031	15.837	.000	0.021	0.458	2.183
	PRDFR1	0.544	14.721	.000	0.275	0.255	3.926
a. Dependent Variable: CAPCTYFR1							

Table 20 Ward wise mean and standard deviation of capacity for considered hazards

WARD NO.		CAPCTYFR1R	CAPCTYFL1R	CAPCTYUFL1R	CAPCTYQ1R
1 (N=30)	Mean	8.5182	8.2195	8.8961	7.8952
	Std. Deviation	.0286	.0066	.0758	.3464
2(N=30)	Mean	9.1781	9.7318	10.1819	9.5184
	Std. Deviation	.4573	.0096	.5410	.7809
3(N=30)	Mean	9.1035	9.4322	10.1858	9.2853
	Std. Deviation	.2148	.3262	.1149	.6286
4(N=30)	Mean	8.5991	8.0710	8.7163	8.4537
	Std. Deviation	.8250	.1076	.0243	.0949
5(N=30)	Mean	8.7777	10.4437	11.2729	9.2863
	Std. Deviation	.3675	.3143	.7784	.4448
6(N=30)	Mean	7.4086	8.2812	9.0135	7.4907
	Std. Deviation	.3332	.3867	.2741	.2879
7(N=30)	Mean	9.1603	9.5743	10.5118	9.2453
	Std. Deviation	.5674	.0280	.2885	.3887
8(N=30)	Mean	6.7956	9.9035	8.4038	7.6941
	Std. Deviation	.1774	.2152	.7695	.6263
9(N=30)	Mean	8.8358	10.6215	10.3039	9.4543
	Std. Deviation	.5038	.0321	.6148	.6746
10(N=30)	Mean	9.2452	10.8623	10.3295	9.9200
	Std. Deviation	.4703	.2050	.1273	.4749
11(N=30)	Mean	9.3557	10.0517	10.4977	9.8639
	Std. Deviation	.6335	.0462	.5640	.4470
12(N=30)	Mean	10.3819	10.5569	11.8062	10.7716
	Std. Deviation	.7179	.2308	.8008	.4081
13(N=30)	Mean	9.4371	10.2261	10.6701	10.0572
	Std. Deviation	.0300	.2537	.0543	.4129
14(N=30)	Mean	9.7382	10.4385	11.3902	10.2483
	Std. Deviation	.5727	.6366	.6612	.3139
15(N=30)	Mean	9.4307	9.7998	10.7162	9.8792
	Std. Deviation	.5648	.7125	.6156	.4782
16(N=30)	Mean	10.5382	11.1110	11.7489	11.0376
	Std. Deviation	.6337	.1367	.2404	.2517
17(N=30)	Mean	8.2078	8.3058	9.1916	8.6568
	Std. Deviation	.4176	.8714	.1428	.0510
18(N=30)	Mean	9.8106	9.9717	10.6863	10.3794
	Std. Deviation	.2186	.3500	.4760	.2513
19(N=30)	Mean	10.3721	11.3145	12.3547	10.7186
	Std. Deviation	.0136	.53410	.5651	.8307
20(N=30)	Mean	9.8784	10.6901	11.1524	10.3279

	Std. Deviation	.5645	.6241	.4775	.5039
21(N=30)	Mean	11.8043	11.7808	12.8206	12.1831
	Std. Deviation	.0135	.5151	.4680	.0054
22(N=30)	Mean	11.8764	11.6496	12.6834	11.5535
	Std. Deviation	.5965	.6424	.8432	.6343
23(N=30)	Mean	9.9955	10.2336	10.8725	10.2172
	Std. Deviation	.3210	.7477	.0019	.2259
24(N=30)	Mean	11.6938	11.0632	11.9110	11.9354
	Std. Deviation	.0673	.1706	.0251	.1944
25(N=30)	Mean	12.9417	12.1207	12.9473	13.0464
	Std. Deviation	.0545	.6593	.4027	.7372
26(N=30)	Mean	10.6489	10.3023	11.0669	10.5559
	Std. Deviation	.1402	.1350	.0384	.1297
27(N=30)	Mean	11.1305	11.2979	11.9806	10.9709
	Std. Deviation	.4276	.07252	.5575	.8526
28(N=30)	Mean	9.9760	10.5050	11.0355	10.3717
	Std. Deviation	.0856	.27558	.5459	.1757
29(N=61)	Mean	9.5069	9.1581	9.7419	9.4730
	Std. Deviation	.1228	.1588	.1767	.2018
Silchar (N=901)	Mean	9.7277	10.1592	10.7577	9.9970
	Std. Deviation	.0762	.8015	.3152	.4316

Table 21 Ward wise indices of capacity for considered hazards			
Variables	L	M	H
CAPCTYQ1R	7.4907-9.3426	9.3427-11.1945	11.1946-13.0464
CAPCTYFL1R	8.071- 9.4209	9.4210-10.7708	10.7709 - 12.1207
CAPCTYUFL1R	8.4038-9.9183	9.9184-11.4328	11.4329-12.9473
CAPCTYFR1R	6.7956- 8.8443	8.8444-10.8930	10.8931-12.9417

Table 22 Ward wise capacity level for considered hazards					
WARD NO.		CAPCTYQ1R	CAPCTYFL1R	CAPCTYUFL1R	CAPCTYFR1R
1	Mean	7.8952	8.2195	8.8961	8.5182
	Index	L	L	L	L
2	Mean	9.5184	9.7318	10.1819	9.1781
	Index	M	M	M	M
3	Mean	9.2853	9.4322	10.1858	9.1035
	Index	L	M	M	M
4	Mean	8.4537	8.071	8.7163	8.5991
	Index	L	L	L	L
5	Mean	9.2863	10.4437	11.2729	8.7777
	Index	L	M	M	L
6	Mean	7.4907	8.2812	9.0135	7.4086

	Index	L	L	L	L
7	Mean	9.2453	9.5743	10.5118	9.1603
	Index	L	M	M	M
8	Mean	7.6941	9.9035	8.4038	6.7956
	Index	L	M	L	L
9	Mean	9.4543	10.6215	10.3039	8.8358
	Index	M	M	M	L
10	Mean	9.92	10.8623	10.3295	9.2452
	Index	M	H	M	M
11	Mean	9.8639	10.0517	10.4977	9.3557
	Index	M	M	M	M
12	Mean	10.7716	10.5569	11.8062	10.3819
	Index	M	M	H	M
13	Mean	10.0572	10.2261	10.6701	9.4371
	Index	M	M	M	M
14	Mean	10.2483	10.4385	11.3902	9.7382
	Index	M	M	M	M
15	Mean	9.8792	9.7998	10.7162	9.4307
	Index	M	M	M	M
16	Mean	11.0376	11.111	11.7489	10.5382
	Index	M	H	H	M
17	Mean	8.6568	8.3058	9.1916	8.2078
	Index	L	L	L	L
18	Mean	10.3794	9.9717	10.6863	9.8106
	Index	M	M	M	M
19	Mean	10.7186	11.3145	12.3547	10.3721
	Index	M	H	H	M
20	Mean	10.3279	10.6901	11.1524	9.8784
	Index	M	M	M	M
21	Mean	12.1831	11.7808	12.8206	11.8043
	Index	H	H	H	H
22	Mean	11.5535	11.6496	12.6834	11.8764
	Index	H	H	H	H
23	Mean	10.2172	10.2336	10.8725	9.9955
	Index	M	M	M	M
24	Mean	11.9354	11.0632	11.911	11.6938
	Index	H	H	H	H
25	Mean	13.0464	12.1207	12.9473	12.9417
	Index	H	H	H	H
26	Mean	10.5559	10.3023	11.0669	10.6489
	Index	M	M	M	M
27	Mean	10.9709	11.2979	11.9806	11.1305

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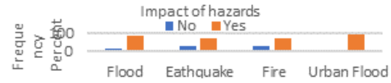
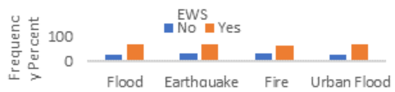
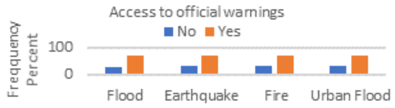
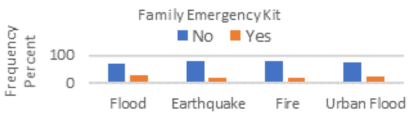
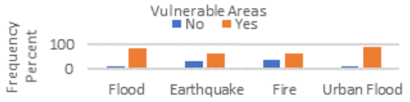
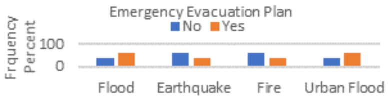
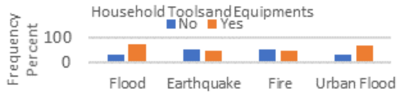
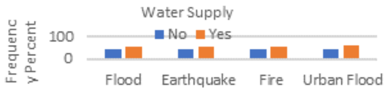
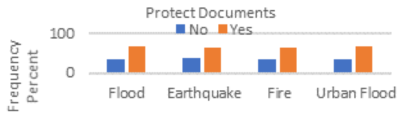
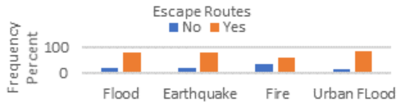
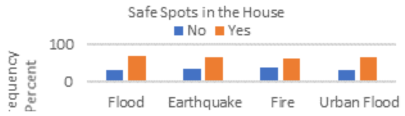
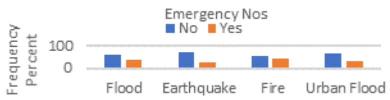
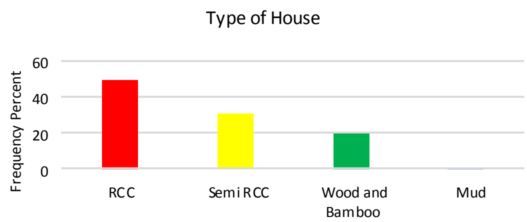
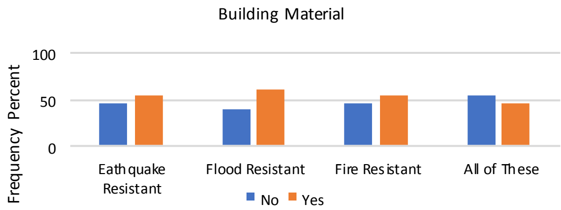
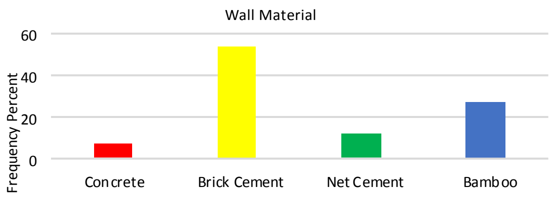
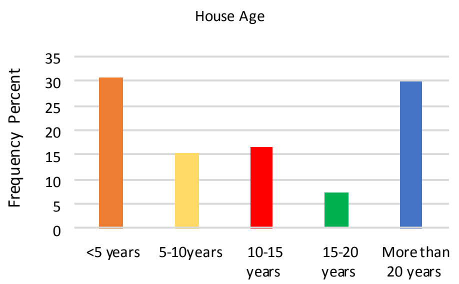
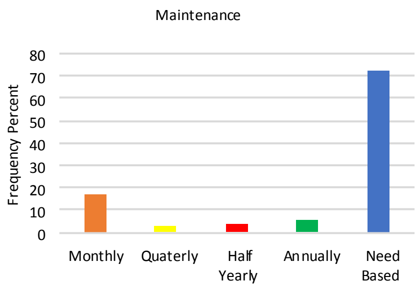
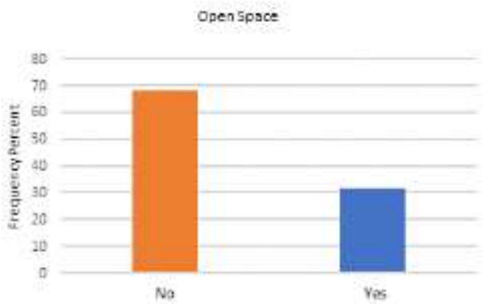
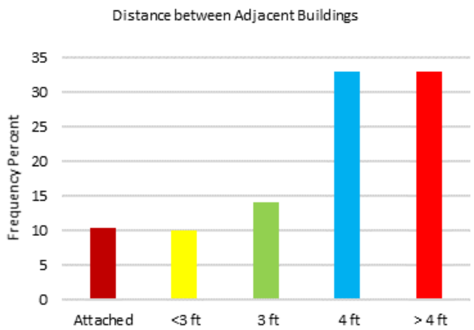
	Index	M	H	H	H
28	Mean	10.3717	10.505	11.0355	9.976
	Index	M	M	M	M
29	Mean	9.473	9.1581	9.7419	9.5069
	Index	M	M	L	M
Silchar	Mean	9.997	10.1592	10.7577	9.7277
	Index	M	M	M	M

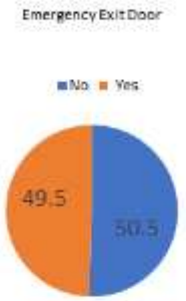
Table 23 Descriptive statistics of preparedness factors

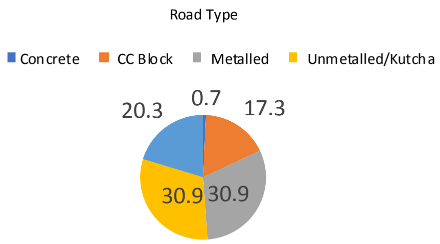
Preparedness Factors	Flood		Earthquake		Fire		Urban Flood	
	Yes%	No%	Yes%	No%	Yes%	No%	Yes%	No%
	87	13	67.8	32.2	69.4	30.6	89.7	10.3
	72.1	27.9	68.8	31.2	67.8	32.2	71.1	28.9
	71.8	28.2	69.1	30.9	68.4	31.6	70.4	29.6
	27.9	72.1	20.6	79.4	19.6	80.4	23.3	76.7
	86	14	64.8	35.2	63.8	36.2	86.4	13.6
	61.5	38.5	37.5	62.5	37.5	62.5	62.1	37.9
	70.4	29.6	46.2	53.8	47.5	52.5	67.4	32.6
	55.8	44.2	57.1	42.9	56.5	43.5	59.1	40.9
	67.1	32.9	62.5	37.5	64.1	35.9	67.1	32.9
	80.1	19.9	79.7	20.3	62.5	37.5	84.4	15.6

<table>
<tr><td>
</td><td>68.8</td><td>31.2</td><td>66.1</td><td>33.9</td><td>61.8</td><td>38.2</td><td>68.1</td><td>31.9</td></tr>
<tr><td>
</td><td>38.5</td><td>61.5</td><td>26.9</td><td>73.1</td><td>42.2</td><td>57.8</td><td>35.2</td><td>64.8</td></tr>
</table>

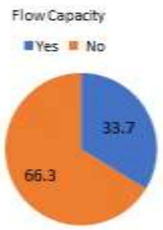
<table>
<tr><td colspan="2">Table 24 (b) Descriptive statistics of other capacity factors in frequency per cent for considered hazards and N = 901</td></tr>
<tr><td>
</td><td>49.2% live in RCC house
30.2% in semi RCC
19.6% in wood and bamboo house and
1% live in a mud house.</td></tr>
<tr><td>
</td><td>53.8 % of people believe to have used earthquake-resistant building material
59.8% believe to have used flood-resistant building material
54.5% believe to have used fire-resistant building material
46.2% of people believe to have used building material resistant to all considered hazards</td></tr>
<tr><td>
</td><td>7.3% have concrete walls in the house
53.8% have brick cement walls in the house
12% have net Cement wall in the house
26.9% have bamboo made a wall in the house</td></tr>
</table>

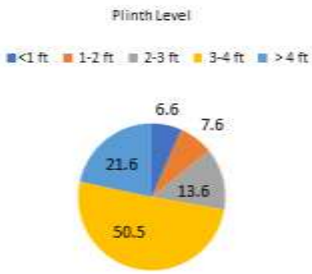
<table>
<tr><td colspan="2">Table 24 (c) Descriptive statistics of capacity factors in frequency per cent for earthquake and fire hazard and N = 901</td></tr>
<tr><td>
</td><td>30.9% say that their house is less than 5 years old
15.3% say that their house is between 5 to 10 years
16.6% say that their house is between 10 to 15 years
7.3% say that their house is between 15 to 20 years
29.9% say that their house is more than 20 years old</td></tr>
<tr><td>
</td><td>16.6% of people say monthly maintenance of the house
2.3% of people say quarterly maintenance of house
3.3% of people say half yearly maintenance of house
5% of people say annual maintenance of house
72.8% of people say need-based maintenance of house</td></tr>
<tr><td>
</td><td>68.1% of participants do not have open space around their house
31.9% of participants have open space around their house</td></tr>
<tr><td>
</td><td>10.3% of the respondents have no distance with adjacent house
10% of the respondents have < 3 ft distance
14% of the respondents have 3 ft distance
32.9% of the respondents have 4 ft distance
32.9% of the respondents have > 4 ft distance with adjacent house</td></tr>
</table>

<table>
<tr><td>


</td><td>49.5% of people have an emergency exit door in their house
50.5% of people do not have an emergency exit door in their house</td></tr>
<tr><td>


</td><td>20.3% of the respondents have concrete road type
17.3% have CC block
30.9% have mettled roads
30.9% of the respondents have kutcha road type</td></tr>
</table>

<table>
<tr><td colspan="2">Table 24 (d) Descriptive statistics of capacity factors in frequency per cent for flood and urban flood hazard and N = 901</td></tr>
<tr><td>


</td><td>33.7% say flow capacity of drain sufficient
66.3% say flow capacity of drain insufficient</td></tr>
<tr><td>


</td><td>6.6% say the plinth level of the house is < 1 ft
7.6% say plinth level is 1 - 2ft
13.6% say plinth level is 2 - 3ft
50.5% say plinth level is 3 - 4ft
21.6% say the plinth level of the house is > 4 ft</td></tr>
</table>

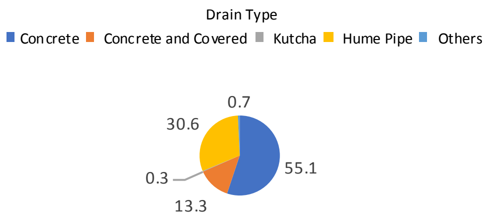
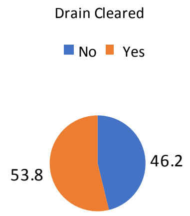
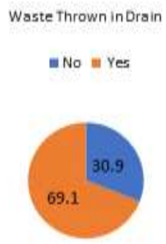
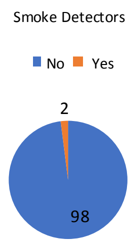
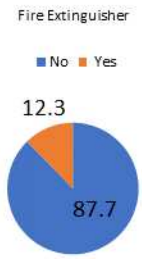
Table 24 (e) Descriptive statistics of capacity factors in frequency per cent for urban flood hazard and N = 901	
	55.1% have concrete drain type 13.3% have concrete and covered drain type 0.3% have kutcha drain type 30.6% have drain made of hume pipes 0.7% have another drain type
	46.2% say drain is cleared 53.8% say drain is not cleared
	69.1% say waste is thrown in the drain 30.9% say waste is not thrown in the drain

Table 24 (f) Descriptive statistics of capacity factors in frequency per cent for fire hazard and N = 901	
	98% do not have smoke detectors installed in the house 2% have smoke detectors in the house
	87.7% do not have fire extinguishers in the house 12.3% have fire extinguishers in the house