

Household Preparedness for Public Health Emergencies among Urban Communities of Ahmedabad, Gujarat, India - A Community Based Cross-Sectional Study

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ABSTRACT

BACKGROUND

Public health emergencies including a disaster are inevitable. Moreover, the vulnerability and health impacts are more profound in urban densely populated dwellings. Household preparedness for public health emergencies need to be focused to minimize the morbidity and mortality associated with such situations.

METHODS

An urban community, situated in field practice area of a tertiary care teaching institute of Ahmedabad, Gujarat was approached for a cross-sectional study through door to door structured interviews. A pre-designed questionnaire was administered to assess the knowledge as well as preparedness for public health emergencies among the respondents. The adult representative family member from each of the selected households formed the sampling unit. Statistical tests of association and logistic regression analysis were used to find our relationship between household preparedness and some of the independent factors.

RESULTS

From a total of 405 households, majority of the respondents were male (65.7 %), married (92.1 %), having secondary level education (43.7 %) and belonged to socio-economic class IV (37.8 %). Only 44 % of the respondents had experienced any form of public health emergency in the past and only 14.6 % had an experience of relief work. "Flash floods following heavy rains" and "earthquake" were the commonest disaster experienced by the respondents. None of the surveyed households had first aid kit or a fire-extinguisher. Majority of the respondents (N = 280, 69.1 %) were aware of emergency contact numbers in case of public health emergencies. The overall household level preparedness was only 12.59 %. Perceived susceptibility to public health emergencies and household preparedness had significant statistical associations with education, occupation, type of house and socio-economic class.

CONCLUSIONS

Education, occupation, and social class play roles in both perception as well as household preparedness for public health emergencies. A very low level of preparedness and their possible factors should be addressed through adequate channels so that the damage due to such emergencies could be minimized.

KEYWORDS

Disaster, Household Preparedness, Public Health Emergency, Urban Community

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BACKGROUND

A "public health emergency" is defined as "an occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or (a) novel and highly fatal infectious agent or biological toxin, that poses a substantial risk of significant number of human facilities or incidents or permanent or long-term disability".¹ Thus, the definition is quite expandable including the situations like outbreaks, floods, fires, earthquakes, heat waves, heavy rains, riots, mass conflicts, explosions and acts of terrorisms. Public health emergencies and disasters are inevitable and are not uncommon as a whole for any localities. The health impacts of both natural and man-made disasters are enormous, in addition to the impacts of the infrastructure, water supply and sewerage systems.² Additionally, several man-made factors such as location of settlements, inadequate building practices, high occupancy in buildings and the absence of warning and awareness systems increase the vulnerability to most of such disaster/emergencies.^{3,4} The urban densely populated areas are more vulnerable as they are likely to be affected in a larger scale with greater impact as far as morbidity and mortality are concerned.⁵ Causes of mortality and morbidity in such disasters include direct causes like trauma, asphyxia, hypothermia as well as indirect causes such as damages to water and sewer systems, energy lines, roads, telecom, and airports.⁶

Preparedness, on the other hand, is defined by United Nations International Strategy for Disaster Reduction as knowledge, capabilities and actions of governments, organizations, community groups, and individuals "to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions".⁷ It can then be understood that preparedness of certain level could minimize the effect of the public health emergencies through relatively smaller interventions, investments and efforts, for example occupancy in an earthquake resistant building and not otherwise. Additionally, it also has been evident from several research studies that the local governments often fail to reach out for emergency responses especially in bigger calamities and therefore the preparedness of households and the communities play pivotal role for limiting the impact of the disasters.⁸ It can be understood that risk literacy and household preparedness are not up to the mark for every possible emergency situations especially among developing and least developed countries.⁹ High population areas are prone to severe mass disaster situations. This is especially important in today's era of uncontrolled urbanization and industrialization. The population in the cities is becoming dense but the perceived risks to health due to such settlements are largely undermined by the people.¹⁰ Unplanned dwellings are one of the crucial factors to increase the impact of any public health emergencies including disasters. A prepared household for disasters/health emergencies could drastically reduce the damage to not only health but also to lives and economy.¹¹ Preparedness for public health emergencies depend on a number of factors like gender, age, education, family

income, perceived risk, disaster preparedness knowledge, prior disaster experiences etc.^{12,13} Moreover, their role is much emphasized due to need of effective emergency response in situations like viral epidemics and terrorist attacks.¹⁴ However, there has not been much research on community preparedness in case of public health emergency situations.¹⁵ Further, it has been said that the immediate help in case of any public health emergency/disaster would come from the community members first. By understanding disaster preparedness and risk perception, interventions can be developed to improve community preparedness and avoid unnecessary mortality and morbidity following a natural disaster.¹⁶ A baseline survey would be very much fruitful for future awareness generation programs.

Objectives

- To assess the status of household level preparedness for public health emergencies among residents of urban community in the field practice area of GCSMC.
- To determine the socio-demographic predictors for awareness and preparedness for public health emergencies among those residents.

METHODS

A cross sectional study was conducted in the field practice area (having a population of about 5000) of Urban health training centre (UHTC) of a tertiary care teaching medical institute of Ahmedabad city, Gujarat after seeking permission from Institutional Ethics Committee. The field practice area had a mix of people belonging to different kinds of social and economic strata. The study was conducted during 2020 and the data collection was done from January 2020 to March 2020. The sampling unit was a household and study unit were representative resident family member of the selected household (preferably the head of the family). Sample size was calculated using formula

$$n = [DEFF * Np(1 - p)] / [d^2 / Z^2_{1-\alpha/2} * (N - 1) + p * (1 - p)]^{17}$$

Considering that population size for finite population correction factor (N), hypothesized % frequency of outcome factor in the population (p) as 50 %, confidence limit of 5 % (95 % CI) and design effect (DEFF) of 1, the desired sample size came out to be 405. Thus, a total of 405 households were surveyed within the field practice area. The data collection was started after seeking permission from Institutional Ethics Committee. A total of 405 households were selected for the study. All five areas were adopted under UHTC, amongst which equal number of households i.e. 81 households were selected from each area through systematic random sampling method. Door to door interview of members of selected household was done by the investigators in liaison with the medical social workers of the institute. If a house was closed permanently, next house was selected.

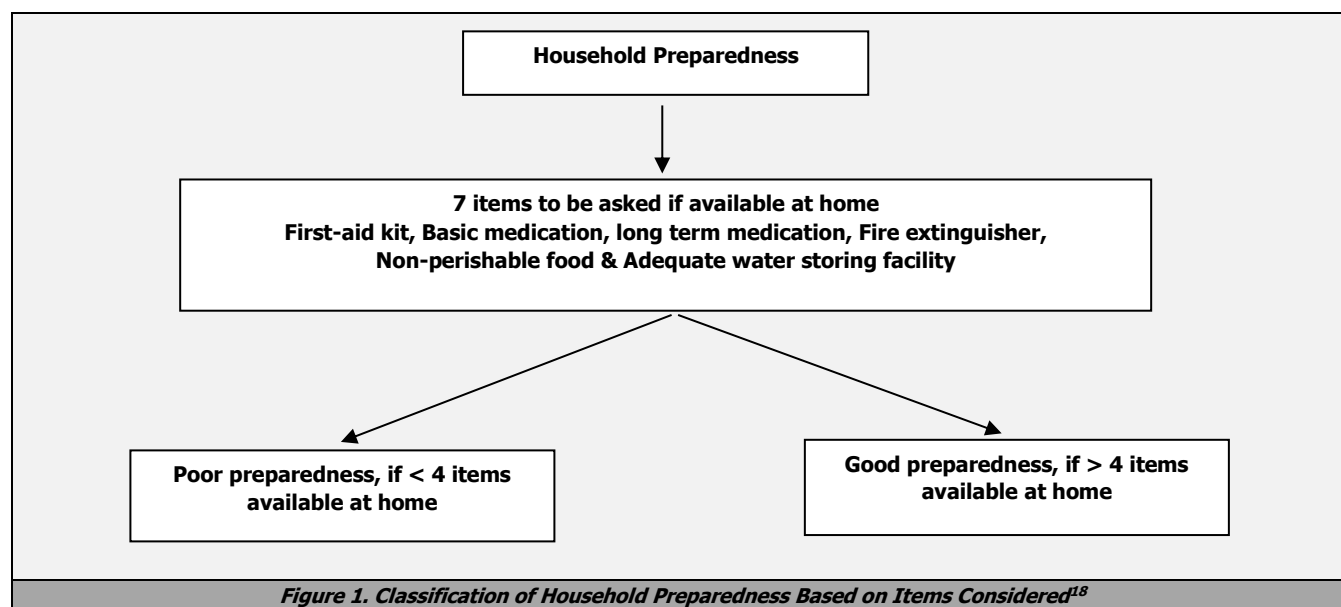
The respondents were any adult member of the family, preferably head of the family. In case a household was closed temporarily another attempt for interview was made during the data collection schedule. Even after that if contact for interview was not established, then in such situation next household was interviewed.

Questions related to socio-demographic profile, knowledge and perception about disaster (for disasters like floods, earthquakes, fire etc.), disaster preparedness and first aid kit were asked to participants. Structured interviews were organized within the households through the team of data collectors with the help of Google form. The exclusion criteria for study samples included any one of the followings: family member(s) not giving consent; those who cannot be interviewed due to certain health issues (like mental health

problem); house that is permanently closed and household occupied with visitor (who do not occupy the home throughout the year).

Statistical Analysis

Data entry was done in MS Excel. Analysis was done using MS Excel and Statistical Package for Social Sciences (SPSS). The household preparedness was also ascertained using the following criteria (Figure 1) which were based on the 7 items essential for public health emergencies based on previous research.¹⁸ The analysis included finding percentages, tests of association (chi-square test, Odds ratio) and multiple logistic regression analysis.



RESULTS

A total of 405 participants (81 from all 5 areas adopted under urban health training centre) were interviewed for the study. Mean age of participants was 54.87 + 14.85 years. Mean monthly income of participants was Rs. 12,119.75 + 377.286. For socio-economic class, the All India Consumer Price Index (AICPI) of 338 for industrial worker for month of August 2020 was considered to classify them from class 1 to 5 according to the modified Prasad's classification. Mean of total family members of participant was 4.86 + 0.87. One or more children of less than 12 years in the family were reported by 305 (75.3 %) participants. One or more geriatric member (age > 60 years) in the family was reported by 201 (49.6 %) participants.

Out of all 405 participants, a total of 151 (37.3 %) participants were not able to describe the word "Disaster". Amongst those who could describe disaster, most of answers (207; 81.5 %) were only related to natural disasters like flood, cyclone, earthquake, etc. Only remaining 47 (18.5 %) of the respondents considered riots & fire as disaster. Out of all, less than half of the respondents (n = 178, 44 %) participants had experienced disaster at some point of time

in their lifetime. Amongst those who had experienced disaster, only about one-fourth of the respondents (n = 26, 14.6 %) had experienced relief work following disaster. On asking about previous experience with any public health emergency within the past decade, it was seen that the commonest experience was with flash flood due to heavy rain (n = 304), followed by earthquake (n = 202), fire (n = 152), disease outbreak (n = 150) and mass conflicts (n = 125) among the respondents.

On inquiring whether their locality was susceptible to different types of disaster, only about a third of the respondent (n = 151, 37.3 %) participants felt their locality was susceptible to disasters. Participants felt flash flood due to heavy rain (n = 114; 75.5 %), earthquake (n = 100; 66.2 %) and disease outbreak (n = 74; 49.0 %) were the most common disasters/public health emergency which their locality was susceptible to. On inquiring about infectious disease common in locality of participants, respiratory disease (n = 255; 63.0 %), mosquito transmitted disease (n = 253; 62.5 %) and water borne disease (n = 200; 49.4 %) were common responses. On inquiring about participant's perception to awareness of their own community regarding disaster and public health emergencies compared to people of other metropolitan cities like Mumbai, Delhi, Bangalore,

etc. a total of 150 (37.0 %) respondents felt it was worse compared to those cities. On further inquiry regarding perception for preparedness of their community compared to people of other metropolitan cities, a total of 175 (43.2 %) felt their locality was worse prepared to other metropolitans. Only 26 (6.4 %) of all the participants or their family members had received basic first aid training. Household epidemic preparedness based on availability of essential items given in Figure 1 was found in 51 (12.6 %) households. The participants were asked whether they had some of the essential items which would help them in case of emergency or not. These items included first aid kit, non-perishable food, basic and long-term medications, water storage capacity, fire-extinguisher and rescue devices. The proportions of possessing basic medications (n = 303, 75 %), non-perishable food (n = 227, 56 %), water storage facility (n = 228, 56 %), rescue devices (n = 178, 44 %) and long term medications (n = 77, 19 %) formed good levels, while none of the households had first aid and fire-extinguisher.

Only 25 (6.2 %) participants had less than 1-year duration of residing at current place. All participants agreed that they had at least one neighbourhood family which would help them in times of disaster. There were a total of 355 (87.7 %) participants who were aware and had contact information of neighbourhood shelter which could be utilized in case of emergency evacuation. Majority of the respondents (N = 280, 69.1 %) were aware of emergency contact numbers in case of public health emergencies. Most common response for emergency contact number by participant was "108" (n = 229; 81.8 %). Only 76 (18.8 %) of the respondents told that they used to have discussion with family members especially children and geriatrics about steps to be taken in case of emergency. A total of 25 (6.2 %) participants or their family member knew how to use fire extinguisher. Food and water storage facility which would last for at least 3 days was available at the households of most of respondents (n = 380, 93.8 %).

It can be seen from Table 1 that the perceived susceptibility to possible disaster/public health situation (asked as a separate question) had a significant statistical association with age, level of education, occupation, type of house, marital status and social-economic class among the respondents on analysis. The proportion of household preparedness was found to be only 12.59 % (n = 51). The findings show (Table 2) that household preparedness for possible disaster/public health situation had a significant statistical association with level of education, type of occupation, type of house, and socio-economic class among the respondents. Significant statistical association was obtained between perception for susceptibility to disaster and preparedness for disaster (P < 0.001). On asking their view regarding the best source of awareness for public health emergency, the commonest response was print media (26.92 %) followed by television (24.51 %), radio (17.11 %), family members (16.92 %) and friends (14.51 %).

The multivariate logistic regression analysis (Table 3) showed that the perceived susceptibility to disaster was significantly associated with adjusted odds ratios (AOR) for

age (AOR = 1.032, 95 % CI = 1.018 - 1.047), occupation (AOR = 0.856, 95 % CI = 0.751 - 0.976), type of house (AOR = 1.032, 95 % CI = 1.016 - 1.048) and socio-economic class (AOR = 0.261, 95 % CI = 0.194 - 0.350). Similarly, the household level preparedness was significantly associated with level of education (AOR = 0.623, 95 % CI = 0.390 - 0.994), occupation (AOR = 1.268, 95 % CI = 1.066 - 1.509), type of house (AOR = 6.179, 95 % CI = 3.311 - 11.532) and socio-economic class (AOR = 2.269, 95 % CI = 1.579 - 2.262) by using multivariate logistic regression analysis (Table 4). The perceived susceptibility and household preparedness were also having significant associations with factors like the number of non-adult members as well as the number of geriatric members in the family. (Table 5)

Variables	Category	Locality Considered Susceptible to Disaster		P Value (Fisher's Exact test)
		Yes n, %	No n, %	
Age	< 18 years	24 (15.8)	0 (0.0)	< 0.001 (DF = 2)
	18 - 60 years	70 (46.2)	125 (49.2)	
	> 60 years	57 (37.7)	129 (50.7)	
Gender	Male	100 (66.2)	165 (64.9)	0.441 (DF = 1)
	Female	51 (33.8)	89 (35.0)	
	Illiterate	0 (0.0)	25 (9.8)	
Level of education	Primary	50 (33.1)	102 (40.1)	< 0.001 (DF = 3)
	Secondary	50 (33.1)	127 (50.0)	
	Higher secondary	51 (33.7)	0 (0.0)	
Occupation	Self employed	34 (22.5)	71 (27.9)	< 0.001 (DF = 5)
	Job	0 (0.0)	126 (49.6)	
	Housework	80 (52.9)	21 (8.2)	
	Unemployed	0 (0.0)	35 (13.7)	
	Retired	12 (7.9)	1 (0.4)	
	Student	25 (16.5)	0 (0.0)	
House type	Pukka	151 (100)	177 (70.5)	< 0.001 (DF = 1)
	Semi-pukka	0 (0)	77 (30.3)	
Marital status	Unmarried	25 (16.5)	0 (0)	< 0.001 (DF = 3)
	Married	122 (48.0)	251 (98.8)	
	Widow	4 (2.6)	1 (0.4)	
	Separated	0 (0)	2 (0.7)	
Socio-economic classification (modified Prasad classification)	I	0 (0)	0 (0)	< 0.001 (DF = 4)
	II	50 (33.1)	26 (10.2)	
	III	75 (49.6)	51 (20.0)	
	IV	26 (17.2)	127 (50)	
	V	0 (0)	50 (19.6)	

Table 1. Statistical Association between Socio-Demographic Profile and Perception of Participants - Whether Their Locality to be Susceptible to Disaster (N=405) (DF=Degrees of Freedom)

Variables	Category	Household Preparedness		P Value (Fisher's Exact test)
		Good n, %	Poor n, %	
Age	< 18 years	0 (0)	24 (6.7)	0.099 (DF = 2)
	18 - 60 years	24 (47.1)	171 (48.3)	
	> 60 years	27 (52.9)	159 (44.9)	
Gender	Male	31 (60.7)	234 (66.1)	0.275
	Female	20 (39.3)	120 (33.9)	
	Illiterate	25 (49.1)	0 (0)	
Level of education	Primary	0 (0)	152 (42.9)	< 0.001 (DF = 3)
	Secondary	26 (50.9)	151 (42.6)	
	Higher secondary	0 (0)	51 (14.4)	
Occupation	Self employed	21 (41.7)	84 (23.7)	< 0.001 (DF = 4)
	Job	20 (39.2)	106 (29.9)	
	Housework	0 (0)	101 (28.5)	
	Unemployed	10 (19.6)	25 (7.0)	
	Retired	0 (0)	13 (3.6)	
	Student	0 (0)	25 (7.0)	
House type	Pukka	25 (49.1)	303 (85.5)	< 0.001 (DF = 1)
	Semi-pukka	26 (50.9)	51 (14.4)	
Marital status	Unmarried	0 (0)	25 (7.2)	0.019 (DF = 3)
	Married	50 (98.0)	323 (93.8)	
	Widow	0 (0)	5 (1.4)	
	Separated	1 (1.9)	1 (0.2)	
Socio-economic classification (modified Prasad classification)	I	0 (0)	0 (0)	< 0.001 (DF = 4)
	II	25 (49.0)	51 (14.4)	
	III	10 (19.6)	76 (21.4)	
	IV	16 (31.3)	152 (42.9)	
	V	0 (0)	75 (21.1)	

Table 2. Statistical Association between Socio-Demographic Profile and Household Preparedness (N=405)

Variable	Adjusted OR	95 % CI	P Value (Multivariate Logistic Regression)
Age	1.032	1.018 - 1.047	< 0.001
Gender	0.946	0.618 - 1.445	0.796
Level of education	1.245	0.778 - 1.994	0.361
Occupation	0.856	0.751 - 0.976	0.020
House type	1.032	1.016 - 1.048	< 0.001
Marital status	8.230	0.910 - 70.417	0.061
Socio-economic class	0.261	0.194 - 0.350	< 0.001

Table 3. Factors Associated with Perceptions of Participants Regarding Their Perceived Susceptibility to Disaster-Multivariate Logistic Regression Analysis (N = 405)

OR: Odds Ratio, CI: Confidence Interval

Variable	Adjusted OR	95 % CI	P Value (Multivariate Logistic Regression)
Age	0.980	0.958 - 1.001	0.064
Gender	0.795	0.435 - 1.454	0.456
Level of education	0.623	0.390 - 0.994	0.047
Occupation	1.268	1.066 - 1.509	0.007
House type	6.179	3.311 - 11.532	< 0.001
Marital status	0.208	0.028 - 1.561	0.127
Socio-economic class	2.269	1.579 - 2.262	< 0.001

Table 4. Factors Associated with Household Preparedness - Multivariate Logistic Regression Analysis (N=405)

OR: Odds Ratio, CI: Confidence Interval

Variable	Perceived Susceptibility to Disaster-Yes (N = 151)			Good Household Level Preparedness for Disaster (N = 51)		
	Adjusted OR	95 % CI	P value (Multivariate Logistic Regression)	Adjusted OR	95 % CI	P Value (Multivariate Logistic Regression)
Number of children < 18 years in family	2.29	1.703 - 3.079	< 0.001	0.280	0.175 - 0.447	< 0.001
Number of geriatric members (> 60 years) in family	0.109	0.63 - 0.190	< 0.001	2.080	1.091 - 3.966	0.026
Total number of family members	1.066	0.947 - 1.200	0.292	1.038	0.877 - 1.228	0.667

Table 5. Factors Related to Family Composition for Perceived Susceptibility and Household Preparedness among the Respondents - Multivariate Logistic Regression Analysis

OR: Odds Ratio, CI: Confidence Interval

DISCUSSION

In the present study, the proportions of male and female respondents were found to be 65.4 % and 34.6 % respectively which was similar to the study conducted by Tomio J and co-workers where the proportion of male was 71 % in a research done in Japan.¹⁹ However, much of the previous similar research have shown almost equal or higher female proportions in various parts of the world, which includes studies done in Hong Kong (52.8 % females), Mexican Americans (52 % females) and two studies in China (56 % female and 52.8 %).²⁰⁻²² The higher male proportions might be due to predominance of the male counterpart in the Indian societies. In the present study, the majority of the adult respondents had an education level of secondary

school (43.7 %, n = 177), which was comparable to the studies done by Tam G. et al. (50.7 %) and Chan E Y (55.7 %).¹⁸

The level of "good" household preparedness for any public health emergency was found to be quite low of 12.59 % in the present study. The research done in the recently study show good household preparedness among about 59.2 % (Hong Kong), 57 % (Mexican Americans) and 90.8 % (China) of the respondents.^{18,20} The very low percentage of preparedness reflects their lack of knowledge as well as attitude as far as household preparedness is concerned. The proportions of possessing basic medications (75 %), non-perishable food (56 %), water storage facility (56 %), rescue devices (44 %) and long-term medications (19 %) formed good levels. On the other hands, none of the households had first aid and fire-extinguisher among all the respondents.

The possession of adequate amount of food and water have found to be different in different parts of the world, ranges from as low as 8 % in Canada, 27 % in Japan, 57 % in China and 80 % in some parts of the USA from various studies.^{19,23,24} Similar high possession of basic medications is also found in many previous studies. In the present research, the best perceived source of information for public health emergency management were print and television, which was similar to the studies done in the USA, Australia, Hong Kong.^{18,25,26} The household preparedness for possible disaster/public health emergency had a significant statistical association with level of education, type of occupation, type of house, and socio-economic class among the respondents, which was similar to previous studies.^{19,27} However, compared to many previous studies.²⁷

However, there was no significant association of household preparation with gender in the present study which might be due to sample size variation or the higher male proportions in the present study. Role of the women had been established in few studies where there was a significant association of female gender and household preparedness.²⁸

CONCLUSIONS

Most of the respondent family members considered only natural disasters as "public health emergency". The level of household preparedness has been substantially low compared to the research done in other parts of the globe. Socio-demographical characteristics such as level of education, occupation, socio-economic and type of house had a significant statistical association with both perceived susceptibility and household preparedness for public health emergencies. Print media and television were the most favoured source for acquiring knowledge regarding public health emergencies/disasters. Advocacy for general public is needed to raise the levels of awareness and preparedness for public health emergency situations by various stakeholders including, public health experts, local authorities, fire-stations, and police.

Limitations of the Study

The study had included only a proportion of selected households. The views of the respondents could be subjective.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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