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## **Surat 2006 Floods: A Citizens' Report**

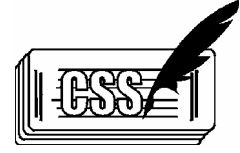
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October 2006

Online at <https://mpra.ub.uni-muenchen.de/1826/>

MPRA Paper No. 1826, posted 19 Feb 2007 UTC



# Surat 2006 Floods: A Citizens' Report



A collaborative study by

**Centre for Social Studies (CSS) Surat**  
and  
**Department of Human Resource Development (DHRD)**

Veer Narmad South Gujarat University, Surat

**OCTOBER 2006**

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# Acknowledgements

## **We thank**

- The students of Master of Human Resource Development (MHRD) and Master of Labour Welfare (MLW) courses of the Department of Human Resource Development (DHRD), Veer Narmad South Gujarat University, Surat for conducting the field work and undertaking the task of data entry.
- The faculty of the Centre for Social Studies (CSS) for useful comments on the questionnaire and facilitating the study.
- Those who participated in the post-survey workshop and encouraged the students for conducting the field work within a short span.
- The respondents for their patience and co-operation while replying to our queries at a time when their lives were in a mess.

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# 1. INTRODUCTION

While events like floods, earthquakes, cyclones, *tsunami* etc. are generally identified as natural events, their impact on human society make them *inclusive* with people and their built environments. Capacity of human systems to deal with such events depends upon a variety of factors that include, the nature of public institutions, ideological positions, quality of human resources and available technology within specific social systems at a given point in time. In addition, geomorphological characteristics of areas affected by such events add to variations in coping abilities of people across areas. However, in spite of a similar magnitude even within a small area, differentials in impact of a hazardous phenomenon also vary across groups by their locations in terms of access and negotiable entitlements in a society. Therefore, an understanding of the causes and impact of such disasters calls for analyzing these through their placement within different socio-political systems and the manner they get articulated through the limits of a set of corresponding mechanics within such systems in terms of a temporal and spatial perspective. And within this context, such disasters become ‘natural’ as well as ‘human’ simultaneously. The framework of understanding an event like the recent floods in Surat too, thus needs to be ‘inclusive’, for seeing it only as an event caused and aggravated by either a *natural* or a *human* intervention would be to shy away from emphasizing upon and employing a holistic framework to its analysis.

While the above perspective indeed can be useful towards understanding the causes and impact of the Surat floods on the city and its region, it must be said that the present report does not employ such a framework. This has mainly been due to an urgency on our part to examine situations during and in the immediate aftermath of the floods quickly, and based on its results taking up a larger and more detailed work later. Hence, we decided to tie down the present study around some key issues related to people’s perceptions and feelings about the August’ 2006 floods during and just after the water receded.

It may not be out of place to mention here that the city of Surat is located at a point where the river Tapi meets the Arabian Sea and it has been a flood prone area since centuries. The city has earlier witnessed major floods of varying intensity in 1782, 1835, 1968, 1994, 1998, 2002 and the recent flood of 2006.<sup>5</sup> Significantly, all these floods, except for the one that occurred in 1782 have engulfed the city and its region during the months of July to September – a period when the rains lash the south Gujarat and the upstream regions through which the Tapi meanders its way through to meet the sea near Magdalla, Dumas and the Hazira belt.

While in the past floods have affected the city in different manners across time, the floods that hit people and its booming economy recently, stands out especially because of the

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<sup>5</sup> Desai, Mahesh. D., “*Scheme for Control of Floods in Tapi – A Critical Evaluation*”, (mimeographed paper), undated.

magnitude of its impact all over. With a population of a little over three million, nearly 90 per cent of the entire city had water that entered and stayed at different levels. Indeed, out of the seven Municipal zones, six had flood water standing for days. In addition, nearly the entire area that surrounds the city and was under the jurisdiction of Surat Urban Development Authority (SUDA) also remained affected as intensely as some of the worst affected areas in the city. Notably, the water level reached close to 18 feet in many of the low lying areas with shops, establishments and shelters on the floodplain and its vicinity along both banks of the Tapi witnessing its devastating impact. While any major epidemic was averted in the post flood months, the city did witness a rise in illnesses like *chikungunya* as well as *leptospirosis* that was hitherto concentrated more in the rural areas. All these have together contributed to the crippling of the economy as well as people's coping abilities for long.

In wake of this disastrous flood, the Department of Human Resource Development (DHRD) of the Veer Narmad South Gujarat University (VNSGU), and the Centre for Social Studies (CSS) jointly carried out this brief but quick inquiry. The major objectives of the study were, (i) to explore the flood time position of citizens in Surat city and to check aspects associated with flood warning system of the Surat Municipal Corporation (SMC) and. (ii) to understand the post-flood situation and ascertain issues like losses incurred by households and businesses, the post-flood health related problems in the city and to assess the extent of help received from the government.

Data were collected from six SMC Zones of Surat and its outskirts through a field survey. The report is divided into four broad sections. While section one introduces the study and discusses the methods adopted, the second section deals with situations that people were compelled to face during the floods. The section also presents a broad socio-economic profile of the respondents. The third section deals with the situation after water receded and in the concluding section a summary and some pointers towards mitigating floods and their effects in the future are presented.

## **1.1 Method Adopted in the Study**

At the very outset, it must be mentioned that the study has not employed statistically representative methods for data collection but has yet tried to cover people from different cross sections and locations within the city to be able to enhance its generalizability.

Table 1 presents details of sampling. The sample size of this study is 750 households, selected randomly from six different zones in Surat city and one area in its outskirts. The city is divided into seven different municipal zones, of which we selected six flood-affected zones. One zone, namely the south zone, which comprises the areas of Udhana, Pandesara etc., was excluded from the study as it was not directly affected by the flood. In addition, to learn as to what was the situation in the surrounding areas of Surat, we selected three villages, viz., Pal, Bhatha and Icchapor situated in the outskirts of the city. Selection of areas

from each of the zones was based on the intensity of floods. Using this method, a total of 14 pockets from 6 municipal zones and 1 outskirts area were selected. From each area it was decided to interview 50 households and this led to our total sample size to be 750 households (i.e.  $15 \times 50 = 750$ )

To conduct the field survey, we selected 27 University students undertaking courses in Masters of Human Resource Development (MHRD) and Masters of Labor Welfare (MLW) from the DHRD, VNSGU. They were given a day's training at the CSS on how to fill up questionnaires and negotiate situations in the field.

**Table 1: Sample Drawn from the Zonal and Area Levels**

<b>Zones in the city and its outskirts</b>	<b>Number of pockets picked from each zone</b>	<b>Total sample from each pocket</b>	<b>Total sample from each zone</b>
Central	4	50	200
Southwest	2	50	100
North	3	50	150
West	2	50	100
Southeast	1	50	50
East	2	50	100
Outskirt	1	50	50
<b>Total Area/Sample</b>	<b>15</b>		<b>750</b>

Divided into three different modules viz. (a) SocioEconomic Status (SES) of the households; (b) the flood module and (c) the post flood module, the interview schedule contained a total of 29 questions. All questions were close-ended, designed for generating a suitable dataset for quick analysis through the use of Statistical Package for Social Sciences (SPSS). The analysis has been done by using elementary statistical techniques like frequency distribution, cross tables and pie and bar charts to get meaningful picture of the flood affected citizens of Surat.



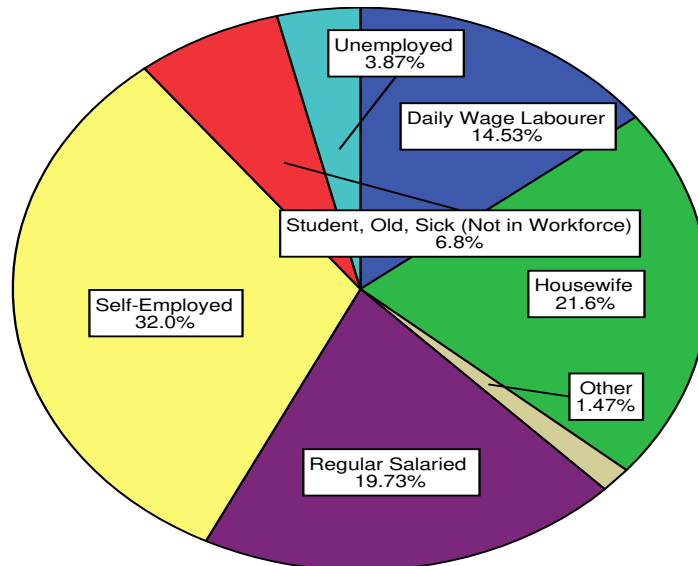
## 2. PROFILE OF THE SURVEYED HOUSEHOLDS AND THE COPING MECHANISMS USED DURING FLOODS

The first module of the schedule was designed to gauge the socio-economic background of respondents. It gives an idea about types of people affected by the flood. Results from this module are presented below.

### 2.1 Socio-Economic Profile of the Households

A gender wise distribution of the respondents indicates that out of a total of 750 respondents, 65 per cent are males and 35 per cent females. Occupational distribution shows that 95 per cent of the interviewed females are housewives, 32 per cent of all respondents are self employed, 14.5 per cent are daily wage labourers, 19.7 per cent have regular salaried jobs, 3.9 per cent are unemployed and 6.8 per cent are either students, old or sick. Figure 1 presents data related to occupation distribution. Highest proportion of self-employed (46 per cent) has been found in the east zone which comprises of slum areas like Dalit Vasahat, Krushnanagar and Bombay Colony.

**Figure 1: Distribution of Surveyed Households by Occupation Types**



About 48 per cent of the surveyed households resides in row houses or bungalows, 36 per cent lives in slums and 16 per cent in apartments or flat type accommodation. As expected, the disaggregated analysis shows the highest proportion of households living in slums and in low-income areas of the east zone (Table 2)

**Table 2: Share of Households Interviewed by kinds of Dwellings Across Different Zones of the SMC**

Zone	Type of the House			Total
	Slum	Flat/Apartment	Pacca house on ground	
Central	50 (25)	66 (33)	84 (42)	200 (100)
South-West	35 (35)	8 (8)	57 (57)	100 (100)
North	51 (34)	6 (4)	93 (62)	150 (100)
West	29 (29)	20 (20)	51 (51)	100 (100)
South-East	21 (42)	8 (16)	21 (42)	50 (100)
East	70 (70)	5 (5)	25 (25)	100 (100)
City Outskirts	13 (26)	10 (20)	27 (54)	50 (100)
<b>Total</b>	269 (35.9)	123 (16.4)	358 (47.7)	750 (100)

**Note:** Figures in parenthesis denote percentage.

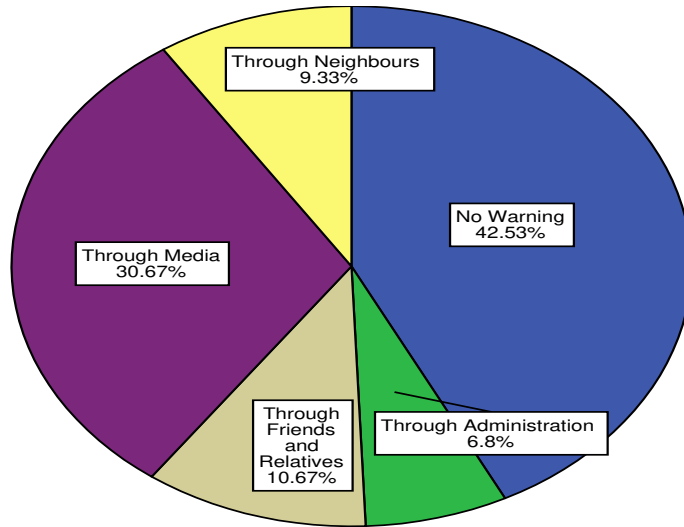
The average family size among the surveyed households is around six members per household and is more or less same in all zones. The data also indicate that, on an average there are about three members per room in the dwelling. This figure is about five in areas like MithiKhadi in the South East Zone. On an average, households have an average of about three rooms each indicating a higher per capita space availability in Surat compared to many other similar size urban centers in the country.

## 2.2 Coping Mechanisms Used During Floods

This module of the interview schedule was used for gathering data on situation of people during the flood in Surat city and explore coping mechanisms adopted by them during these days. The following narrative lists the major findings of this module.

An important finding of this module is about flood warning. It is well known that if people can be warned in advance about a disaster, they can prepare themselves to face the same to the extent possible. Timely warning system helps in minimizing damages caused by a coming disaster. And when government has assumed the role of managing a large number of macro systems, including dams and weather forecasting, then it becomes its responsibility to warn people of any such impending disaster. Our enquiry related to the flood warning in Surat city suggests that hardly any *official* warning system worked when the flood struck the city. Figure 2 presents the relevant findings.

**Figure 2: Status of Warning in Surat During the Flood.**



Evidently, about 43 per cent of people did not receive any warning from the Surat Municipal Corporation (SMC) or any other state agency. They learnt about the approaching floods only when they saw the water rising. This proportion was highest (64 per cent) in areas like citylight, umra, bhatar and piplod, all of which are considered Surat's posh or upcoming localities. Only around 7 per cent of respondents said that they had received some warning from the administration through vans or Short Service Messages (SMS) on mobile phones. The study also suggests that during a crisis when information is needed, how useful the media could be. As many as 30.7 per cent of respondents said that they first learnt about the floods through the media<sup>6</sup>. Friends, relatives and neighbors were of big help in warning people. A significant share making up for 20 per cent of respondents said that they got information about the flood either through their friends, relatives or neighbors.

Important here however is that the local government failed in giving any kind of useful and substantial warning to people in the city. Many of those interviewed stated that they did not get enough time to respond and deal with the coming flood. They could not do much to save their belongings. A large number of them were caught by complete surprise. It is clear from the data that the warning system on floods is perhaps not in place and if there exists anything at all, it certainly is inadequate. This becomes more pertinent as Surat has, in its recent past, experienced recurrence of flood at regular intervals. This shows the inability of the local administration to have learnt lessons from the past. They do not seem to have equipped themselves against such disasters. During last few decades, the state has increasingly been

<sup>6</sup> Includes television, radio etc.

facing disasters like cyclones, earthquakes and floods. The state government has also created a Gujarat State Disaster Management Authority (GSDMA) which did not appear very functional especially during Surat floods. If the government does not draw any lessons out of the 2006 floods, it may then aid to the emergence of bigger calamities in future. This is particularly so as a host of micro as well as macro level environmental changes are taking place concurrently at a rather fast pace.

When there was no warning provided by the local administration, it is obvious that people were caught by surprise with some being stranded and others entrapped at different locations. This must have created intense anxiety amongst the family members of those who could not contact their near and dear ones for long. We tried to capture this phenomenon too. About 13 per cent of the respondents were away from their families during the flood. This figure was as high as 26 per cent in case of pockets situated in the outskirts of the city. Out of those who were not at home during the floods, 66 per cent could get in touch with their families through one or the other means, but the rest (34 per cent) could not establish any communication or remain in touch with their family members. This resulted in a high degree of anxiety amongst family members of those who were stranded in different areas in the city.

Data on the level of flood water reaching at the respondent's homes and areas surrounding their apartments as well as number of days for which water stayed at their homes show the gravity of the situation. On an average there was 8 feet of water in respondents' houses and their surroundings. The maximum level of water reported in our study was 20 feet in the north zone in areas like Ved, Amroli and Katargam. Water stayed for as long as 4 days in most areas except in the South East where the intensity was less.

To save their lives, about 40 percent of the respondents were compelled to take shelter at elevated spaces outside their homes. Since the water level was highest in the North Zone, a larger proportion of people (60 per cent) had to move to higher spaces in this part of the city. When trapped at homes for these many days, some respondents had no other way but to use flood water for different purposes. A total of about 30 per cent of the respondents used flood water for responding to daily chores like cleaning utensils and clothes, flushing etc. Around 3.3 per cent of the respondents used the flood water for drinking as no other alternative was available. This figure was as high as 10 per cent in villages like Pal, Bhatha and Icchapor situated in the outskirts of the city.

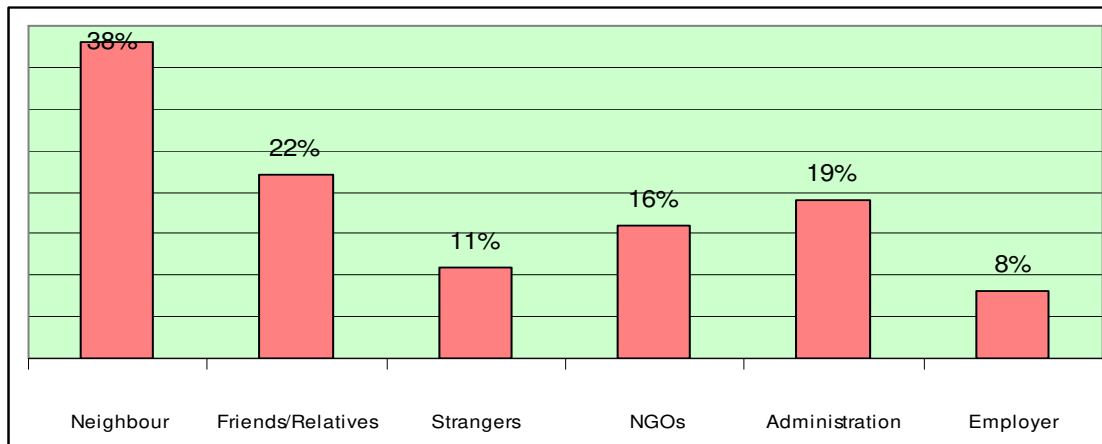
One promising fact that emerges from the data is that majority of the respondents had access to nearly all the survival tools like shelter, drinking water, food, cooking fuel etc. In specific terms, 84.7 per cent had access to elevated places, 69.9 per cent had access to food stock, 69.7 per cent had access to drinking water, and 55.5 per cent had access to gas/cooking fuel. This shows that a section of people in Surat city now remains better equipped to deal with flood like situations and are, to a significant extent, prepared to face such contingencies. It suggests that people have learnt from past floods and think about its likely recurrence and

accordingly have shaped their behavior and developed coping mechanisms.

As usual there exists a lot of controversy regarding the loss of human life during the flood<sup>7</sup> in the city. In our study we tried to probe the issue of flood induced mortality<sup>8</sup>. The data suggest that only 11.6 per cent of respondents reported that there was some loss of human life in their area while the majority (80.3 per cent) reported no loss of human life in their areas. The higher proportion (33.3 per cent) of such incidents has been reported from the areas in the outskirts comprising Pal, Bhatha and Icchapor villages. Reported mortality figures show that the data on loss of human lives provided by the government may by and large be correct and that issue might have been exaggerated during and soon after the water receded.

As stated earlier, during flood people were trapped in their homes for almost a week's time. This must have made their positions difficult. During such times people need different types of relief. Those who did not have access to food and drinking water were in need of these immediately for survival. With the water level being high, people could not go out on their own and seek help. It is important that on such occasions people receive appropriate relief at the right time. We tried to ascertain as to from whom and where did they receive help while being trapped in flood water. Figure 3 presents help received by citizens from various channels and agencies during floods.

**Figure 3: Relief Received from Various Channels and Agencies During floods<sup>9</sup>**



<sup>7</sup> Current official figures have kept the death toll at 155. However, many claim that thousands of lives were lost.

<sup>8</sup> In spite of the method being not very systematic to probe into this issue, we feel that the results are sufficiently indicative.

<sup>9</sup> Percentage figures do not add up to 100 as these reflect multiple responses.

The data suggest that it was neighbors who helped the most, for as much as 38 per cent of the respondents stated that the maximum help came from the neighbors during the flood. 22 per cent received relief from their friends and relatives and 11 per cent received help from strangers. NGOs also came forward to help around 15 per cent of respondents. This shows that NGOs had a restricted outreach compared to neighbours and kinship networks. An important indication about help received from the administration is that only 19 per cent of respondent received relief from such quarters. The figure related to help received from the administration was highest at 32 per cent in the outskirts in the villages of Pal, Bhata and Icchapor. This suggests the extent of inability of the local government in dealing with relief measures during the floods in the city.

Another indicator of hardship faced by people during the flood is indicated by data on number of days that people had to remain without water supply, power and telecom facility. On an average, people had to remain without these services for about seven days across the city. However, areas situated in the outskirts of the city had to wait for longer before these services were restored.

### 3. THE AFTERMATH OF FLOODS

Although the days and nights spent during floods seemed like never ending for the citizens of Surat, the aftermath was also quite painful in terms of cleaning mud and the muck, facing economic losses as well as illnesses.

The floods resulted into huge financial losses to the households and business establishments as well as to those running a wide range of petty enterprises. We tried to estimate the total loss to households and the businesses due to this flood. The data gathered indicate that on an average a household had a financial loss of rupees 29,757. The corresponding loss in business was rupees 35,628 across a range of establishments that differed in terms of size and capital invested. Table 3 presents a zone wise picture of losses incurred as reported by the respondents.

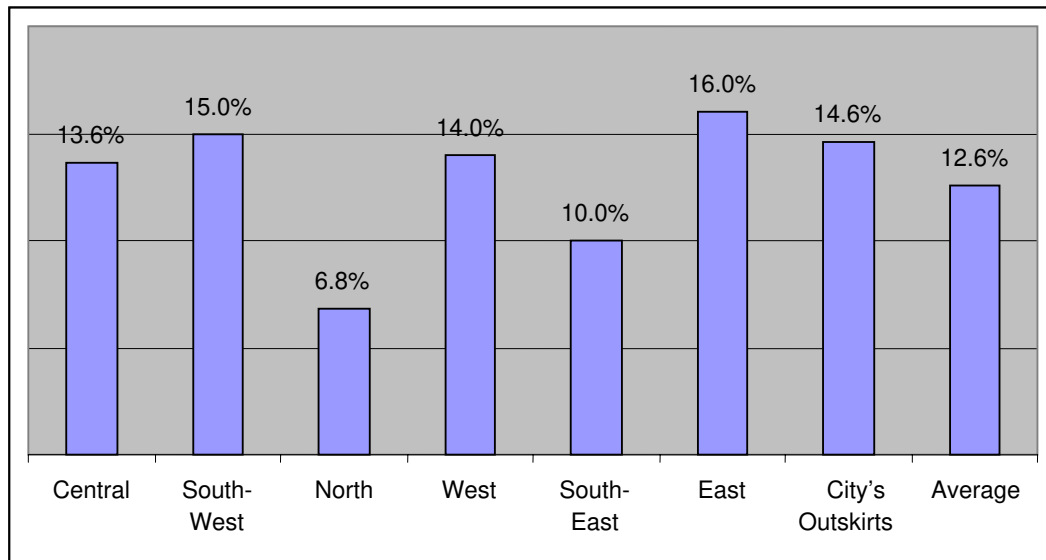
**Table 3: Financial Losses Faced by Respondents**

Zone	Average Financial Loss (in rupees)		
	Home	Businesses	Total
Central	32,515	30,648	63,163
South-West	15,681	57,016	72,698
North	23,768	10,052	33,821
West	79,364	1,06,233	1,85,598
South-East	5138	4695	9833
East	13,086	20,662	33,749
City's outskirts	19,489	23,231	42,721
<b>Average</b>	<b>29,757</b>	<b>35,628</b>	<b>65,385</b>

It can be seen from the table that areas in the West Zone including Rander, Jahangirpura, Mora Bhagal, Adajan and Palanpur Patia suffered the highest amount of loss in terms of household as well as business enterprises. On the face of it, though the loss incurred in areas like MithiKhadi (South-East Zone) seems little, it should be remembered that these are slum areas and the reported loss is significant in terms of its ratio to their household earnings. Moreover, these data only indicate direct economic loss. Indirect losses (e.g. wage lost) must have also placed much burden on such low-income groups in the city. In terms of business losses, the West Zone is followed by South-West Zone where posh areas of the city like Umra, Piplod, Citilight and Bhatar are located.

When flood can create such a huge damage, the only way to protect at least to some extent, is through insurance. In this context, we checked as to whether households and enterprises had any insurance against what they lost. The results of this exercise are revealing as much as shocking. Out of the total respondents, only 12.5 per cent had any insurance against their estimated losses. Figure 4 presents the disaggregated zone wise picture highlighting this status.

**Figure 4: Zone wise Coverage of Insurance Against Financial Losses**



It can be seen from figure 4 that North Zone (Ved, Amroli etc.) which carried the highest level of water has the lowest frequency of insurance. The highest figure is also only 16 per cent in the east zone<sup>10</sup>. This shows that the insurance market has not penetrated much into the city and that a large number of enterprises are in the service sector and of an 'informal' variety. Not having an insurance policy makes the position of a household and businesses very serious. They can not recover the huge cost that they have incurred from any other means. Many of the small entrepreneurs and petty shop keepers are going to find it difficult while trying to resurrect their businesses and rebuild their premises etc. Many households have lost nearly all investments of their lifetime and have to start their life from scratch. Flood has really dealt a serious blow to the people in Surat.

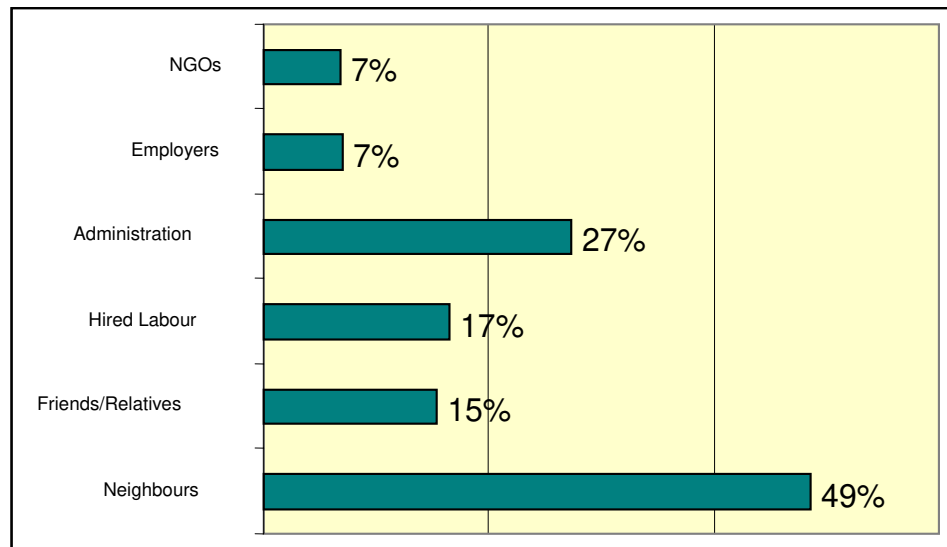
The above estimate on economic losses just represents only the direct economic cost of the flood. The flood also resulted into indirect economic losses in form of man days (of work) lost. The flood had made people trapped inside their houses for almost one week and even after the flood waters receded, they could not go to their work places. This resulted in loss of production where they were working, and thus accumulating loss of profit and earnings for the economy of Surat city. Our study indicates that on an average, respondents could not go to their work for 14 days. This figure was highest at 17 days in case of respondents from the North Zone where flood water stayed longer. If we add this indirect cost into the direct cost of flood, then the losses would go up substantially. The economy in the city will surely take considerable time to recover from such big economic losses.

<sup>10</sup> This may be because in areas within the East Zone, comprising of the sampled slums like Dalit Vasahat has the presence of an NGO (SEWA) which markets insurance policy to its members.



In the post flood situation too, there were neighbors, friends and relatives who helped the respondents in cleaning the surroundings. As can be seen from figure 5, as much as 49 per cent of the respondents reported about their neighbors having helped them in cleaning the surroundings. 15 per cent said that they received such help from their friends and relatives.

**Figure 5: Help Received from Various Quarters for Cleaning Homes and Surroundings After Floods**



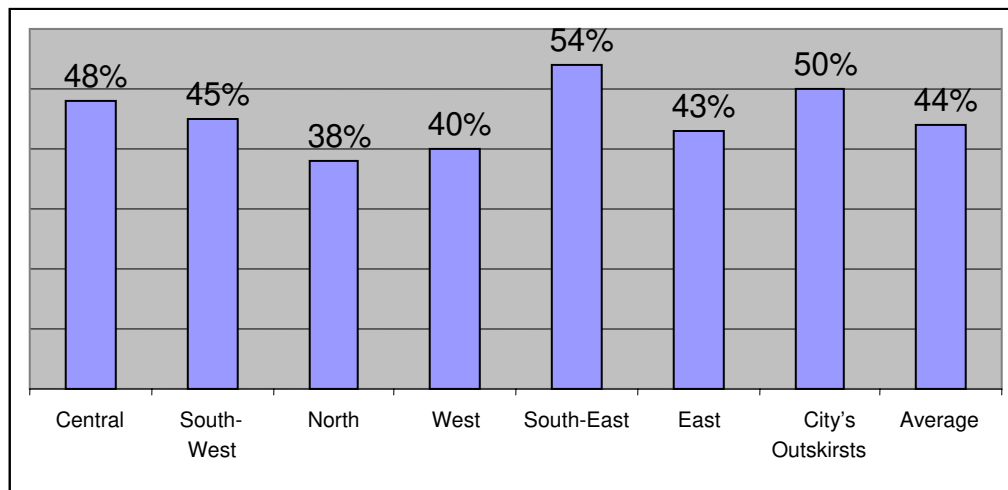
Around 17 per cent of the respondents chose to hire labor for works related to cleaning. This shows that while inflicting economic losses on some, the flood also provided a temporary disaster induced economic opportunity for others<sup>11</sup>. The proportion of respondents using hired labour was high at 32 per cent in the upper middle class areas like Adajan. Help from the administration towards this was reported only by 27.3 per cent of respondents. The government does not seem to have succeeded much on this count too. However, more than half of the low-income households from the MithiKhadi area reported about the administration and the government taking up cleaning of their surroundings. This also suggests that people belonging to the middle and upper middle class localities place lesser degree of trust on the government and administrative machinery on such jobs being done timely and effectively.

During the post flood period, there was a major threat perception of some kind of epidemic gripping the city. It was feared that Surat may once again become a victim of the deadly Plague. In order to check as to whether people became sick after the flood, we asked them about the incidence of sickness in their families after flood. Figure 6 presents a zone wise

<sup>11</sup> Needless to say that the economic losses have been far greater than the economic opportunities generated by flood. A cost benefit analysis can indicate that cost weighs heavily here.

picture of post-flood morbidity.

**Figure 6: Post Flood Morbidity in Different Zones of Surat City**



On an average, around 44 per cent of the respondents said that someone or the other in their houses suffered from sickness after flood. This figure was highest (54 per cent) in the South East zone that houses most of the low-income families. This was followed by surrounding villages like Pal, Bhatha and Ichapor. Although we have no concrete evidence to deduct that sickness after the flood were caused by it but it is likely that the changed environment and bacterial ingress may have aggravated and added to the frequency of episodes of the otherwise prevalent illnesses at the city level. It may also have invited illnesses to the city which were hither to common features particularly in rural areas.

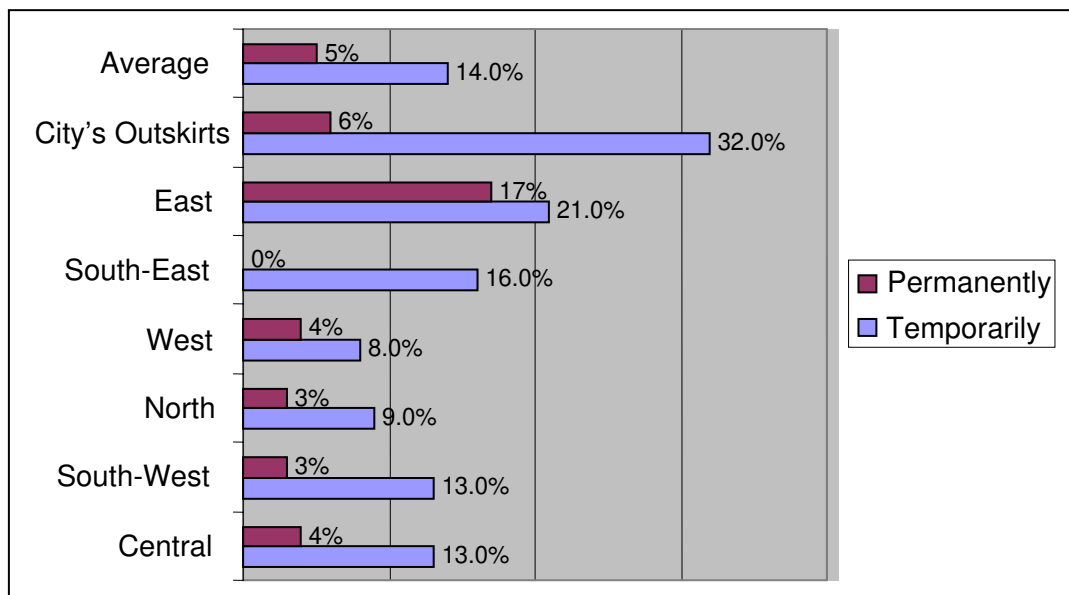
Normally after such disasters there is a sudden rise in psychological disturbances. In order to capture this phenomenon, we examined extent of sleep deprivation among members of the respondents' households. Our results show that in 21.5 per cent of the houses, at least one family member complained about problems related to sleep deprivation. This figure was as high as 32 per cent in the posh areas of Citylight and Bhatar. To prove that sleep deprivation may have been caused by the floods, one needs to compare such data with the extent of sleep deprivation (among members in the same household) prior to the flood. Unfortunately, the scope of this study does not permit such an analysis and hence we are not in a position to establish that the flood was the reason behind sleep deprivation. However, by way of conjecture, it can be said that the memory of flood was one of the reasons behind psychological disturbances faced by some citizens soon after the flood.

During post flood period, the government did much work in providing medical help to the people in Surat city. This is indicated in our study where around 78 per cent of respondents said that they received medical help especially related to preventive aspects of health from the government. As was the case with help from administration in cleaning the surroundings, here too the figure was highest (86 per cent) in case of the South East Zone. A possible explanation towards this may be that after flood, the local administration could gather their

strength and manpower which might not have been possible during the flood time.

Looking at the media reports indicating that people were leaving Surat after floods, we tried to understand the phenomenon by asking them the question, “Have you considered leaving Surat?” About 5.1 per cent of respondents said that they indeed were considering leaving Surat permanently and 14 per cent said that they considered leaving the city temporarily<sup>12</sup>. Significantly however, the majority (81 per cent) of the respondents are not inclined to leave Surat. Many expressed that they still had love and affection for the city. But the thing that needs to be emphasized is that 5.1 per cent of the respondents did consider leaving Surat city permanently - an ominous sign for the growth of Surat. Figure 7 presents the relevant zone wise picture.

**Figure 7: Proportion of Surat’s Citizens Considering Leaving Surat After Floods**



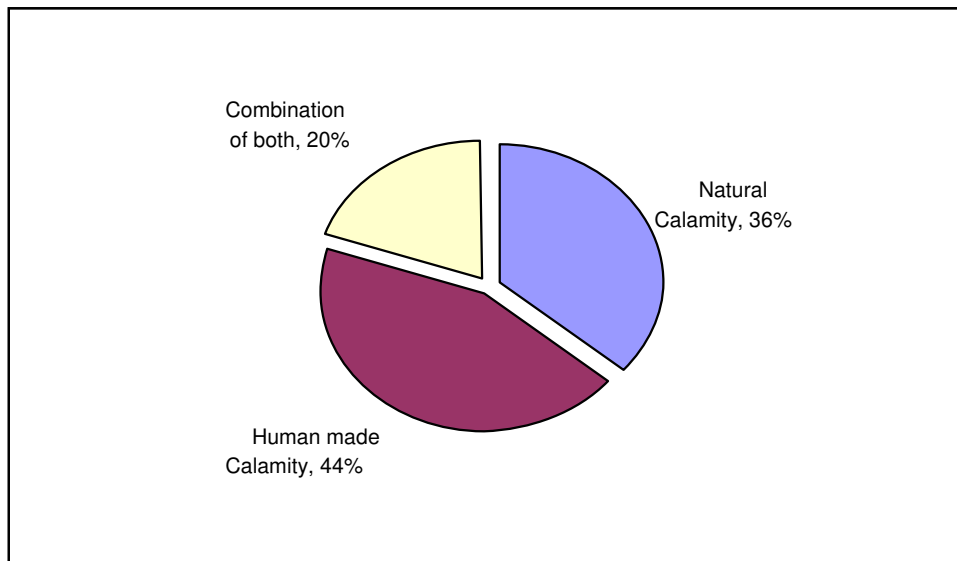
It can be seen from the data that the highest proportion of people who consider leaving Surat permanently are from the East Zone and mainly from the slums of Dalit Vasahat, Krushnanahar and Bombay Colony. It is likely that most of these households are migrants working in various industries in the city and may have been hit by the impact of flood on their job prospects.

We also inquired on the perceptions of people on the primary cause of this flood i.e. whether they thought that this flood was a natural calamity, a human made disaster or a combination of both. The results of this have implications for the local body as well as the state government. If people believe that the flood was caused due to the negligence of the government machinery, it may have political implications. The results are interesting as can

<sup>12</sup> Of this 14 per cent, some respondents had already left Surat for some time and had returned by the time of interview.

be seen from figure 8.

**Figure 8: Citizens' Perceptions on Reasons Behind Floods**



As can be seen from the figure, 36 per cent of the respondents believed that the present floods was a natural disaster. Interestingly, 44 per cent of them believed that this was a human made disaster and 21 per cent responded that it was a mix of both. Evidently, a much higher proportion believed that the recent floods was a human made disaster. Many respondents who said that this flood was a natural disaster believed that it was the result of 'gods becoming angry, result of more sins on the earth' etc. To some extent, this indicates how people interpret the causes of disasters and their differential impact on them.

## 4. CONCLUSION

In spite of the study being carried out within a short span of time and limited scope, it does provide some important insights. The data clearly suggest that there is a lack of disaster preparedness on part of the administration, as 93 per cent of respondents reported that there was no warning or alert that came from the administration before the water gushed in. This figure was slightly lower in case of areas like Adajan in the West Zone and it seems that only that area was on their priority list to the extent that warning for the flood was concerned. City administration may have ignored other areas and proved disastrous. This is an important issue and the administration needs to work on designing effective disaster warning systems throughout the city. We suggest that each SMC Zone should blow siren when danger is impending and use local media for dissemination of warning messages.

On the other hand, citizens of Surat have learnt from the past floods and have developed coping mechanisms in form of storing food grains, ration, drinking water, etc. as a majority of the respondents reported access to these survival strategies. Nonetheless, about 10 per cent of the respondents from the outskirts had to use flood water for drinking. Only about 12 per cent of the respondents reported loss of human lives in their areas. These data indicate that media might have exaggerated the figures related to death toll immediately after the waters receded.

The role of administration was minimal even in terms of relief when water levels were high as well as during the times of cleaning the surroundings after floods. Most people have reported relying on their neighbours and kinship networks for help. On an average, the reported loss per household has been to the tune of Rs. 30,000 and for the business establishments around Rs.36,000. More importantly, only about 13 per cent had any insurance policy to counter these losses. Looking to this situation, there is need to promote awareness about insurance mechanisms that can protect citizens against financial hardships at times of such crisis led by disasters.

Almost half of the surveyed households reported some sickness after the floods and some also reported about psychological problems like sleep deprivation due to fear and anxiety. The government and administrative set-up has however done well in terms of health as about 78 per cent reported to have received medical aid from the government. It should also be noted that perhaps due to such intensified measures, any major epidemic has been averted after floods.

Although the proportion is not very significant, indeed some people in the city have been considering leaving Surat either permanently or temporarily after floods. This can create an adverse impact on the growth and economy of the city. People are also considering moving their homes and offices to safer areas where the water levels were low during floods. This is likely to give a boost to the speculations in the real estate and the housing market. Last but

not least, while replying to our questions, majority of the people have termed the August 2006 floods as a “human made disaster”. This means that in peoples’ perceptions, this calamity could have been averted or its impact curtailed, had the administration been more responsive to the contingent situation.

What appears from the study is that the state, district as well as municipal administration need to learn some lessons out of this disaster. If the administration fails to reflect and learn then perhaps on a similar occasion next time, the city will have to once again pay a big price for negligence and lop-sided planning. Surat is one of the fastest growing cities in South Asia boosted by industrial investments as well as influx of migrant workers. Its economy gets propelled fast from their contributions. It is possible that if floods become a recurring phenomena and strike the city at intervals of every few years as is happening now, it would have serious impact on the immigrants’ perceptions about Surat. People come to Surat for work and to pursue businesses as they find the investment environment to be friendly. Major industries are located in Surat due to many such favourable factors. Such disasters may result in loss of attractions for immigrants and industries eventually retarding the economic growth of city.

# Appendix A

**Table: Surveyed Zones and Areas**

<b>Zones</b>	<b>Areas</b>
Central	Kadarsha Ni Nal, Chowk Bazaar, Navsari Bazaar, and Moti Talkies
South West	Umra, Piplod, City Light, and Bhatar
North	Katargam, Amroli and Ved Road
West	Rander, Jahangirpura, Morabhagal, Adajan anmd Palanpur Patia
South East	Mithi Khadi
East	Dalit Vasahat, Bombay Colony and Krushna Nagar.
City Outskirts	Pal, Bhatha and Ichhapor villages

# Appendix B

## Participating Student's Names

### I : MLW-MHRD Part -I

<b>Name</b>	<b>Name</b>	<b>Name</b>
Babli R. Kaushik	Ashok A. Pamnani	Murtuza S. Malampattiwala
Nainita J. Mistry	Nitu S. Prasad	Ravi D. Solanki
Bhavin J. Patel	Sudhir D. Tiwari	Chirag M. Parmar
Dinesh K. Dhokia	Nisha M. Patel	

### II : MLW-MHRD Part -II

<b>Name</b>	<b>Name</b>	<b>Name</b>
Keta H. Bhatt	Khyati M. Dada	Nilesh R. Baria
Bhavesh J. Shiroya	Hiten B. Dabhi	Rakesh J. Patel
Valerie D. Hood	Ketaki P. Joshi	Sanket S. Patel
Anup R. Singh	Preeti Premchandran	Mayuri C. Sureja
Manthan M. Joshi	Vatsal G. Soni	Yugma P. Rawal
Manish A. Tailor		



# Appendix C

## Sample Interview Schedule

### CSS-VNSGU Study on Surat-2006 Floods

Area: \_\_\_\_\_



Kadarsha ni naal	1	Moti Talkies	4	Katargam	7
Chowk Bazar	2	Umra/Piplod	5	Ved Road	8
Navsari Bazar	3	City light/Bhatar	6	Amroli	9
Mithi Khadi	10	Bombay colony	11	Krushnanagar	12
Rander/Jhanaghirpura/Mora Bhagal	13				
Adajan/Palanpur Patia	14				
Pal/Bhatha/Icchapor	15				

Investigator's name: \_\_\_\_\_



*[Investigator will establish rapport with the respondent by explaining the purpose of the survey and will take his/her consent before proceeding with the questions]*

### Household Module

1. Name of the respondent: \_\_\_\_\_
2. Gender: [Male 1, Female 2]
3. Age
4. Occupation of the respondent
 

Student, Old, Sick (not in workforce)	0
Unemployed	1
Self-employed	2
Daily wage labourer	3
Regular salaried	4
Housewife	5
Other _____ (specify)	6



5. Type of house ┌  
 [Slum 1, Apartment/flat 2, Row house/bungalow etc. 3]
6. Number of rooms in the House ┌
7. Number of Household/family members ┌┌

Flood Module

8. How did you first come to know that water was approaching your area? ┌
- Came to know only when we saw the water 0
- Through friends/relatives 1
- Neighbours 2
- Through media (TV/Radio etc.) 3
- Through administration (van/mobile sms) 4
9. Were all of your household members in touch during floods? ┌
- We all were together 1
- We were apart but in touch 2
- We were apart and not in touch 3
10. Where did you move during floods? ┌
- No where 1
- Elevated pace in the house 2
- Elevated pace in the neighbourhood/relative's/friend's 3
- Public places (schools, offices, relief camps etc.) 4

11. What was the maximum level of water in your home/under your apartment?  
(in feet)

12. For how many days water stayed in your home?

13. Did you use the floods water for any of the following?

- Drinking  1
- Domestic work (clothes/utensils/flushing)  2
- None  3

14. Was there any loss of human life in your area?   
[No 0, Yes 1, Don't know 9]

15. Did anyone suffer injury in your family?   
[No 0, Yes 1]

16. Did you have access to any of these survival tools?  
[No 0, Yes 1]

- |                              |                          |                  |                          |
|------------------------------|--------------------------|------------------|--------------------------|
| Shelter at an elevated space | <input type="checkbox"/> | Food stock       | <input type="checkbox"/> |
| Drinking water               | <input type="checkbox"/> | Gas/cooking fuel | <input type="checkbox"/> |

17. During floods, did you receive relief from  
[No 0, Yes 1]

- |                   |                          |                |                          |
|-------------------|--------------------------|----------------|--------------------------|
| Employer          | <input type="checkbox"/> | NGOs           | <input type="checkbox"/> |
| Friends/Relatives | <input type="checkbox"/> | Strangers      | <input type="checkbox"/> |
| Neighbours        | <input type="checkbox"/> | Administration | <input type="checkbox"/> |

18. For how many days you were without

Food  Water Supply  Power  Phone

19. Has your work place also been affected by floods?

[No 0, Yes 1]

### Post-Flood Module

20. What is the total estimated loss to you (home and business)?

Home:  in words \_\_\_\_\_

Business:  in words \_\_\_\_\_

21. Are you insured against any of this loss?

[No 0, Yes 1]

22. For how many days you didn't go to work?

23. Did you receive help for cleaning the surroundings?

[No 0, Yes 1]

Employer  NGOs

Friends/Relatives  Hired Labour

Neighbours  Administration

24. Has anyone in your family suffered from sickness after floods?

[No 0, Yes 1]

25. Is anyone from your family complaining about sleep deprivation?      ┌  
     [No 0,            Yes 1]
26. Have you received any medical help from the government?      ┌  
     (pesticides, chlorine tablets etc.)  
     [No 0,            Yes 1]
27. Have you considered leaving Surat?      ┌  
     [No 0,            Yes 1]                              0  
     Temporarily for the fear of epidemic    1  
     Permanently                                        2
28. Are you considering moving your home/office to safer area in Surat?      ┌  
     [No 0,            Yes 1]
29. In your opinion the recent flood was      ┌  
     A natural calamity                              1  
     A human made calamity                        2  
     A combination of both                         3

**Remarks of the investigator (if any)**