

A Descriptive Cross-Sectional Survey to Understand the Health Status of People after 2013 Kedarnath Flood in Srinagar, Pauri Garhwal, Uttarakhand

M.K. Parmar¹, Sanam Shanker²

¹Department of Rural Technology, H.N.B.Garhwal Central University, Srinagar Garhwal, India

²Resource Centre for Primary Health Care, Kathmandu, Nepal

Abstract:

Uttarakhand is a disaster prone state. Every year the people residing the river here fears of landslide and flood due to heavy rain. The disaster of June 2013 that occurs through flash flood and heavy rainfall was the massive one. Whole Uttarakhand was affected specially the Rudraprayag, Tehri and some part of Pauri district. Srinagar which is located in the left bank of Alakhnanda river basin was also highly affected by the overflow of water in Alakhnanda River. The main aim of this study is to know the present situation of people post disaster in Srinagar. To assess the health (mental, physical and social) and sanitation of people now. It also measures the satisfaction level of people with the support of government during and after the disaster. The purpose of this study is to assess the health status of community of Srinagar after years of disaster in affected area. It also involve the rapid health assessment and surveillance of people under affected area .It gave an opportunity to investigator to assess the disease burden to disaster affected people in the form of communicable and non communicable disease in long term through analysing the different incident of the people in affected area in the form of economic , social and emotional loss and its impact over health status, investigator suggest the measure of improvement and recommend some guideline to local health authority and govt of Uttarakhand to implement best policy to combat with future disaster .

Keywords- MATLAB 7.8 Simulink, Lab VIEW 8.5, etc.

Introduction

The term disaster is derive from French word *Desastre*, which is combination of words ‘*des*’ meaning bad and ‘*astre*’ meaning star. It refers Bad or Evil star. In ancient times disasters were consider as outcome of some unpleasant star. A disaster may be defined as “an event concentrated in time and space which threatens a society or a relatively self sufficient subdivision of a society with major unwanted consequences as a result of the collapse of precautions

which had till now been culturally accepted as adequate. (Turner, 1976)

The direct impacts of the disasters are death, injuries to human and animal population and destruction of properties. There is destruction of communication, power and water supply and drainage. All the economic activities come to stand still. Livelihood of the poor are badly affected. The psychological trauma of the disasters is very high. In case of major disasters the recovery and resilience of the community takes years.

The flash flood that took place in June 16th and 17th, 2013 in Uttarakhand was unprecedented which causes heavy loss of human lives, infrastructure and property. Thousands of people were dead and more than lakhs were injured and many lose their property. It's been almost 3 years that the flood took place but the effect on health of people is still there both physically and mentally. The upper hills of Uttarakhand mostly valley adjoining Manadakani and Alakhnanda, Ganga river were affected. (Uttarakhand at a glance, DMMC). Heavy rainfall for long period cause sudden increase in the volume of water in Alakhnanda River. Srinagar town low lying areas were submerged in the devastating flood. Like Shakti-Vihar, NIT area and Kedar Colony. These were the areas of Srinagar that were mostly affected by the flood of 2013. Most of the houses were damaged by the flood caused by over flow of the Alakhnanda River. Now, life has been somehow become normal but the people here still couldn't forget that devastated disaster. Though there were no such loss of life is recorded in Srinagar but the material damage of infrastructure and property were seen heavily. The debris of sands and some damaged homes are still not fixed even after the years of the disaster. It creates heavy economic loss. Major population of the region were temporary migrate to other areas.

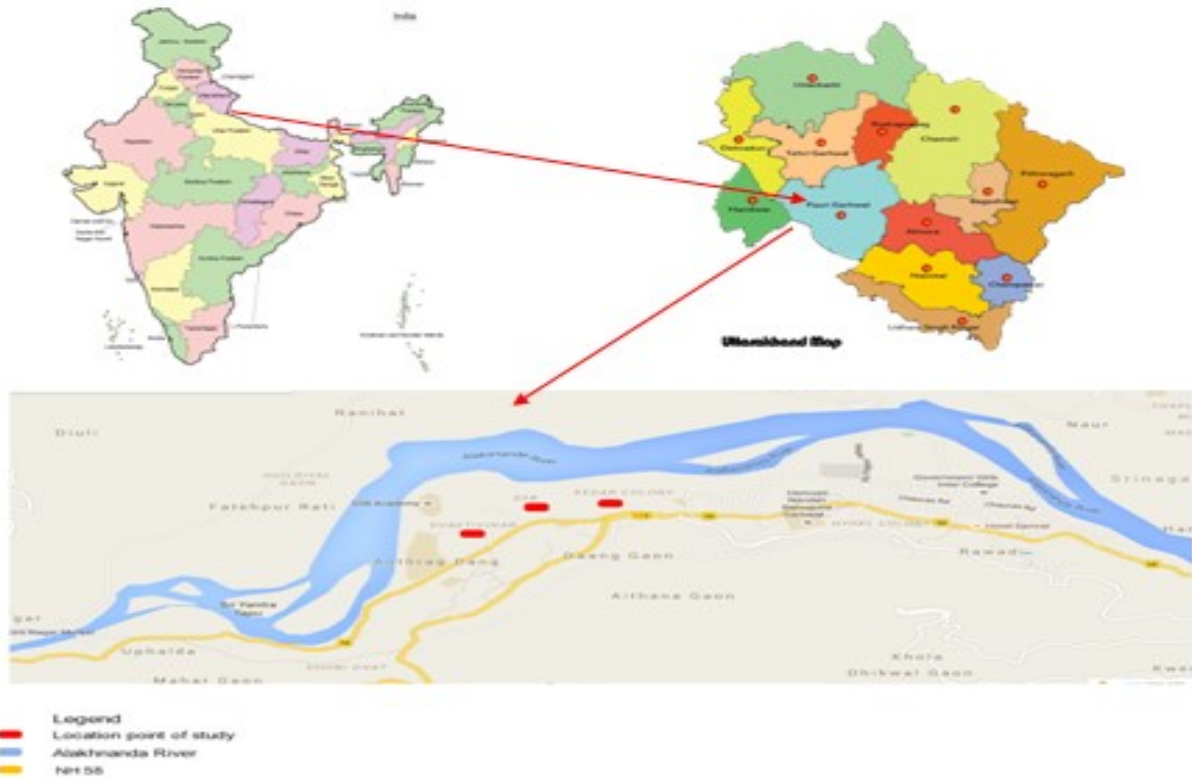
The purpose of this study is to assess the health status of the people post disaster in Srinagar. What are the long term effect on health of the people who has experienced the disaster in 2013? It also involves the rapid health assessment and surveillance of people under affected area .It gave

opportunity to investigator to assess the disease burden in the form of communicable and non communicable disease.

Through analyzing the different incident of the people in affected area in the form of economic, social and emotional loss and its impact over health status measure of improvement and recommendation are also suggested to local authority and government of Uttarakhand.

The Study Area:

Srinagar town is located in lesser Himalayas in Pauri, Garhwal District, Uttarakhand. It is disaster vulnerable located in a wide valley of Alakhnanda river. According the census of India 2011, the population of the town is 20115. Srinagar is a major City of Pauri Garhwal District lies in survey of India toposheet no. 53J/16 and can be approached by Risikesh-Badrinath National Highway (NH-58). Jolly Grant is a nearest airport at a distance of 127 km in Jollygrant. While the nearest rail head is 106km away at Risikesh. During the devastated flood most of the habitants close to the river bank were hit particularly hard by the flash flood. Out of which 3 major habitation zone of Srinagar were worst damaged by the flood. So, these mostly affected areas Shakti-Bihar, SSB Area and Kedar Colony together with upper reaches of Alakhnanda river valley are taken up for the present study. These three areas in Srinagar were mostly affected as they are the adjoining habitants of the Alakhnanda River. These areas is located at 1-2 kilometer from each other. This is a cross sectional community based study. The local people experienced heavy floods on June 2013.



Map: 1 Study Area of Present Study

Objectives

In order to identify the current situation, it is proposed to provide the in-depth insights into the people who have suffered from the disaster in Srinagar. In this perspective, major objective is:

1. To examine the situation of health status of disaster affected people.
2. To do the exclusive study on the satisfaction level of people from Government support after disaster.
3. To give an analytical view on health and sanitation situation of the people who are affected from 2013 flood disaster in Srinagar.

Research Design and Methodology

Target Population: As stated before, disaster affected people residing in Srinagar town selected sites.

Location: National Institute of Technology area, Shakti-Vihar and Kedar Colony of Srinagar Garhwal.

Phase 1: Research Design:

The review of literature on disaster management, Disaster of June 2013, and other related issues were done. Published journals, articles, and books were review to finalize the topic. Conceptual framework, statement of the problem, hypothesis, aims and objectives were set before the survey.

Phase 2: Selection of the Study Area

The selection of the areas were finalized on the bases of damage occur during 2013. Three areas of Srinagar Shakti Vihar, NIT Area and Kedar Colony were selected for the study and were most affected located in the left bank of River Alakhnanda. Geographically all of 3 sample sites are

vulnerable to disaster like flood and landslide. In order to fulfill the objectives of the study present research work was focus to concentrate on only those households who were adversely affected by the devastating flood of June 2013.

Phase 3: Pilot Survey and Development of Assessment model

In phase 3 assessment model is developed. Initially, the pilot survey was done and interview of important person of the area were done from which the semi-structure questionnaire was developed with consultation of other experts.

Phase 4: Data Collection

Data collection has been undertaken through primary and secondary sources. Primary data collection was done through field survey. The survey were scheduled and conducted over period of 2 month January and February 2016. The survey was done through interviewing 270 people from each house hold. The criteria for selecting participants in study were as follow.

- 1) She/he should be present at the time of disaster.
- 2) She/he should be senior member in the family or head of the family.
- 3) She/he should be economically decision making in the family

Phase 5: Data Processing and Analyzing:

After data collection the primary data was analyzed using the model developed in the previous phase to get the insight non gaps and issues. Statistical tools were used to analyze the data. Both Quantitative and Qualitative analysis were done through different forms like tabulation, maps and other graphics.

Phase 6: Findings and Recommendations

It is equally important to recommend the important strategies for prevention and

mitigation of the affect of disaster in urban areas in the mountain situation. Thus, on the basis of data collection and proper analysis done by researcher, the specific recommendation or conclusion were drawn. Negative impact of disasters on human health is also highlighted in this study.

Uttarakhand Flood 2013

The tragedy of massive proportions took place in the uppermost reach of of Mandakani river. Immense destruction occurred all along its length upto its confluence with the Alakhnanda at Rudraprayag. The origin of the 2013 Uttarakhand Flood and landslides can be described to an extreme rainfall event. The devastation was statewide through the main death occurred between Kedarnath and Gaurikund in the uppermost reach of The Mandakani Valley in Rudrprayag. It was the peak of annual tourist season in Uttarakhand. More than 1,00,000 pilgrims, tourists and service providers were left abandoned near various shrines in the upper reaches of major rivers during the disaster. The destruction due to 2013 was multidimensional and continuing which arose flood and landslide that battered different parts of the state during the entire monsoon season after repeated spells of heavy rainfall.

The flash floods triggered by very heavy rainfall and cloudburst in Uttarakhand on 16-17 June 2013, affected 12 out of the 13 districts in Uttarakhand. The 4 districts that were worst affected were Rudraprayag, Chamoli, Uttarkashi and Pithoragarh. There was very heavy damage i.e. washed away roads, bridges and other infrastructure. So that time about 10000 deaths were reported and many are still reported missing. In Kedarnath alone about 75,000 pilgrims had been stranded due to landslides and flash floods.

The reason the floods were on such a larger scale than the regular floods the state usually received was because of the debris of the building of dams upstream. The debris blocked up the rivers, causing major overflow. The main day of the flood is said to be on 16 June 2013. According to figures provided by the Uttarakhand government, more than 5,700 people were "presumed dead." This total included 934 local residents. Destruction of bridges and roads left about 100,000 pilgrims and tourists trapped in the valleys leading to three of the four Hindu Chota Char Dham pilgrimage sites. The Indian Army, and paramilitary troops evacuated more than 110,000 people from the flood ravaged area.

Rescue Operations

The Army, Air Force, Navy, Indo-Tibetan Border Police (ITBP), Border Security Force, National Disaster Response Force (NDRF), Public Works Department and local administrations worked together for quick rescue operations. Several thousand soldiers were deployed for the rescue missions. Activists of political and social organisations are also involved in the rescue and management of relief centers, Helicopters were used to rescue people, but due to the rough terrain, heavy fog and rainfall, maneuvering them was a challenge. By 21 June 2013, the Army had deployed 10,000 soldiers and 11 helicopters, the Navy had sent 45 naval divers, and the Air force had deployed 43 aircraft including 36 helicopters. From 17 to 30 June 2013, the IAF airlifted a total of 18,424 people - flying a total of 2,137 sorties and dropping/landing a total of 3,36,930 kg of relief material and equipment. Indo Tibetan border Police (ITBP) a Force which guards the Indo China borders on the high himalayas with its 3 Regional Response Centres (RRCs) based at Matli (Uttarkashi), Gauchar (Chamoli) and

Pithoragarh swung into action and started rescue and relief operation. 2000 strong ITBP force with its mountaineering skills and improvisation methods started rescue of stranded pilgrims. It was a simultaneous effort by ITBP at Kedar ghati, Gangotri valley and Govind ghat areas. According to official figures by ITBP, they were able to rescue 33,009 pilgrims in 15 days on their own from extreme remote and inaccessible areas. Before Army or Air Force called in, being deployed in the nearby areas, ITBP took the first call and saved many lives. They also distributed food packets to stranded pilgrims who were in a pathetic condition being not having any food for more than 72 hours at many places.

Data Analysis and Result

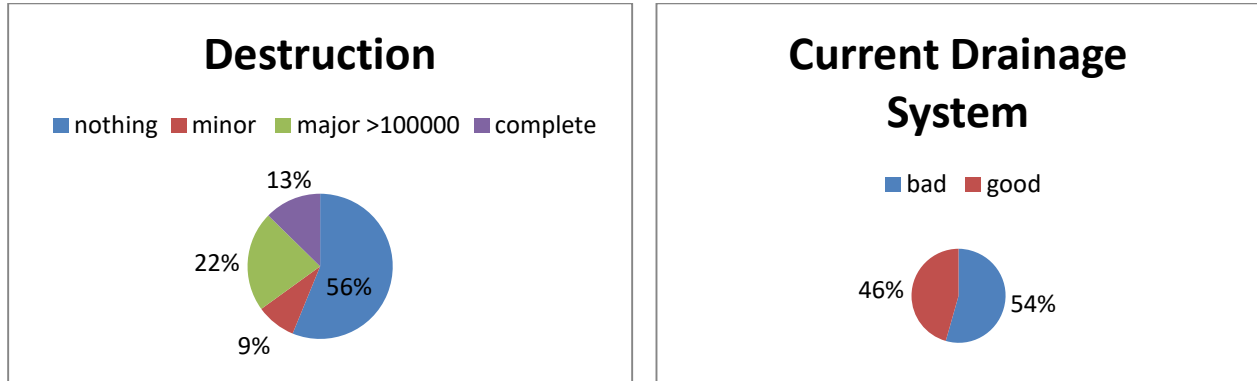
Data Analysis

The sample consists of 270 persons from 3 areas of Sringar i.e. NIT area, Shakti-Vihar and Kedar Colony. Interview was taken in a form of semi-structure questionnaire. Each question is analyzed below one by one.

Destruction/Damage of Property

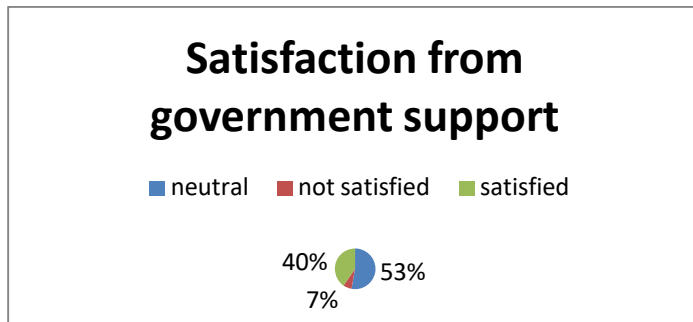
From the Fig 1 pie chart it is seen that out of 270 respondents, 56% of people property was not damaged at all. 13% of the sample population's property was completely destroyed by the flood. 22% of the persons' property was majorly damaged and 13% people suffer from minor destruction. The complete destruction is those whose house were completely damaged or silt by sand. The major destruction includes those whose properties were damaged worth more than 100000. It was also seen that the maximum damages were up to 10-15 Lakhs. And according to the response of people government has given only IRs.100000 each to all the victims. And the minor includes those who have suffered from some minor damages from the flood water that enter their houses

Fig1. Destruction/ Damage Occur in terms of Fig 2. Current Drainage System property



The Fig 2 pie chart stated that the current drainage system of 54% of 270 households is not good. However, only 46% of the person’s drainage system is good. According to the most of the respondents the drainage system was also maintain by themselves.

Fig 3. Satisfaction from government support



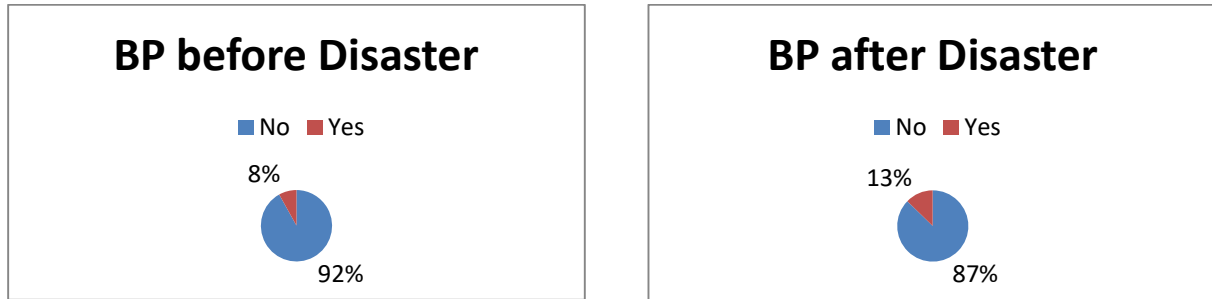
Satisfaction from Government Support

From the Fig 3 pie chart we can see that out of 270 respondents 40% has a neutral feeling from the support which they got from government during disaster. However, 40% of the people were not satisfied. And only 7% were fully satisfied with the support from government. The 40% includes those affected people whose damages was more than Rs. 1 Lakh as the government only provide them Rs. 1 Lakh however, there damages was more than worth of 1 lakh which varies from more than 1 lakh to 15, 0000.

Blood Pressure before/after Disaster

From the Fig 4 pie-charts we can see that 8% of 270 disaster affected people have Blood pressure before Disaster. And in second pie chart we can see that the percentage of people endure BP increases to 13% within the sample of 270 persons.

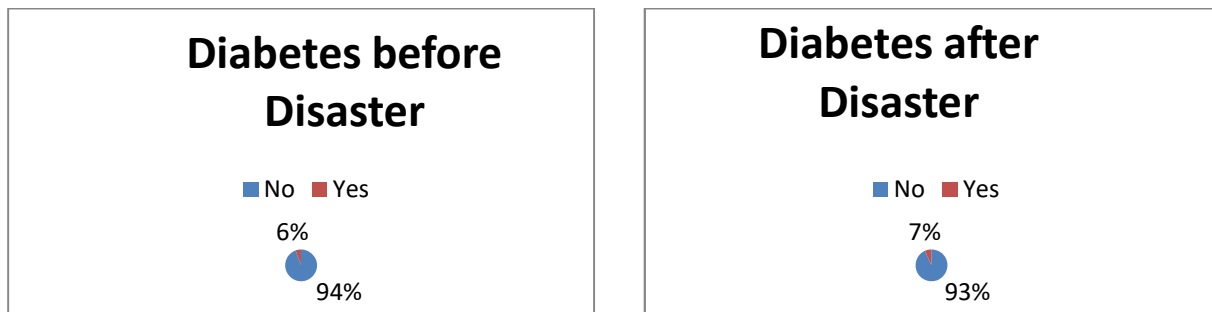
Fig 4. Blood Pressure Before/After Disaster



Diabetes before/after Disaster

From the Fig 5 pie-charts we can see that 6% of the sample population had Diabetes before disaster. And 7% of the same population had diabetes post disaster.

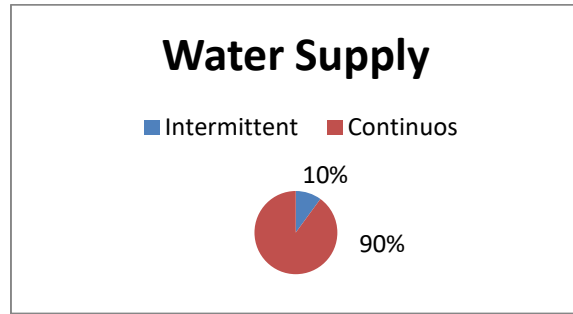
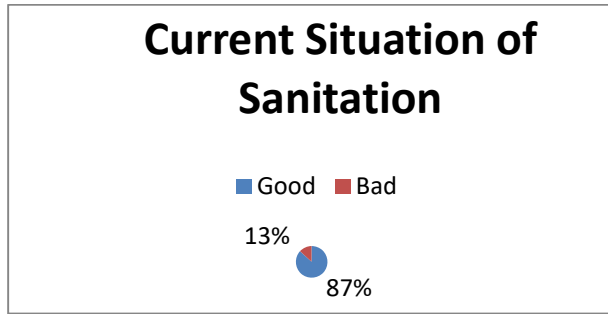
Fig 5. Diabetes Before/After Disaster



Current Situation of Sanitation

It was spotted that out of 270 households 13% of the families' sanitation status was not good. We can see in above pie-chart 87% of the families live in good hygiene and sanitation but the rest of them was not so good.

Fig 6. Current situation of sanitation & water supply



Situation of Water Supply

Fig 6 pie-charts indicated that in 90% of the households the supply of running water is continuous that the running water comes daily at the stated time however in 10% of the households the flow of water is intermittent.

Mental Preparation for Future Disaster

We have asked to 270 persons that are they mentally prepared for such disaster in future? To this, 61% of the population said yes however 39% of the population are still not mentally prepared for such disaster in future.

Fig 7 Preparation of Future Disaster

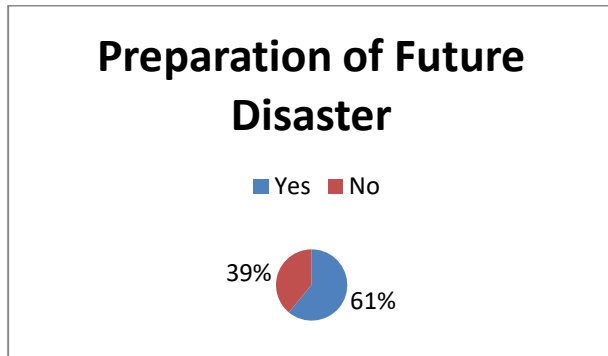
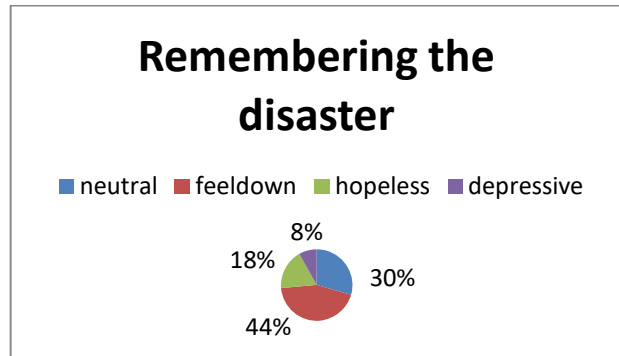


Fig 8. Remembering the disaster



Remembering the Disaster

From the fig 8 pie chart it can be seen that 44% of the respondents feel bad/ down remembering that disaster. 18% feels hopeless, 8% feels depressive however 30% don't feel anything, they feel neutral remembering that disaster.

Mental Health Problem

From the fig. 9 pie chart we can see that 90% of the people suffer from fear of rain and thunderstorm, 4% are stressed, 3% of the persons suffer from anxiety and 3% from the depression due to destruction occurs from the disaster

Fig 9. Mental Problem

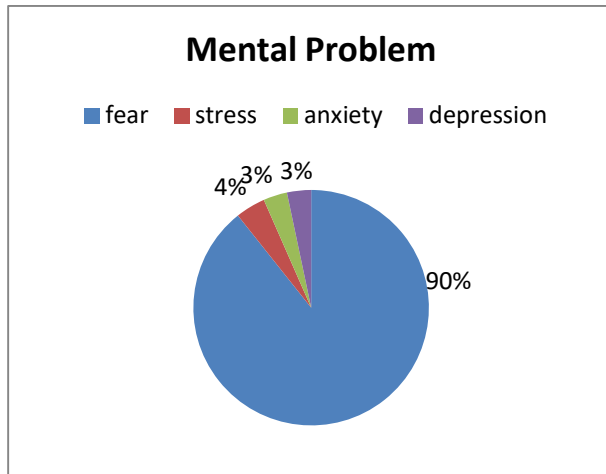
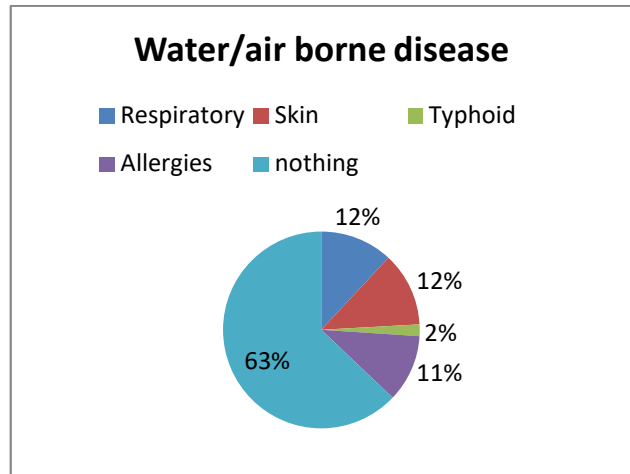


Fig.10 Water/air borne disease



Water/ Air borne Diseases Post Disaster

From the Fig 10 pie chart we can see that 12% people suffer from respiratory disease, 12% people suffer from Skin related diseases. 2% of the people suffer from typhoid and 11% of people suffer from different kind of allergies. 63% of the population doesn't suffer from any water/air borne diseases.

Findings: All of the respondents are disaster affected however no physical harms or loss was seen in the study areas. The loss of property were maximum which gave the mental pressure to the victims in long run specially in the adult of age above 40 as they are worried about regaining their loss. According to all the respondents the government has compensate Rs. One Lakh to each of the affected people, people whose damages are not more that a lakh are

satisfied with the help of government but those families whose loss exceeds lakh are not satisfied with the support of the government. It was seen that some of the families has loss their property worth 7-15 lakh. During the survey it was also observed that the damage occur in 2013 are still not repair. The reconstruction work is going very slowly. Some people was reconstructing there damaged wall and house now, which is more than 2 and half years of the disaster.

Maximum people are afraid of the rain and thunderstorm now, children are more fearful whenever there is heavy rainfall and thunderstorm. Some old citizens are also suffers from fear of rain and storm.

It is obvious that no one feel good remembering that disaster people feel very hopeless and depressive remembering that disaster. But, people are not mentally

prepared for another disaster. The safety wall which is under construction along the bank of river has also built some confidence among people.

Some people have suffered from blood pressure, diabetes and even a mental illness after the disaster. After facing the devastated disaster due to traumatic conditions of weather and their loss of property people have gained these diseases which stay with them in the long run.

The sanitation and hygiene is good as most of the people here are educated and self-awareness. The drainage system is not good; most of the people say they maintain the drainage system by themselves. The drainage is open which causes pollution in air, due to which most of the people suffer from water/airborne diseases related with skin and allergies.

As the debris and sand from the dumped houses are still not taken out by the government, it is found from the locals that their children and elderly people are mostly suffering from respiratory and eye diseases specially in the month of March-April when windy storms are maximum.

The drinking water supply from the government continues but the water is dirty. According to the respondents most of the days the running water comes dirty and contaminated. Soil and some small particles can be seen clearly with the naked eyes.

Recommendations and Conclusions

Key Findings

The main purpose of the study was to know the long term effect on health post disaster in disaster affected areas. It was found that the people can forget their physical pain but it is hard to forget the mental distress they suffer from any kind of disaster. Most of the people are afraid of the rain and thunderstorm. They feel fear whenever there is a heavy rainfall. Children are more afraid of it. People whose properties were damaged

are living stressful lives. Some of the people take loans for the repair of their damaged infrastructures; they are living stressful and tensioned lives to repay their debts. Due to which diseases like blood pressure and diabetes are seen on them after the occurrence. Some who have not repaired their houses are still in despair to maintain their property as before. Some people with soft hearts have suffered from mental illness. Depression was also seen in some people.

Recommendation

1. Sustain government economic support and obligation towards disaster affected people is required: The government should focus on not only on time compensation but a sustainable economic support of the victims. They should ensure that the victims are economically sustained and able to generate the income for their survival in the long run. Hence, the programs related with the sustainable livelihood of the people in disaster affected areas should be initiated for the rehabilitation of the people of disaster affected areas.

2 Social and local administrative special care for the affected and disaster prone community: Administration should provide the special care to the people of disaster prone and affected communities. Awareness programs on general preparedness for disasters should be organized to aware and prepare the community and for the reduction of risk during disasters.

3 Establishment of separate medical and psychosocial care unit among disaster affected area dually supported by counselor and sociologist: We can see that free medical campaigns for general health check ups are organized in disaster affected areas however; the camps should also include the counselor and sociologist for curing the post traumatic situation of the people. Frequent medical and psychosocial

care unit should set up including the counselor and sociologist.

Conclusion

These kind of study of long term impact on health was rarely done in past. It was initiated to know the current situation of the society which was affected by the disaster in long run. The conditions of the community in terms of health, sanitation and hygiene were studied. The people have severely suffered from the disaster and still facing its post traumatic diseases. It was sad to know the reconstruction process of the people and the clearance of the silt of sand inside the homes and Institutions are still not done by the government. That can cause the respiratory disease among the people living nearer. Also, It will remind people of the distressed disaster. The Ngo's, Voluntary Organization and other stakeholders should not only focus on the immediate relief and rescue but should be aware of the condition of the people in long run. Health Camps, counseling to the locals, and the disaster preparedness trainings should be given to the community by the responsible centers of government.

References

1. *Census of India, 2011.*
2. *DMMC 2014, Geological Observation on the devastation around Srinagar in Pauri Garhwal District of Uttarkahand on the aftermath of June 2013 Floods*
3. Ford ES, Mokdad AH, Link MW, Garvin WS, McGuire LC, Jiles RB, Balluz LS.,2006 Chronic Disease in Health Emergencies, In the Eye of Hurricane, Prev Chronic Dis. Apr;3(2):A46. Epub 2006 Mar 15.
4. *Gerard, 2002, Natural Disasters and the Impacts on Health*
5. *Jonath R.T. Davidson,M.D. and Alexender C Mcfarlane, M.D, 2006, The extent and Impact of Mental Health Problems After Disaster,*
6. *Lydia Dotto 2000, Storm Warning - Gambling With The Climate Of Our*

- Planet, By Lydia Dotto, Doubleday Canada Limited ISBN 0385257902, 9780385257909, 332 page*
7. *Satendra, 2003, Disaster Management in the Hills, Concept Publishing Company*
 8. *Turner Berry, A. and Nick, F. Pidgeon, 1976. Man made Disasters. Butterworth- Heineman: Oxford*
 9. Web resources: www.disasterphilanthrphy.org
 10. Web resources www.wikipedia.org
 11. Web resources www.reliefweb.int