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International Journal of Current Research
Vol. 10, Issue, 03, pp.66778-66782, March, 2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

PERCEPTION BASED STUDY ON THE IMPACTS OF CONTEMPORARY CLIMATE CHANGE ON THE RESIDENTS OF SAMDUR VILLAGE, GANGTOK MUNICIPAL CORPORATION, EAST SIKKIM

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ARTICLE INFO

Article History:
Received 24th December, 2017
Received in revised form
05th January, 2018
Accepted 17th February, 2018
Published online 28th March, 2018

Key words:
Climate Change,
Human Health,
Sikkim, Samdur,
Impact, Disease, Respondents.

ABSTRACT

Climate Change has been considered as the prominent global effect in the present scenario, impacting all spheres of the planet. Global warming has been considered as an global concern. Even in Sikkim too, its impact are occuring in reality. This paper tries to study on the perception of residents of Samdur, Gangtok ward 16, East Sikkim about their awareness on climate change and its impact on human health. Through the survey, it was found that about 90% people were aware of the ongoing climate change and believed that climate change was duely to be the change in weather, furthermore they were also acknowledged with the impacts of climate change on human health and their trending disease pattern and mainly opted cold, fever, malaria to be rising. Respondents observe unmanaged waste, smoke from automobiles; factories and burning of household and commercial waste are contributing to degradation of environment as well as responsible for escalating climate change. Various suggestions and measures were also given and multiple examples were narated about historical climate and disease pattern and believed using of renewable energy, maximising afforestation, managing waste and sensitizing about climate change and its impact on human health would help in awaring people.

Citation: Sundeep Chettri, Dr. Sudha Kumari Jha, Dr. Savita Chettri and Dr. Dahal, D. R. 2018. "Perception Based Study on the Impacts of Contemporary Climate Change on the Residents of Samdur Village, Gangtok Municipal Corporation, East Sikkim", *International Journal of Current Research*, 10, (03), 66778-66782.

INTRODUCTION

Climate change has its global impact evident all over the world. Changes in weather are now visible in regional level too. The impact and influence of climate change have limited not only to environmental issues but also on human health (Epstein, 2005; McMichael and Lindgren, 2011; Peterson and Zhang 2008; Lancet and University College London, 2009). Global temperature rise will affect health and studies reveal that increase in temperature will increase the number of human casualties (Ogden St-Onge *et al*., 2008; Robine, 2003). According to the most recent studies, heat waves are projected to increase in frequency and in duration (Meehl and Tebaldi 2004). In 2003, heat waves (extreme temperature events) killed an estimated 29,817 to 30,617 people in Europe through heat stroke and exacerbated cardiovascular, cerebrovascular and respiratory diseases (Haines *et al*. 2006). Climate change will raise incident of forest fires and other smoke hazard which will in turn create threat to respiratory health promoting respiratory disease and changes in weather will affect contagious disease as pneumonia, influenza and other allergic disease like asthma which will increase the incidence and severity. (Ayres et. al. 2009) Another health problem due to climate change will be of vector borne disease. The associated vector organism like mosquitoes, sand flies, Schistosomiasis, fascioliasis, alveolar echinococcosis, leishmaniasis, Lyme borreliosis, tick-borne encephalitis, and hantavirus infections are determined by temperature and local climate to survive and to reproduce, all of this are projected to increase as a result of global warming and global climate change (Hales *et al*. 2007; Mas-Coma *et al*. 2008; Cardenas, *et al*. 2008; Brownstein *et al*. 2005; Gray *et al*. 2009; Clement *et al*. 2009). Malaria and Dengue are the most important vector-borne diseases in the world. Malaria is transmitted by female Anopheles mosquitoes. Whereas Dengue is transmitted by *Aedesalbopictus*, Aedes, Aegypti, which can even tolerate colder temperatures (Hales *et al*., ?) and according to dengue fever is sensitive to climate (Menne *et al*., 2002). Epidemiological studies have also shown that temperature is a factor in dengue transmission in urban areas (McMichael *et al*., 1996). Ozone depletion due to global warming has multiplied the risk of associated skin disease and over the last decades cases of skin carcinoma (cancer) have been growing.

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A reduction in the availability of clean water increases the risk of drinking contaminated supplies and also reduces the amount of water available for personal hygiene thus leading to skin infections (McMichael *et al.* , 2003; Van der Leun and Gruijilfr. 2002). Climate change will also boost up the rate of infection of water-borne disease especially diarrheal disease all over the world (Charron *et al*. 2005; Zhou *et al*. 2008). The impacts of climate change may cause severe social disruptions, local economic decline and population displacement that would affect human health. Population displacement resulting from sea level rise, natural disasters or environmental degradation is likely to lead to substantial health problems, both physical and mental (WHO, 2003).

Effects of climate change are becoming reality in India (Singh *et al.* 2010). The summer of 2010 was the hottest summer on record in India, with temperatures approaching 50°C (122°F); the effects were far-reaching, including hospitalization because of heatstroke, suffering of livestock, and severe drought in some regions that affected health as well as agriculture (Burke, 2010). India represents the most cases of malaria positive cases approximately about 2 million per year (Kumar *et al*., 2007). WHO concludes that approximately 15,000 individuals die from malaria each year in India (WHO, 2008). A study estimates approximately 200,000 malaria deaths in India have been within the age group of 70 years and 55,000 in early childhood (Dhingra *et al.,* 2010; Dash *et al*., 2008). Even in Sikkim, the impacts of climate change are becoming apparent, and people residing in the area are narrating effects in their lives and their livelihood due to global warming (Khawas, 2011). Gangtok Meteorological office reveals, that the impact of global warming on the hill town is, further, evident from the temperature recordings of 40 years – from 1957 – 97 which has shown 4 degree Celsius increase. Various climate sensitive health hazards like malaria, dengue, fever, cholera, encephalitis, skin disease, diarrhea and so on cases has been recorded in Sikkim and indicating its increase in the recent years (Sharma and Shrestha, 2012). According to (Sharma and Shrestha, 2012), occurrence of mosquitoes even in winter cold season and growing reports of climate sensitive disease in the state in the cold season is quite unfamiliar and it is a evident proof depicting temperature rise in Sikkim. Not only, health issues of people of Sikkim are deteriorating but also socio-economic systems are virtually on the effects due to climate change (Seetharam, 2012)

MATERIALS AND METHODS

The study started with selecting the location for the proposed study area and collecting demographic information through Census 2011, Sikkim and DESME 2005 report and bio-physical data were extracted from Remote Sensing technique of Arcgis Arcmap using Liss II imagery. The Survey for the data was done through structure questionnaire based upon the selected theme and topic about climate change and health and about 20 households were selected in the proposed area for the information. Sample selection of household was based upon family size, education, religion, income, profession etc. Geographic Information System was used to locate the selected study area and further land use and land cover thematic map of the same has been prepared through ESRI Arcgis Arcmap

Objective

- To quantify the relationship between climate change and health.
- To understand the perception of inhabitants of Samdur area on their awareness on climate change.

Study Area

This study was carried at Samdur ward No. 16 of the Gangtok Municipal Corporation (GMC), East Sikkim. Samdur village is located at 27°17′54. 19”N latitude to 88°35′35. 46”E longitude at an altitude of 1,118m in the sub-tropical eco-belt of Rani Khola basin. The northern of the ward runs from M. P Golai to Lower Syari in a parallel direction (WE) while eastern boundary runs from Lower Syari to Setipool in a NS direction. The southern and western boundary runs from Setipool to Adampool and from Adampool to M. P. Golai in the NW. It covers an area of about 7315. 22 hectares (0. 08%) of the total geographical area of East district of Sikkim.

RESULTS

In the response of the people according to the questionnaire residents of Samdur, Gangtok ward 16, 97 percent people are aware of climate change. I found that the 60 percent of respondents consider climate change as change in the weather conditions and 20 percent of people said climate change is change in temperature and 10 percent of people said climate change is the change in the environment. Only 10 percent of people aptly answered the question in a more sensible manner. According to the survey, respondents were question about their awareness on climate change. The questionnaire were set to extract the concept and their understanding on what exactly climate change will have its maximum effect on. About 40% of respondent narrated rise in temperature is climate change, whereas 30% of respondents said occurrence of unpredictable weather condition, 12% flooding, 8% drought, 4% melting glacier, 4% others and lastly 2% said rise in temperature will cause this problems.

Sequentially, 75 percent of people agreed that human activities are responsible for climate change. 10 percent of people did not consider human activities responsible for climate change. 5 percent of people did not know whether climate change is due to human activities or due to natural events like volcano eruption wildfire etc. and 10 percent of people consider climate change as the consequence of both human activities and natural events. More than 95 percent of people said they are noticing change in climatic pattern of Sikkim from last 7-10 years. They said that the summer days are with more intense heat and winter is more harsh cold and dry and the monsoon has become more unpredictable and sometimes the rainfall is high and sometimes it is low. Due to climate change agriculture of the area is getting affected and crops have started to fail to yield high and decaying of vegetable leaves and necrosis have increased in the recent time. The local considers smoke from the automobiles and unplanned and unmanaged waste that are fired open the atmosphere from household waste to commercial waste as well as agricultural waste are producing hazardous gases and garbage and industrial wastage from factories and industries have also being contributing to the degradation of environment of the area. The air has become unsafe with dust and smoke even the soil quality is getting affected. Due to increase in pollution the wildlife of the area is also getting affected. All the people agreed that climate and health is related and hence human health condition is getting tainted due to change in climatic pattern. More vector diseases like malaria dengue and water borne diseases such as typhoid jaundice is spreading more rapidly due to climate change.

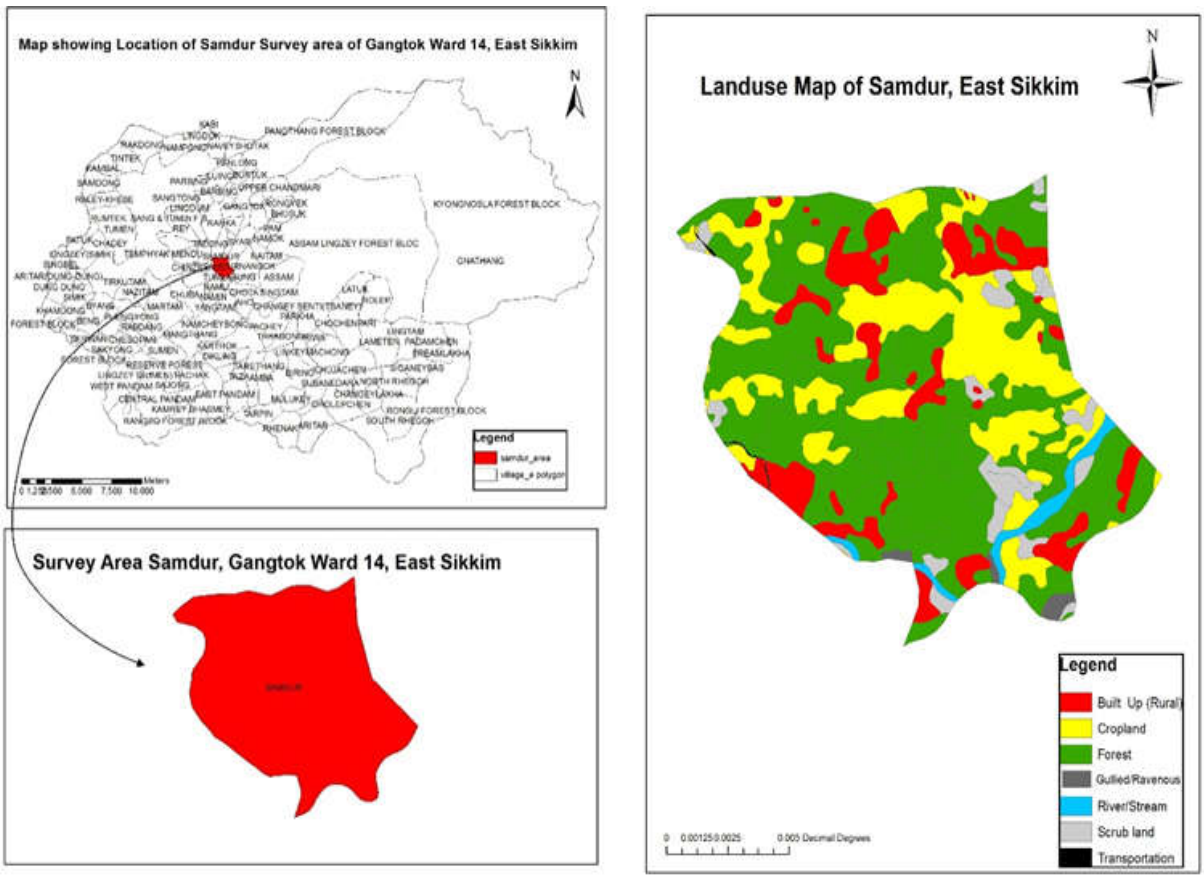

Figure 1. Thematic map showing location of study area and land use and land cover

Table 1. The detail bio-physical and demographic attributes of the Samdur ward

Bio-Physical Attributes[a]		Demographic Attributes[b]			
Area	7315.22		7315.22 (ha)		
Built Up (Rural)	39.99	Total Households	1,047		
Cropland	44.52	Total Population	4,520	Male	2,319
Forest	207.2)			Female	2,201
Gullied/Ravenous	4.65	Population (0-6)	438		
River/Stream	6.99	Total Workers	1,771		
Scrub land	6999.67	Literacy rate	88.58		
Transportation	12.2	Sex Ratio	949		
		Population density	62 /km^2		

Source: (a) calculated by the author using GIS (b) Census, 2011

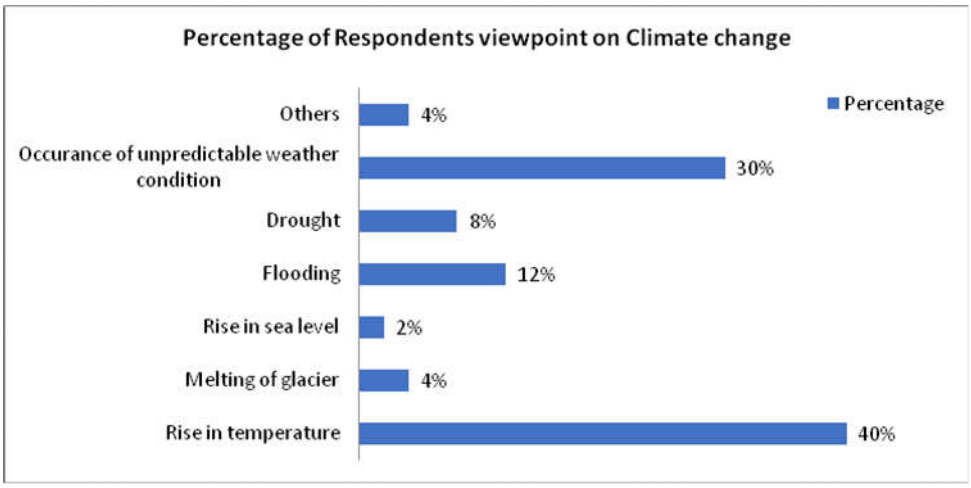

Figure 2. Bar diagram Showing Percentage of Respondents opinion on Climate change

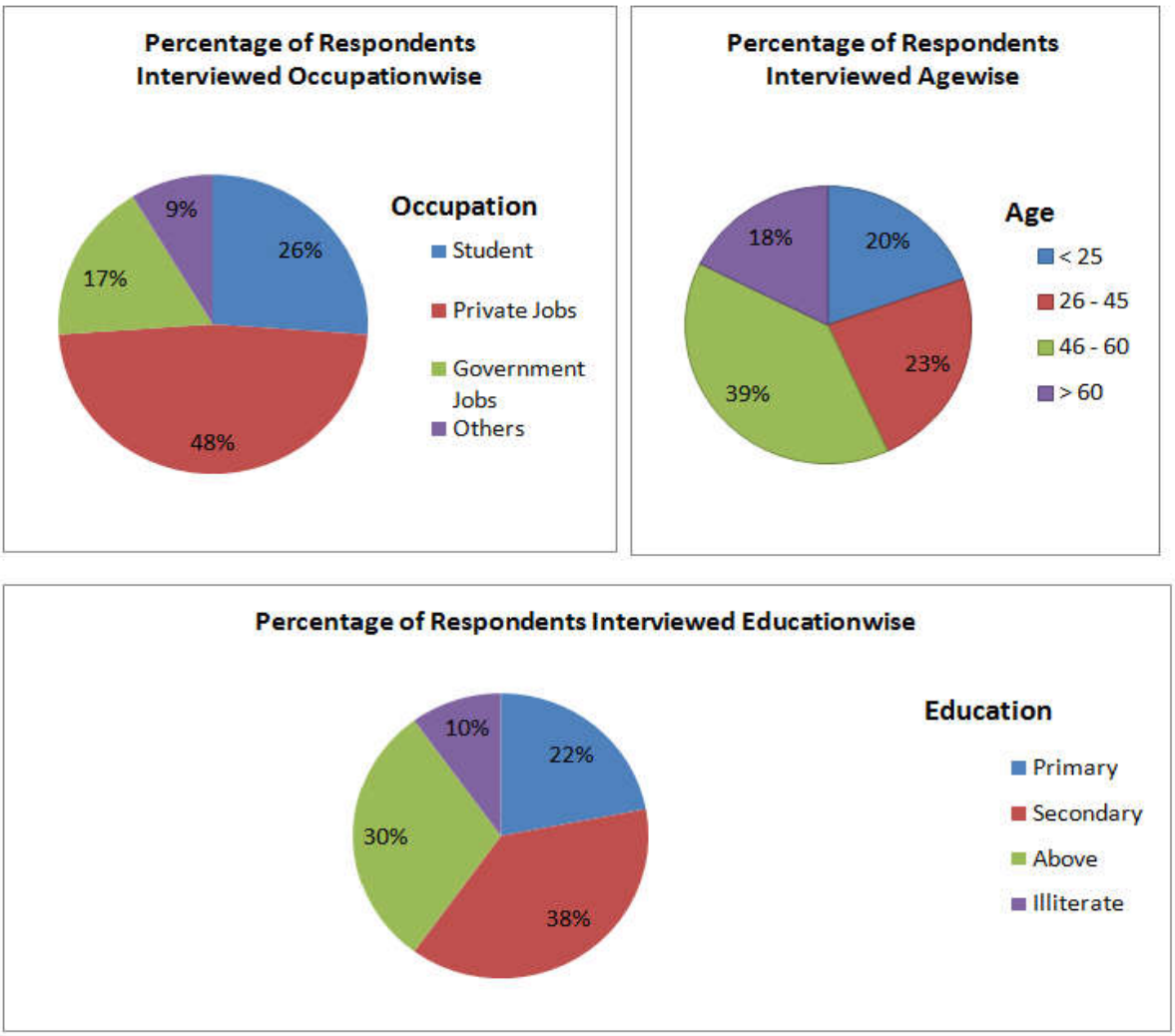

Figure 3. Pie-diagram showing percentage of respondents within different parameters

Many skin related diseases and respiratory diseases are also getting traced in Sikkim in last one decade, as per viewpoint of the respondent. The mosquitoes and other flies are also seen during winters as a consequence of climate change which was not present in the past respondent narrated. The people agreed that the quality of air is getting degraded with more pollutant content in it. 50 percent of people agreed that due to climate change their family members have suffered in health. More than 70 percent of people suggested using of mask over face while venturing outside to stay away from pollutants that may cause illness and proper management of garbage and afforestation and following the pattern of organic farming and creating awareness among people to tackle the issue of climate change. There should be use of sustainable resources instead of conventional resources. We should follow the three R(s) to cut down pollution there should be use of renewable resources which cause less pollution and sustain the ecological balance. There should be less use of plastic products and more tress should be planted and there should be steps to conserve the water and forest resources including wildlife. A pie diagram has been prepared to display the socioeconomic condition of respondents interviewed in the selected area at Samdur ward 16, Ranipool. Three graph diagram has been arranged which include percentage of respondents categorise under occupation wise, agewise and education wise. Accordingly, the purpose was to understand the concept of respondents on the issue of climate change categorizing their socioeconomic influence.

Conclusion

The impact and influence of climate change have limited not only to environmental issues but also on human health (Epstein, 2005; McMichael and Lindgren, 2011; Peterson and Zhang 2008; Lancet and University College London, 2009). Global temperature rise will affect health and studies reveal that increase in temperature will increase the number of human casualties (Ogden St-Onge *et al.* 2008; Robine, 2003). More cases of climate sensitive diseases like vector borne, air borne and water borne have increased over the years. A study was conducted at Samdur area above Ranipool, Gangtok Municipal Corporation (GMC), East Sikkim in order to make out perception of residents of Samdur village on the contemporary climate change and its impacts on human health. The study provided that about 85% of respondents gave the impression to be aware of climate change but their perception was not fully logical and appropriate and the reason behind it was the education, as the respondents with higher education (above graduation) were well informed. Majority have encountered the problem of health issues caused by the changing weather pattern. Most of the respondents answer that human health problem that will increase is of Cold, Fever, Diarhoea, Malaria etc. Respondents suggested that the risk and exposure due to climate change has increased, that has to be controlled by the Government or any organisation, institution etc by initiating various planned schemes and programmes, focussing especially to control automobiles pollution, waste disposal and

factories throw away products. A appropriate climate change sensitization and awareness programmes is needed and adaptative capacity building programmes should be launched at local, national and global level too. Unless and until individual should not treat as a priority issue will not able to build up climate change cope up abilities. Therefore, individual should dedicate to built up resilient capacity to ongoing climate change impact on human health.

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