

# AN INTROSPECTION OF IMPACT OF CLIMATE CHANGE ON HUMAN HEALTH IN INDIA

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## INTRODUCTION

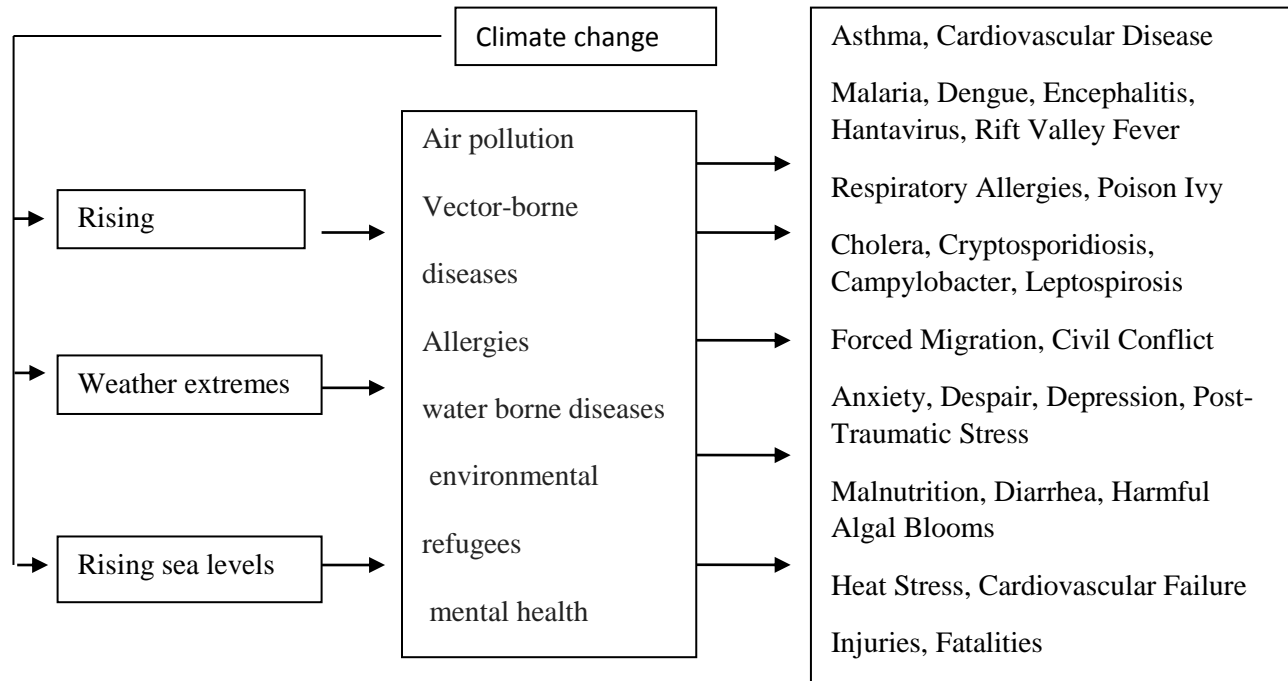
Human health has always been influenced by climate and weather. Changes in climate and climate variability, particularly changes in weather extremes, affect the environment that provides us with clean air, food, water, shelter, and security. Climate change is perceived to be among the greatest health risks of the 21<sup>st</sup> Century. It affects social and environmental determinants of health like – clean air, safe drinking Water, sufficient food and secure Shelter. Climate change, together with other natural and human-Made health stressors, influences human health and disease in numerous ways.

Climate change which is attributed directly or indirectly to human activity that alters the composition of the Global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Climate change may negatively affect human health through a number of ways, but the commonly experienced are increased frequency and intensity of heat waves leading to rise in heat related illnesses and deaths, increased precipitation, floods, droughts and desertification costing lives directly. High temperature is known to increase the level of ‘ground level ozone’ and other ‘climate altering pollutants’ other than carbon Dioxide, which further exacerbate cardio-respiratory and allergic diseases and certain cancers. Beside these, there is increase in transmission and spread of infectious diseases, changes in the distribution of water-borne, food borne and vector-borne diseases and effects on the risk of disasters and malnutrition.

## IMPACT OF CLIMATE CHANGE ON HUMAN HEALTH

Weather exchange with different natural and human-made health stressors, influences human health and sickness in several methods. Public health can be suffering from disruptions of physical, biological and ecological systems. The fitness outcomes of these disruptions include improved respiration sicknesses, cardiovascular diseases, accidents, premature deaths associated with excessive climate events, adjustments in the prevalence of food and water-borne sicknesses, other infectious diseases and threats to intellectual health. The forth coming flow chart depicts the impact of climate change on human health.

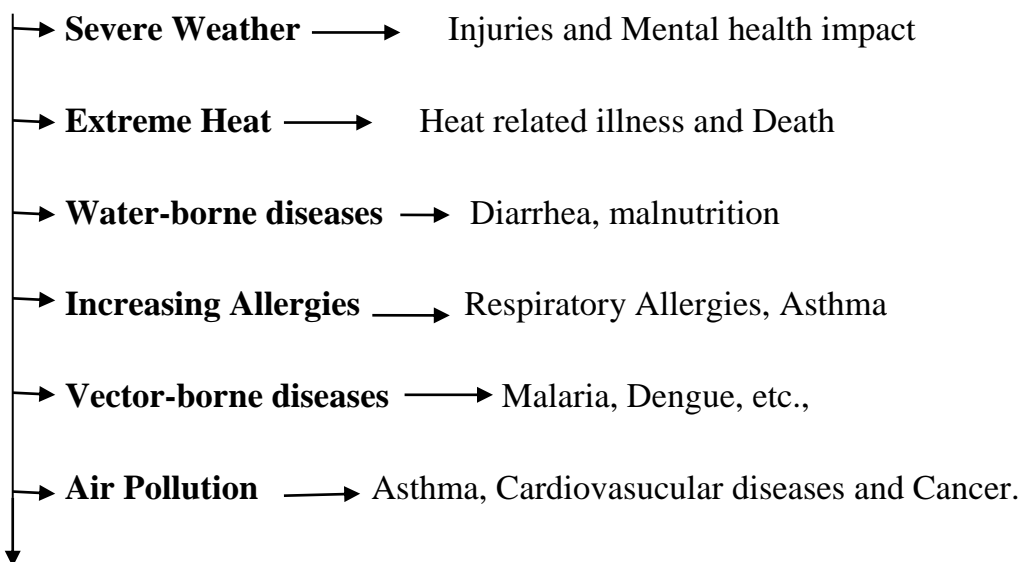
Figure 1



### HEALTH RISKS OF CLIMATE CHANGE

The weather has a direct impact on our health. If the overall climate becomes warmer, there will be an increase in health problems. It is anticipated that there will be an increase of deaths due to greater frequency and severity of heat waves and other extreme weather events. The elderly, the very young and those suffering from respiratory and cardiovascular disorders will probably be affected by such weather extremes as they have lesser coping capacity. An extreme rise in the temperature will affect people living in the urban areas more than those in the rural areas.

Indirectly, changes in the weather pattern can lead to ecological disturbances, changes in food production levels, an increase in the distribution of malaria, and other vector borne diseases.



**Rising Temperature, Extreme Weather and Water and Food Supply Impact**

↑  
**Climate Factors**

### RESPONSES OF CLIMATE CHANGE, ON HUMAN HEALTH

Fluctuation in the climate especially in the temperature, precipitation, and humidity can influence biological organisms and the processes linked to the spread of infection diseases. This health related impacts are given in table 1

**Table-1**  
**Health related impacts of Climate Change**

SI No	Impact	Outcome	Incidence
1.	Heat and cold	Cardiovascular disease deaths	Rising
2.	Food and water borne diseases	Diarrhea episodes	Rising (high)
3.	Vector borne diseases	Malaria cases, dengue cases	Rising (high)
4.	Natural disasters	Injuries	Rising (medium)
5.	Risk of malnutrition	Weak health low productivity	Rising (medium)

**Source:** climate change human health, risk and responses, world health organization, geneva ,2003

Rise in temperature and cold due to climate change will cause cardiovascular diseases deaths. The incidence of food and water borne diseases is likely to increase substantially leading to more diarrhea and stomach related problems. Similarly vector borne diseases will spread through mosquitoes as they increase in a warmer climate.

### IMPACTS OF CHANGE IN CLIMATE AND WEATHER ON HEALTH

Changes in temperature and precipitation and occurrence of heat waves, floods, droughts and Fires directly impact health of people.

**1. Heat-Stress and Related Impacts**

Increase in daily maximum temperatures, resulting in increase in number of heat-related illnesses. As per the basic processes of human thermoregulation, the health effects are seen when body temperature rises above 38°C i.e. physical functions are impaired with experience of weakness (heat exhaustion), when body temperature rises further to 40.6°C, the risk of physical and cognitive functions get impaired (heat syncope), risks of organ damage, loss of Consciousness, and death increase sharply at further rise in body temperature usually above 40.6°C (heat stroke). Various factors interplay in occurrence of these morbidity and mortality majorly affecting mainly the vulnerable population especially in the vulnerable regions.

**2. Drought, Storms and Floods**

The health gets directly affected due to injuries, hypothermia, hyperthermia, drowning and indirectly through population dislocation, crowding, poor living conditions, faeco-oral transmission of gastro-intestinal pathogens causing water and food borne illnesses, respiratory illness and other infectious diseases (e.g., leptospirosis, vector-borne disease, cholera and also mental illnesses) The reason primarily is due to contamination of water and sewage disposal.

**3. Ozone**

Ozone is a powerful oxidant that has been persistently associated with damage to structure of airway or lung tissue. It contributes to more severe symptom of asthma, increase in other respiratory illnesses and deaths. High concentration of ground-level ozone accompanied with heat waves result in higher frequency and severity of cardio-pulmonary attacks.

**4. Air-Borne and Cardio-Respiratory Illnesses**

Climate change influences various illnesses including respiratory tract infections like asthma, rhinosinusitis, Chronic Obstructive Pulmonary Diseases (COPD), respiratory viral diseases (Avian Influenza) & circulatory Collapse posing danger to cardiac patients. The cited reasons are poor air quality, high Ozone, dust storms, extreme heat, desertification, alteration of allergens, change in timing and duration of survival and transmission cycle of respiratory virus, alteration in bird Migration.

**5. Vector-borne diseases (VBD)**

Change and other weather parameters have significant impact on vector borne diseases such as Malaria, Dengue, Chikungunya, Japanese Encephalitis, kala-azar, and filariasis. The known parameters are temperature, humidity, wind, rainfall, flood and drought, affecting 'distribution of vector' and 'effectiveness of transmission of pathogen' through vectors.

**6. Waterborne & Food borne diseases**

Waterborne & Food borne diseases such as typhoid, hepatitis, dysentery, and others Caused from micro-organisms such as *Vibrio vulnificus* and *Vibrio cholera*, *facilitie*, *Campylobacter*, *Salmonella*, *Cryptosporidium*, *Giardia*, *Yersinia*, *Legionella* are some climate-dependant infectious diseases. The increase in temperature is seen to be associated with increased survival and abundance of micro-organisms. The decreased precipitation and drought result in decrease availability of safe-water, reuse of wastewater, contamination of water sources, transmission from vertebrate to human or human to human etc.

**MORBIDITY CASES IN INDIA**

The following table depicts the number of morbidity cases in India owing to climate change on human health.

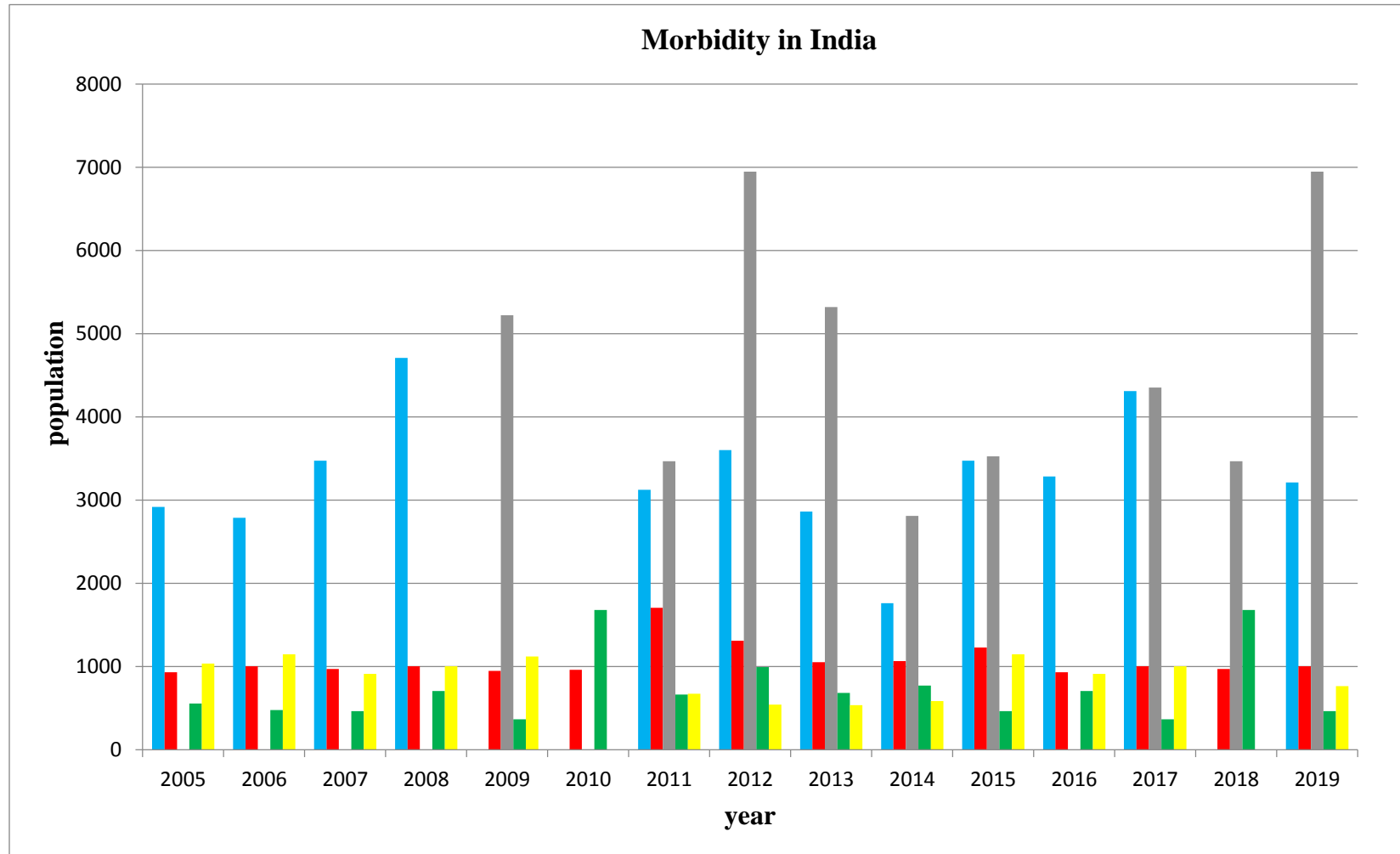
**Table 2**  
**Number of Morbidity Cases in India**

Year	Acute Diarrheal Diseases	Malaria	Acute Respiratory Infection	Japanese Encephalitis	Viral Hepatitis
	Cases	Cases	Cases	Cases	Cases
2005	8870507	2031790	32567321	2593	153034
2006	9289558	2085484	31326532	2061	149262
2007	9441456	1842019	30246351	1765	135859
2008	10510476	1869403	29435123	2568	151287
2009	104326	1915363	25571757	1697	203939
2010	102435	1816569	25348561	6669	163214
2011	10079263	1785129	25807722	2871	146433
2012	10993639	1508927	36171496	4110	110055
2013	11408666	1526210	27451421	3839	92291
2014	11224319	1533169	26544613	4482	110586
2015	9441456	1487693	1748392	1765	149262
2016	9379263	1345767	322614	2568	135859
2017	10585473	2021233	3452634	1697	151287
2018	11342	1700375	25807722	6669	131278
2019	12040845	1876432	36171496	2871	111643

Source: Compiled from National Family Health Survey 2020

Table 2 indicates the number cases due to illness/ diseases in india. It shows the important diseases which may be occur only on climate change out of Diarrhea, Malaria, Respiratory, Japanese Encephalitis and Viral Hepatitis, people mostly affected by Acute Respiratory infection which accounts for 36171496 cr/lakhs. It place number one position followed By Acute Diarrheal diseases and Malaria which placed II<sup>nd</sup> and III<sup>rd</sup> in their place. Very minimum amount of people are affected by Japanese Encephalitis. Over all it shows change climate bring some impact in human health.

Figure-1



**DEATH IN INDIA**

Number of Mortality due to illness in India explained in the following Table-3

**Table 3****Number of Deaths due to Diseases in India**

Year	Acute Diarrheal Diseases	Malaria	Acute Respiratory Infection	Japanese Encephalitis	Viral Hepatitis
	Deaths	Deaths	Deaths	Deaths	Deaths
2005	2918	931	6734	556	1038
2006	2787	1005	6210	479	1147
2007	3475	973	5945	466	914
2008	4709	1006	5736	707	1006
2009	4506	949	5223	367	1122
2010	3962	963	4875	1682	879
2011	3124	1707	3467	663	673
2012	3603	1311	6948	995	544
2013	2865	1055	5321	684	536
2014	1762	1068	2813	774	586
2015	3475	1231	3526	466	1147
2016	3285	931	3324	707	914
2017	4311	1005	4353	367	1006
2018	3011	973	3467	1682	956
2019	3212	1006	6948	466	765

Source: Compiled from National Family Health Survey 2020

Table 3 explained about the number of deaths due to diseases in India for repeated cases of diseases in India bring mortality also. The mortality rate increase in the morbidity of Acute Respiratory infection followed by Acute Diarrheal diseases, and malaria. Impact of climate change not only bring the morbidity it also brings mortality rate

Figure 2

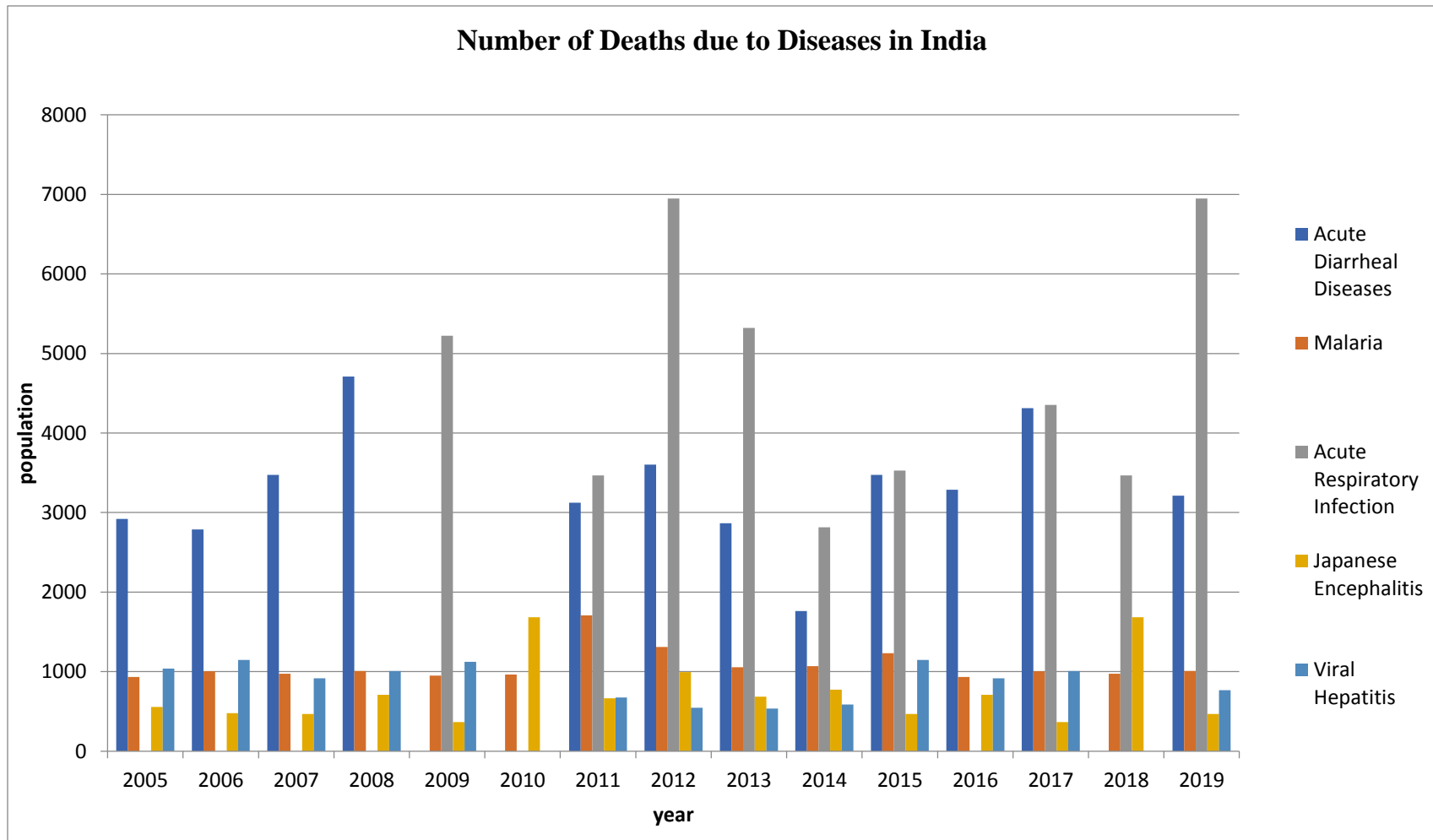
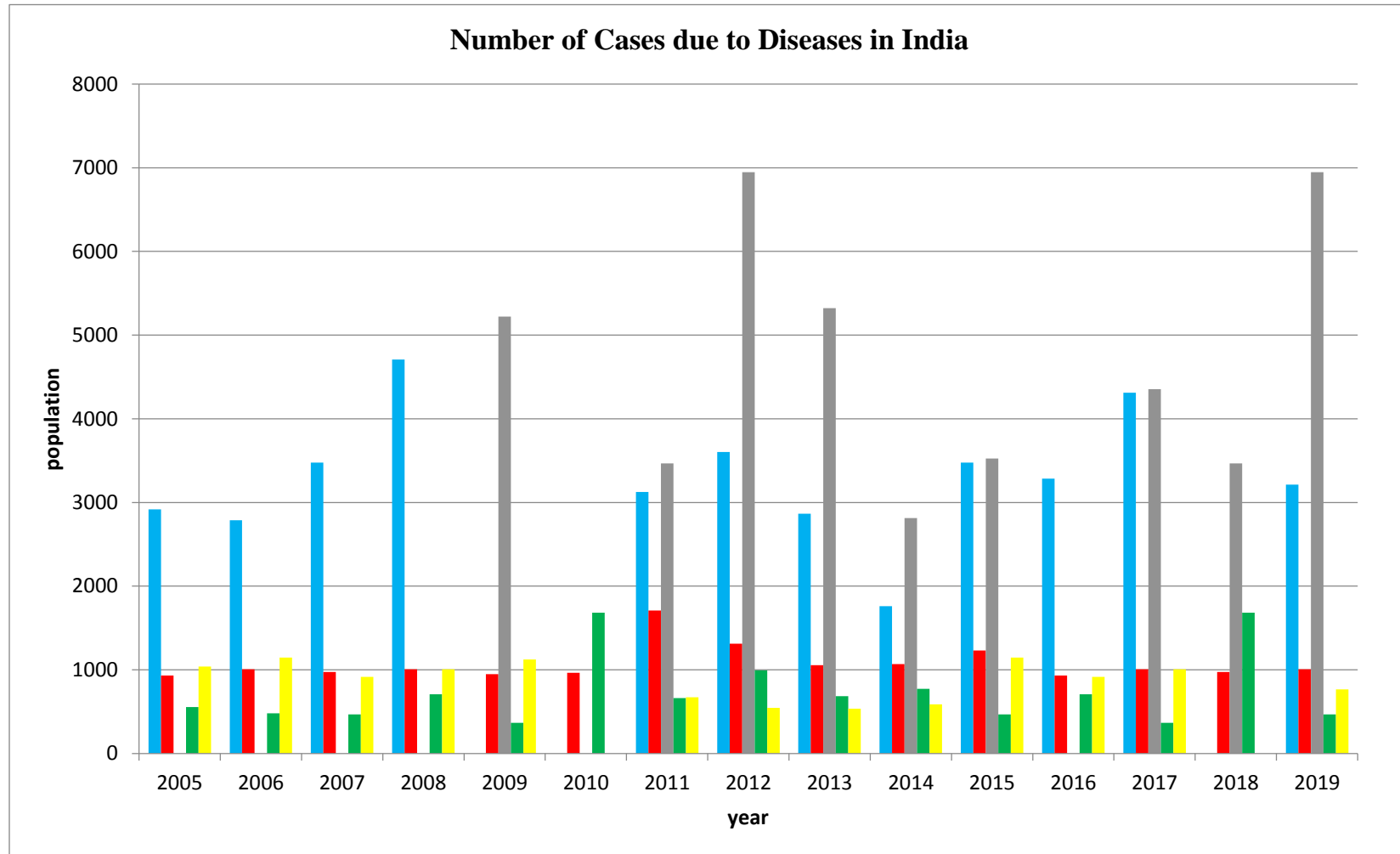




Figure-3



## SUGGESTIONS

Health sector in preparedness for climate change needs urgent, serious, and multifaceted Action, which should include:

1. Strengthen the coordination for health related early warning and surveillance systems in specific areas through an integrated disease surveillance system.
2. Feedback mechanisms to other ministries responsible for several ecological determinants of health particularly- air, water, food, fuel and human resource.
3. Development of risk maps for climate sensitive diseases for each geographical area.
4. Developing response action based on innovative strategies to increase access, early health care advice and health tracking system incorporating Aadhaar card number to assist surveillance and Generate trends.
5. The Health Missions seeks coordination with other Missions identified under the umbrella of National Action Plan for Climate change. The targets achieved by other national missions will also scale down the morbidity and mortality of various types of illnesses.

## CONCLUSION

The impact of climate change on human health, an ecosystems, urban areas, and frequency of disasters will have critical implications for the goal of sustainable development. While government programs in these sectors notice issues relevant for strengthening adaptive capacity to climate change. Inclusion of climate risk in the framework and implementation of development initiatives is important to lessen vulnerability and develop sustainability. Though adaptation to protect human health from the impacts of climate change should be enhanced primarily with in the health systems, are al so critical. Many of the adaptation measures focused on climate – sensitive infectious diseases are routine actions developed in the context of health systems but some specific actions should be al so developed. Outstanding among these are the epidemiological and entomological surveillance targeted to specific diseases and territories. All these health protecting strategies should be included in a context of multi sector approaches to adaptation, informed by comprehensive vulnerability assessments.

We have to review the coping capacity of the health care system, develop and implement adaptation strategies against climate change risks training and observed health personnel, gain health literacy and environmental literacy. It would involve strengthening primary health care, providing priority to turn the deaf ear communicable diseases and noticing ecological diseases abundant in the tropical regions ensuring nutrition and food security, health, water, and sanitation. Health security of the vulnerable communities should be given priority. Inter-disciplinary research on health protection from climate change is necessary.

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