

Heat Stroke – Emerging as One of the Biggest Natural Calamity in India

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ABSTRACT

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Over the last 25 years the average global temperature rose by 0.6 degrees Celsius. As temperatures continue to climb, the toll of heat waves in individual countries could jump from thousands to tens thousands. Every year, India faces many natural calamities in the form of cyclone, landslide, flood etc. One major inclusion in this never ending list during last few decades is the heat wave. In this present article authors have tried to enumerate the heat wave related mortality scenario of India and appropriate remedial actions for future. According to the report of National Crime Records Bureau (NCRB), in India among all deaths from natural calamities lighting (34%) is at the top of the list followed by heat stroke (15%) (2001-2012). Heat strokes were proportionately higher compared to cold wave related deaths in most of the years of last one decade. In 2015 deaths from heat stroke recorded 5 times more compared to 2001. Odisha, Andhra Pradesh, Punjab, and Uttar Pradesh & West Bengal had reported more than 1000 deaths from heat stroke during last 15 years. India from the geographical and environmental point of view is a land of natural calamities. Individual as well as policy level actions should be taken for saving the country from the harsh consequences of heat waves in future.

KEYWORDS: Heat stroke, Heat wave, India, Natural calamity.

INTRODUCTION

Over the last 25 years the average global temperature rose by 0.6 degrees Celsius. The Intergovernmental Panel on Climate Change (IPCC)'s projected rise in temperature for this century is a global average, but the temperature is expected to rise more over land compared to sea area. As temperatures continue to climb, the toll of heat waves in individual countries could jump from the thousands to tens thousands. The World Meteorological Organization estimates that the number of heat-related fatalities could double in less than 20 years.¹ Studies of recent heat waves across Greece in 2007,² Australia in 2009,³ Russia in 2010⁴ and US in 2012⁵ were all associated with increased mortality. Every year, India faces many natural calamities in the form of cyclone, landslide, flood etc. One major inclusion in this never ending list during last few decades is the heat wave. Report of Indian Metrological Department (IMD) shows that in India also during the last 60 years (1951-2010) the mean temperature shows an increasing trend over all the states except those in the Indo-Gangetic plains.⁶ The effect of adverse climatic condition (heat wave) is more on the vulnerable population mainly the poor. Large population of India is forced to live in conditions of deprivation - without adequate shelter; lack of sanitation and hygiene; lack of proper employment and lack of access to health facilities. Very often their work

conditions require them to work outdoors for prolonged time periods, thereby exposing them to temperature extremes. In India cold wave has recognized as a natural calamity but heat wave is not included in the list. A study conducted by Das S et al. In Odisha has shown that awareness generation among community is one of the strategies for reducing mortality from heat wave.⁷ There is also enough evidence that heat way related deaths are very much under reported in our country.⁸ In this present article authors have tried to enumerate the heat wave related mortality scenario of India and appropriate remedial actions for future.

HEAT WAVE

There is no universally accepted definition of the heat wave and it is usually defined relative to the normal weather in an area. Temperature that people from a hotter climate consider normal may be termed as heat wave in a cooler area if outside the normal climate pattern for that area. There may be further variation in these thresholds depending on the humidity in the atmosphere or costal or interior areas.⁷ Heat wave can be defined as a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. It is period of abnormally and uncomfortably hot and humid weather.

Major consequences of heat wave on human being¹

1. **Heat cramp:** mainly affecting calves, thigh and shoulder muscles
2. **Heat syncope (fainting)**
3. **Heat exhaustion:**
Intense thirst, heavy sweating, anxiety, headache, nausea or vomiting, dizziness and fainting
4. **Heat stroke:**
High body temperature (104° F), altered mental state, alteration in sweating. Flushed skin, rapid breathing, fast pulse etc

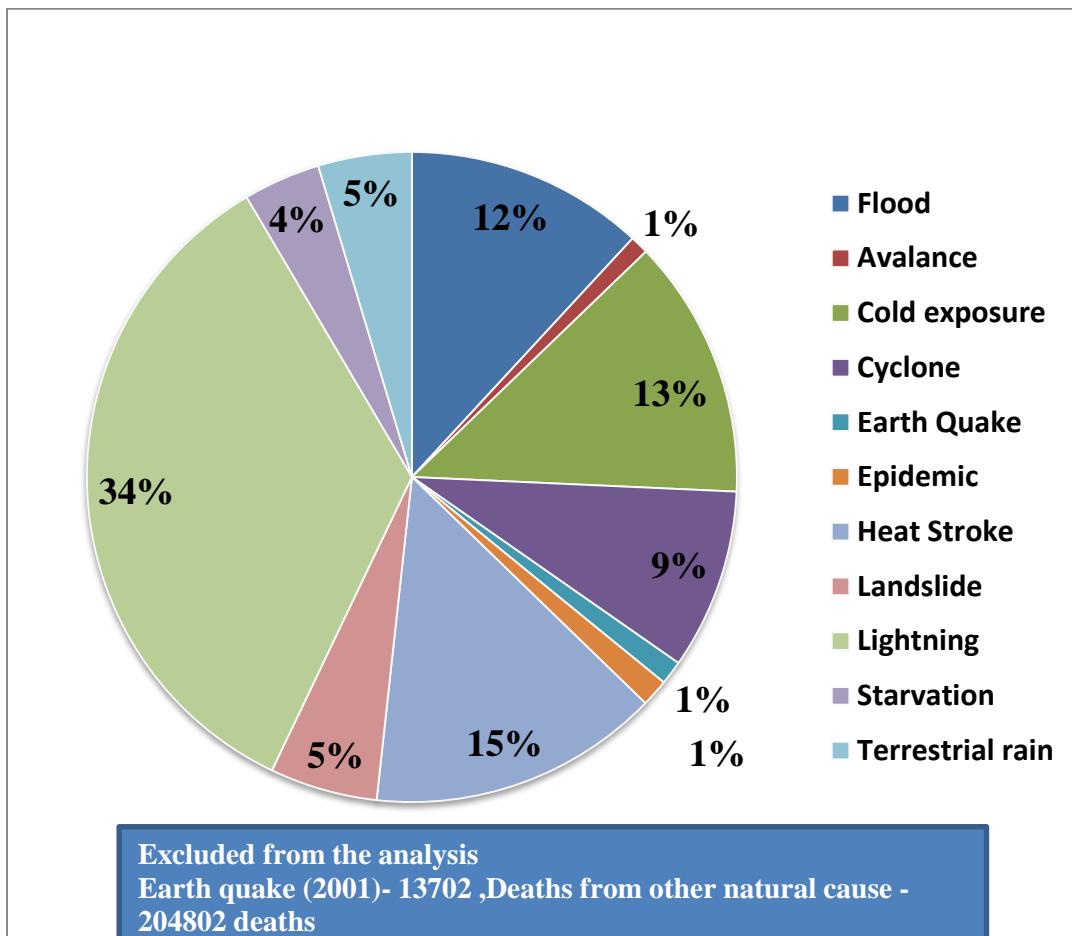


Fig 1: Comparison of mortality from different natural calamities in India (2001-2012)¹⁰

QUANTITATIVE DEFINITION OF HEAT WAVE⁹

- The normal temperature is $< 40^{\circ} \text{ C}$. Any increase from the above normal temperature is called heat wave.
 - $+ (5 \text{ or } 6)^{\circ} \text{ C}$ – Moderate heat wave
 - $7^{\circ} \text{ C. or more}$ – Severe heat wave
- The normal temperature is $> 40^{\circ} \text{ C}$. Any increase from the above normal temperature is called heat wave.
 - $+ (5 \text{ or } 6)^{\circ} \text{ C}$ – Moderate heat wave
 - $7^{\circ} \text{ C. or more}$ – Severe heat wave

- If the maximum temperature of any place continues to be 45° C . consecutively for two days, it is called a heat wave condition.

NATURAL CALAMITIES & INDIA

Below pie chart shows the proportioned distribution of mortality cause by various natural calamities during one decade (2001-2012) in India. (Fig 1) Lightning (34%) is at the top of the list followed by heat stroke (15%). According to the report of National Crime Records Bureau (NCRB), mortality from heat stroke is only

officially declared as heat related death. People suffering from pre existing disease conditions can also face grave consequences due to extreme heat. So official report only highlighting the tip of the iceberg and it has been demonstrated by a research conducted in Ahmadabad

during 2010 heat wave.¹¹ Heat wave dose not draw as much government attention like cyclone, flood etc. But figures show that during the last few years heat stroke or heat wave related death has emerged as one of the major natural calamities for India.

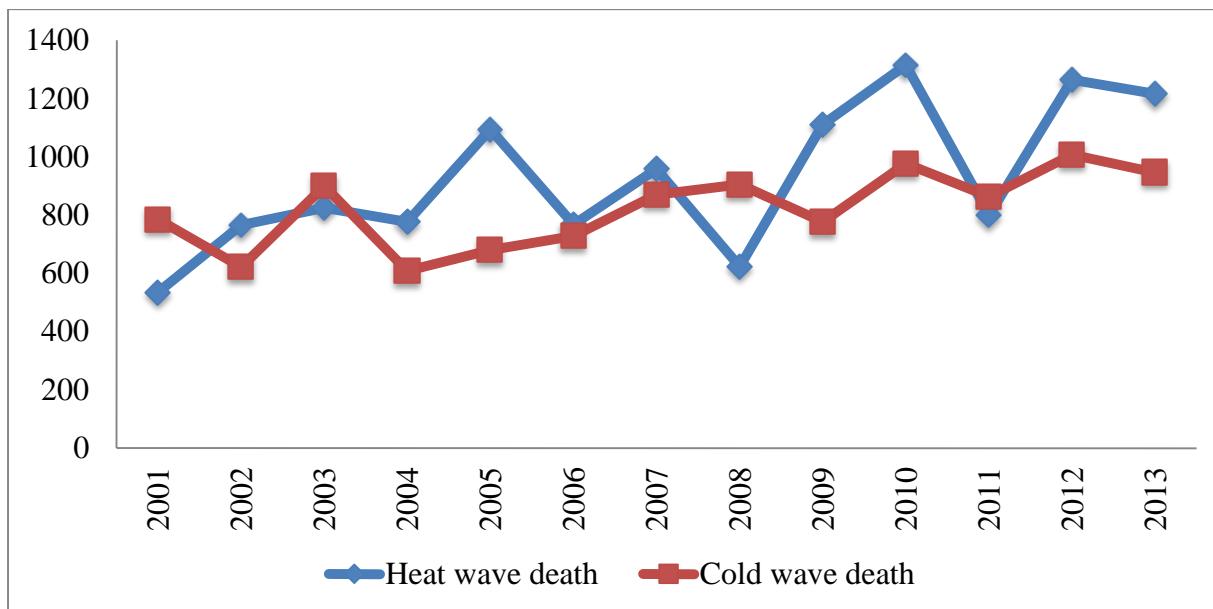


Fig 2: Trend of mortality from cold wave & heat wave from 2001 to 2013^{10,12}

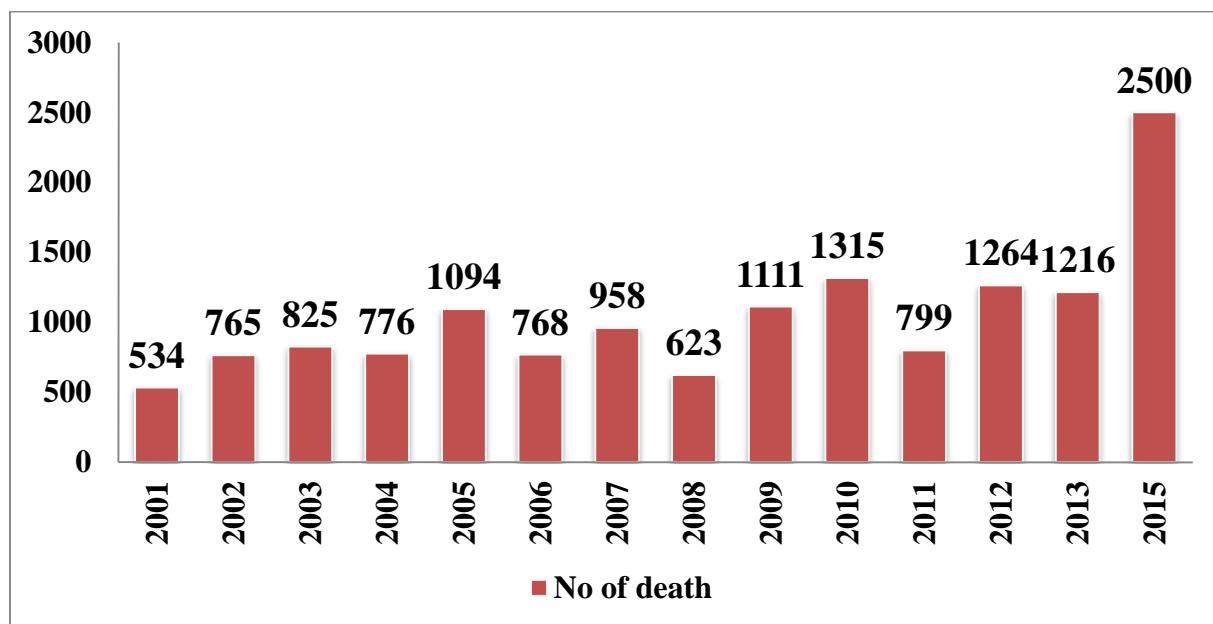


Fig 3: Trend of heat stroke mortality in India (2001-2015 June 2nd)^{10,12}

HEAT WAVE V/S COLD WAVE

Below frequency polygon shows the comparison of mortality from Heat & cold wave in India (2001-2013). [Fig 2] It is evident from the figure that numbers of mortality from heat wave were proportionately higher compared to cold wave in most of the years of last decade. Cold wave has been official designated a natural calamity in India from 3rd August 2012 but it is not same for heat wave.¹³ As a result people suffering from heat wave are not eligible for any government financial assistance or relief. Time has come in India to review the situation.

HEAT STROKE AND INDIA

It is apparent from the below bar chart that mortality from heat stroke in India showing an increasing trend during last 15 years.

This trend has got maximum thrust after 2009, when almost every year heat stroke is crossing the line of thousand. According to the report of IMD, major affected years for heat wave in India were 1998, 2005, 2010 etc. But 2015 heat wave related mortality has probably crossed all the previous records. In 2015 death from heat stroke recorded 5 times more compared to 2001. (Fig 3)

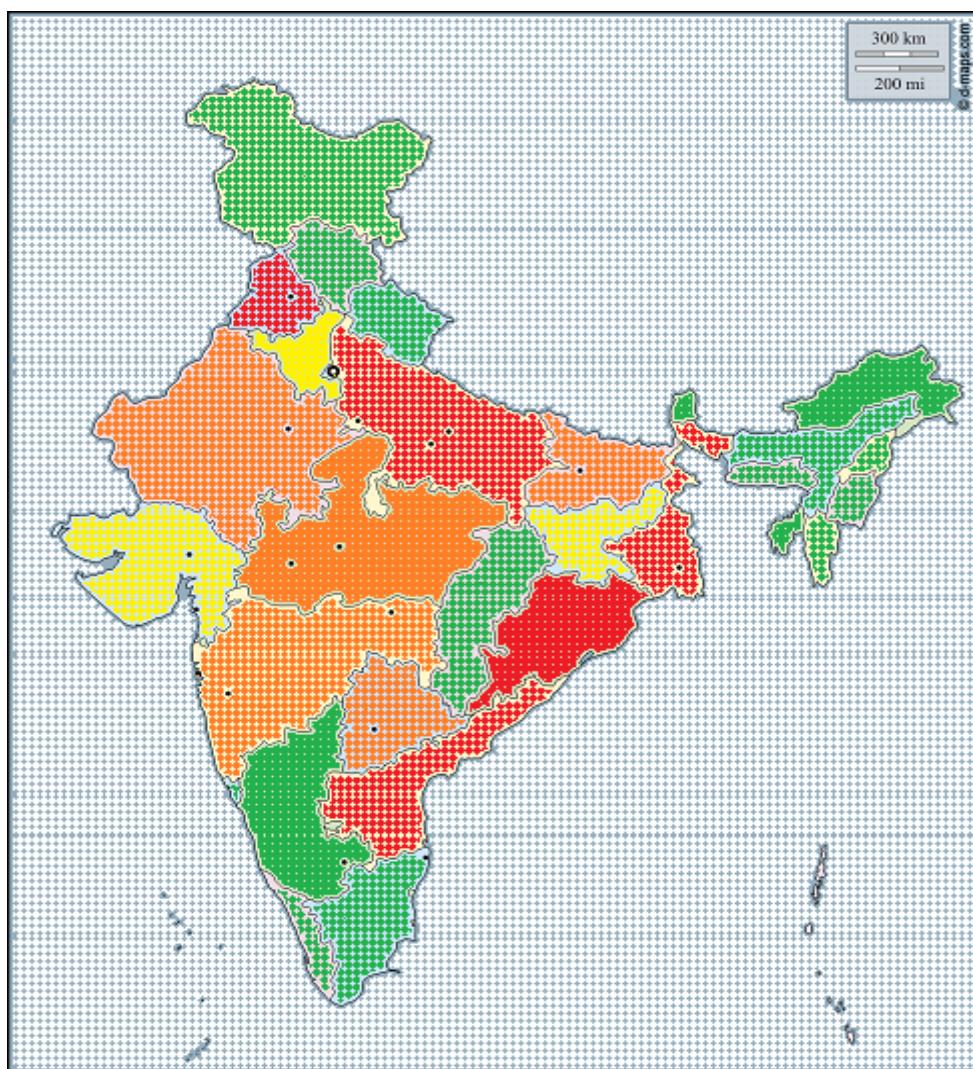


Fig 4: Distribution of mortality from heat stroke in India (2001 -2015)^{10,12,14,15,16}

Below figure shows that in India five states (Odisha, Andhra Pradesh, Punjab, and Uttar Pradesh & West Bengal) had more than 1000 deaths from heat stroke during last 15 years. Another 5 states (Bihar, Madhya Pradesh, Maharashtra, Rajasthan and Telangana) have encountered more than 500 heat wave related death during the time period. It shows that a major part of India suffers from death related with heat stroke. (Fig 4) Below table shows the major heat wave affected states in India in 2015. (Table 1) Experts say that sudden end of pre-monsoon rain and El Nino effects may be the possible reasons for this extreme heat wave ("Loo" like situation).^{17,18}

Table 1: Major affected states from heat stroke in 2015^{14,15,16}

State	No of deaths
Andra Pradesh	1,735
Telangana	585
Odisha	25
Uttar Pradesh	22
West Bengal	13

WHAT NEEDS TO BE DONE

Individual level action¹

- Avoid going out in the sun, especially between 12.00 noon and 4.00 p.m.
- Drink plenty of water and as often as possible
- Wear lightweight, light-colored, loose, and porous cotton clothes. Use protective goggles, umbrella/hat, shoes or chappals while going out in sun.
- Avoid strenuous activities when the outside temperature is high.
- While travelling always carry water with you.
- If you work outside, use a hat or an umbrella and also use a damp cloth on your head, neck, face and limbs
- If you feel faint or ill, see a doctor immediately.
- Use ORS, homemade drinks like lassi, lemon water, buttermilk, etc. which helps to re-hydrate the body.
- Keep animals in shade and give them plenty of water to drink.
- Keep your home cool, use curtains, shutters or sunshade and open windows at night.

- Use fans, damp clothing and take bath in cold water frequently.

Policy level/ administrative level action

- Government can consider of declaring heat wave as an eligible natural calamity for relief and financial assistance for the affected people
- Awareness generating programme regarding heat wave prevention strategies
- Massive mass media campaign on heat wave
- Construction of special facility for managing the heat wave related cases in the tertiary care hospital
- Rural hospitals also should be equipped with the facilities for managing heat stroke emergencies because rural areas are badly affected by heat waves
- Arrangement for drinking water facilities in major areas of the city (e.g. - traffic point, market etc.).
- Construction of water bodies in every locality
- Official instructions for avoiding outdoor activity of any kind during hot extreme conditions.
- Extensive research for identification of the cause of rising temperature and appropriate remedies

CONCLUSION

India from the geographical and environmental point of view is a land of natural calamities. Multiple studies have shown that maximum & minimum temperature of the country is rising alarmingly. Severe heat waves are expected for the country in future. Government should consider heat wave as a national emergency and develop proper remedial measures for future.

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