

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 963
TO BE ANSWERED ON WEDNESDAY, 26TH JULY, 2023**

STUDY ON GLOBAL WARMING

†963. KUNWAR DANISH ALI:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government has conducted any study on global warming during the last five years and if so, the details thereof;
- (b) whether the Government has received information about the death of large number of persons because of extreme heat wave in different parts of the country;
- (c) if so, the State-wise details thereof;
- (d) whether the Government has conducted or proposes to conduct an extensive scientific study on incidents of heat wave in different parts of the country;
- (e) if so, the details thereof including Uttar Pradesh;
- (f) whether the Government has also assessed the effect of severe heat wave on humans, plants and animals in the country;
- (g) if so, the details thereof; and
- (h) the remedial steps taken or proposed to be taken by the Government to solve this problem?

ANSWER

**THE MINISTER OF EARTH SCIENCES
(SHRI KIREN RIJIJU)**

- (a) Yes Sir. Ministry of Earth Sciences (MoES) recently has published 'Assessment of Climate Change over the Indian Region, which contains a comprehensive assessment of the impact of climate change upon the Indian subcontinent. The highlights of the report follow:
 - 1. India's average temperature has risen by around 0.7°C during 1901-2018.
 - 2. Frequency of daily precipitation extremes (rainfall intensities >150 mm per day) increased by about 75% during 1950-2015.
 - 3. The frequency and spatial extent of droughts over India has increased significantly during 1951-2015.
 - 4. Sea-level rise in the North Indian Ocean occurred at a rate of 3.3 mm per year in the last two and half decades (1993-2017)
 - 5. Frequency of Severe Cyclonic Storms over Arabian sea has increased during the post monsoon seasons of 1998-2018.

The report is available in the following link:

https://cccr.tropmet.res.in/home/docs/cccr/2020_Book_AssessmentOfClimateChangeOverT.pdf

- (b)-(c) Yes Sir. In the recent years, death due to heat wave has decreased significantly. The details of death toll due to heatwave during the recent years from 2017 to 2021 as provided by the National Crime Record Bureau (NCRB), Ministry of Home Affairs is given in Annexure-I.
- (d)-(e) Yes. India Meteorological Department (IMD) routinely monitor Climate over Indian Region and bring out yearly publication viz. Annual Climate summary” since 2004. These are available in the following link:<https://www.imdpune.gov.in/cmpg/Product/acs.html>).

IMD started issuing monthly climate summary also since April 2021. (Refer <https://www.imdpune.gov.in/cmpg/Product/mcs.php>). Annual/Monthly climate summary include information about the temperature, Rainfall and extreme weather events occurring during the concerned period.

Since last year IMD started preparing state wise Annual climate report also which is available in the following link:

https://www.imdpune.gov.in/Reports/Statewise%20annual%20climate/statewise_annual_climate.html.

Recently published met monograph on Heat and Cold Waves in India (https://www.imdpune.gov.in/Reports/Met_Monograph_Cold_Heat_Waves.pdf) analyses heat waves over India and the processes and predictability aspects of heat wave.

Also, IMD brought out web based online “Climate Hazard & Vulnerability Atlas of India” prepared for the thirteen most hazardous meteorological events including heatwave, which cause extensive damages, economic, human, and animal losses. The same can be accessed at <https://imdpune.gov.in/hazardatlas/about Hazard.html>.

- (f)-(h) IMD in collaboration with National Disaster Management Authority (NDMA) has analysed the impact of heatwave especially on human beings and has published the guidelines accordingly for general public while getting exposed to heatwave.

These guidelines are included in the Impact Based Forecast issued by IMD related to heatwave.

IMD issues forecast and warnings related to severe weather events including heat waves, in different spatial and temporal scales (seasonal, monthly and daily) and share the same with public as well as disaster management authorities so as to initiate required mitigation measures. IMD is issuing Seasonal Outlook for temperatures for the months of April, May & June for planning purpose. The seasonal outlook is followed by Extended Range Outlook issued on every Thursday for next two weeks. In addition to this, the forecast and the colour coded warnings for severe weather including heat wave warning are issued on daily basis for next five days (next seven days from July 2023) with outlook for another two days.

- ❖ During the summer period from 1 April to 30 June, IMD issues colour coded impact-based heatwave warning for the benefit of the users.
- ❖ Recent developments in Heatwave Early Warning Services of IMD follow:
 - (i) Extended range forecast bulletin (including temperature forecast and warnings for next two weeks) is issued every Thursday.
 - (ii) Information in Web-GIS is added for better interpretation of Heat Wave warnings by various users.
 - (iii) IMD kept Frequently Asked Questions (FAQ) on heat wave, NDMA Heat Wave Guidelines along with the warning in a dedicated page created in IMD website (<https://mausam.imd.gov.in/>) with the name All India Heat Wave Information.
 - (iv) IMD contributed towards the preparation of “*Guidelines for Preparation of Action Plan –Prevention and Management of Heat-Wave*” published by NDMA
 - (v) Heat Wave hazard analysis for entire country for four hot weather months (March, April, May& June) considering the Maximum Temperature, Minimum Temperature, Humidity, Wind and Frequency is being carried out. This will help in identification of hazard scores based on different meteorological parameters aggravating impact of Heat Waves.
 - (vi) For Dissemination of Heat Wave Warning, the following modes are used:
 - Mass Media, Weekly & Daily Weather Video, Internet (e-mail), ftp, Public Website (mausam.imd.gov.in)
 - IMD Apps: Mausam/ Meghdoot/DAMIN/RAIN ALARM
 - Social Media: Facebook, Twitter, Instagram, BLOG
 - (vii) IMD has recently launched experimental Heat Index to provide general guidance for the regions within India where, the apparent temperature/feel like temperature (considering the impact of Humidity along with the temperature) are on higher side causing the discomfort for the human beings.
 - (viii) As an adaptive measure, IMD in collaboration with NDMA and local health departments have started Heat Action Plan in many parts of the country to forewarn about the heat waves and also advising action to be taken during such occasions. Heat action plan became operational since 2013.

The Heat Action Plan is a comprehensive early warning system and preparedness plan for extreme heat events. The Plan presents immediate as well as longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of extreme heat on vulnerable populations. NDMA and IMD are working with 23 states prone to high temperatures leading to heat-wave conditions to develop heat action plans.

All these activities have significantly reduced the casualties related to heatwaves.

Annexure-I

State/UT-wise Number of Accidental deaths due to Heat/Sun Stroke during 2017-2021

| SN | State/UT | 2017 | 2018 | 2019 | 2020 | 2021 |
|----|-----------------------|-------------|------------|-------------|------------|------------|
| 1 | Andhra Pradesh | 231 | 97 | 128 | 50 | 22 |
| 2 | Arunachal Pradesh | 0 | 0 | 0 | 0 | 0 |
| 3 | Assam | 0 | 0 | 3 | 0 | 0 |
| 4 | Bihar | 84 | 64 | 215 | 53 | 57 |
| 5 | Chhattisgarh | 11 | 1 | 16 | 3 | 2 |
| 6 | Goa | 0 | 0 | 0 | 0 | 0 |
| 7 | Gujarat | 25 | 31 | 27 | 12 | 8 |
| 8 | Haryana | 24 | 56 | 46 | 23 | 14 |
| 9 | Himachal Pradesh | 0 | 0 | 0 | 0 | 1 |
| 10 | Jharkhand | 51 | 42 | 88 | 23 | 33 |
| 11 | Karnataka | 0 | 0 | 4 | 1 | 0 |
| 12 | Kerala | 1 | 1 | 3 | 0 | 0 |
| 13 | Madhya Pradesh | 34 | 15 | 33 | 7 | 2 |
| 14 | Maharashtra | 102 | 128 | 159 | 56 | 37 |
| 15 | Manipur | 0 | 0 | 0 | 0 | 0 |
| 16 | Meghalaya | 0 | 4 | 0 | 0 | 0 |
| 17 | Mizoram | 0 | 0 | 0 | 0 | 0 |
| 18 | Nagaland | 0 | 0 | 0 | 0 | 0 |
| 19 | Odisha | 99 | 40 | 84 | 13 | 15 |
| 20 | Punjab | 60 | 38 | 90 | 110 | 91 |
| 21 | Rajasthan | 35 | 43 | 54 | 23 | 1 |
| 22 | Sikkim | 0 | 0 | 1 | 0 | 0 |
| 23 | Tamil Nadu | 0 | 0 | 0 | 0 | 2 |
| 24 | Telangana | 180 | 107 | 156 | 98 | 43 |
| 25 | Tripura | 0 | 1 | 1 | 2 | 0 |
| 26 | Uttar Pradesh | 142 | 176 | 117 | 50 | 35 |
| 27 | Uttarakhand | 0 | 0 | 0 | 0 | 0 |
| 28 | West Bengal | 48 | 46 | 49 | 6 | 11 |
| | TOTAL STATE(S) | 1127 | 890 | 1274 | 530 | 374 |

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|----|------------------------------|-------------|------------|-------------|------------|------------|
| 29 | A & N Islands | 0 | 0 | 0 | 0 | 0 |
| 30 | Chandigarh | 0 | 0 | 0 | 0 | 0 |
| 31 | D&N Haveli and Daman&Diu @ + | 0 | 0 | 0 | 0 | 0 |
| 32 | Delhi UT | 0 | 0 | 0 | 0 | 0 |
| 33 | Jammu & Kashmir @ * | 0 | 0 | 0 | 0 | 0 |
| 34 | Ladakh @ | - | - | - | 0 | 0 |
| 35 | Lakshadweep | 0 | 0 | 0 | 0 | 0 |
| 36 | Puducherry | 0 | 0 | 0 | 0 | 0 |
| | TOTAL UT(S) | 0 | 0 | 0 | 0 | 0 |
| | TOTAL (ALL INDIA) | 1127 | 890 | 1274 | 530 | 374 |

As per data provided by states/UTs

Source: Accidental Deaths & Suicides in India

'+' Combined data of erstwhile D & N HAVELI AND DAMAN & DIU UT during 2017-2019

'*' Data of erstwhile JAMMU & KASHMIR State Including LADAKH during 2017- 2019

'@' Data of newly created Union territory
