

COMMUNITY-LEVEL ASSESSMENT OF HEATWAVES IN ODISHA STATE, INDIA: EFFECTS, RESILIENCE, AND IMPLICATIONS

Incidents of heatwave have become more frequent over the last few decades as temperatures have risen in countries around the world (CRED and UNISDR 2015). People of low socioeconomic status are most vulnerable to adverse effects of heatwaves (Kovats and Kristie 2006; Loughnan et. al. 2010).

Heatwaves have particularly affected the health, livelihood, and development pathways of low income countries (NDMA 2016). India is among the countries exposed to heatwaves, which emerged as a serious national concern in 1998 when a heatwave killed nearly 3,000 people, of whom 2,042 died in Odisha state alone (Murari et al. 2015; OSDMA 2017).

Twenty years on, heatwaves continue to be a potential threat to many of India's states, including Odisha, and its impact could become acute without adaptive capacity.

Odisha experiences heatwaves from March until June, with temperatures becoming extreme in the month of May. Few studies have explored the varied consequences of heatwaves and resilience among populations, and the mechanisms at the state level to address adverse effects of heatwaves.

To fill this gap, the Population Council conducted a study to explore perceptions of the causes and effects of heatwaves in Odisha, resilience exhibited among rural communities, and examines the state level infrastructure and institutional initiatives to strengthen responses to heatwaves.

Methodology

Data for this brief are drawn from a qualitative study conducted between April and June 2017 in a rural setting in Sundargarh district of Odisha, which is highly vulnerable to heatwaves (Map 1). Information was collected from a range of stakeholders through 23 in-depth interviews (IDI) and two focus group discussions (FGD). IDIs were conducted among community members (e.g., farmers, daily wage laborers,

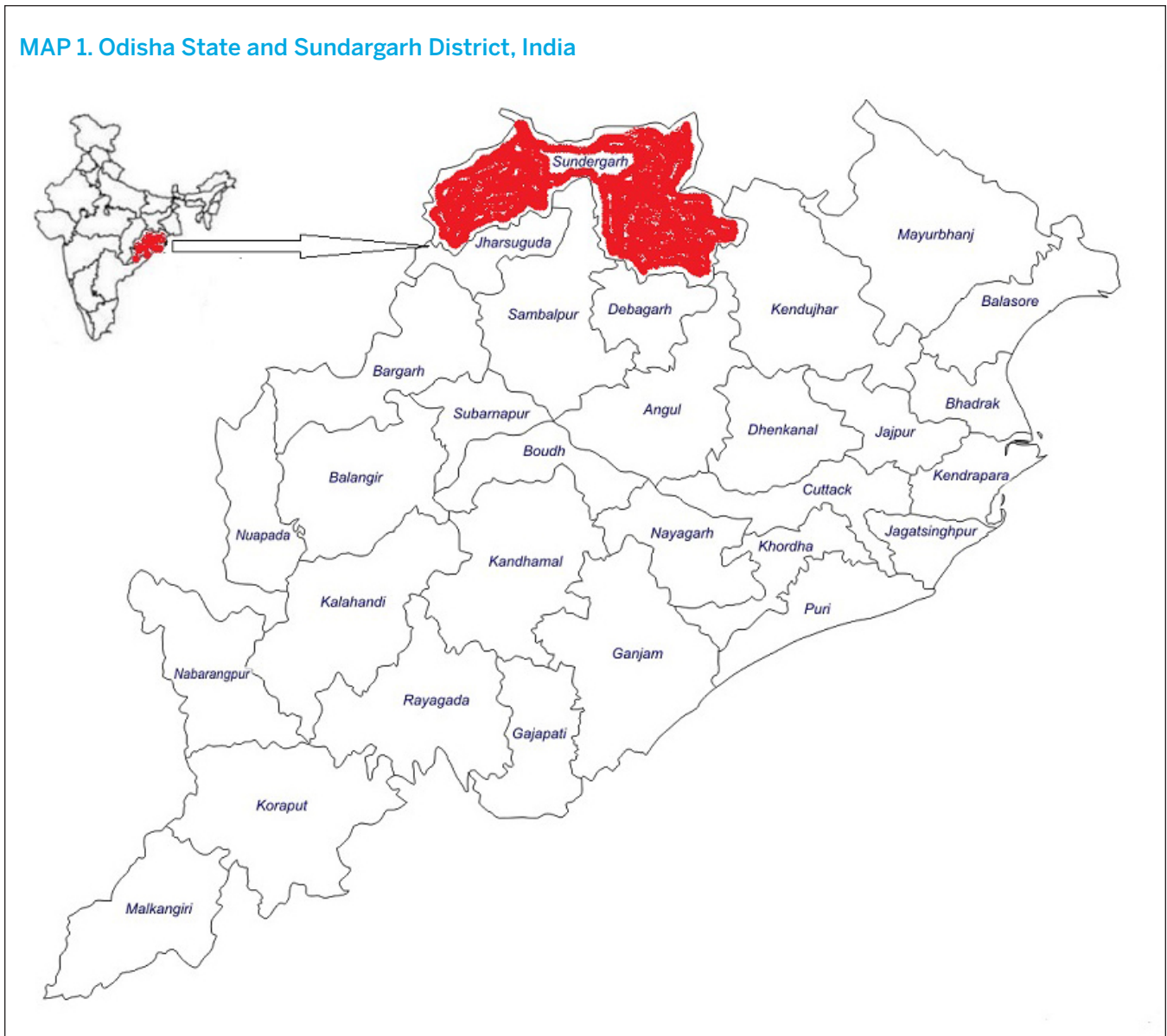


A woman collecting Tendu leaves for livelihood, Sundargarh, Odisha

A heatwave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season.

Heatwaves have acutely affected livelihoods as people find it difficult to work in the sweltering heat and are forced to either work for low wages inside, in the shade. Migration for work is also an adaptation response.

MAP 1. Odisha State and Sundargarh District, India



tribal community members, women with children, young women without children, and the elderly and disabled), and stakeholders at the panchayat, district, and state levels. A total of 10 government stakeholders were interviewed (e.g., Panchayat Office, District Emergency Office, District Health Office, District Agricultural Department, District Minor Irrigation Office, Odisha State Disaster Management Authority, State Meteorological Department, State Agriculture Department, State Directorate of Health). The FGDs were conducted separately among adult women and men in the community.

Findings

Climate change and heatwave: Perceived causes and experiences

Most participants in this study were aware of heatwaves and the link to climate change. They unanimously believed that over the last 5 to 10 years, climate change was occurring and temperatures had increased during summer months (it varies between 40 to 50 degrees Celsius). Increasing urbanization, shrinking wetlands, cutting down of plants, deforestation, burning of straws and *Mahuwa* (*Madhuca Longifolia*) leaves, construction of buildings and concrete roads, brick kilns, factories, mobile towers, power grids, and coal mining--all



Decreased water level in well, Sundargarh, Odisha

actions by humans (an anthropogenic effect)--were cited as the main reasons for the changing climate and increasing temperature. While heatwaves are not a new phenomenon for Odisha, people said rising temperatures have made the heatwaves worse.

“Our area is located in the heat zone, and the eastern part of the state is located near the sea. Thus, one side of the state has low temperature and the other side has high temperature. In our area, there are no such water bodies and forest. We have only hilly areas, so the temperature is high. Apart from that, the amount of carbon dioxide is increasing. After retirement, when I came to the village I saw there are brick kilns in and around our village which increases the temperature. This year the Government banned it, so the temperature has reduced a little. If there are brick kilns, the temperature will increase in that area because they burn coal.” (Male, 63 years, IDI)

Effects of heatwave

According to participants, heatwaves have physically and financially affected the people of Odisha. The heat has made it difficult to work, which has affected livelihoods. Water shortages due to increased temperatures have affected people, livestock, and vegetation.

Reported effects on livelihoods, food security, and livestock. Participants said that heatwaves have become more frequent and intense, disrupting lives and routines, making it difficult for people to be outside during specific hours of the day. Small

Farmers, daily wage labours, vendors, rickshaw pullers, children, pregnant women, elderly and the disabled are highly affected particularly by heatwave

businessmen, farmers, roadside vendors, daily wage labourers, rickshaw pullers, the landless, and the poor were particularly affected as workers were unable to work continuously in the heat. Participants explained that earlier, people could venture out in the summer before 10:00 am and after around 2:00 or 3:00 pm, but now it was too hot to go out between 9:00 am and 4:00 pm. Participants said that a few people did go out for work as they had no other choice. Other effects noted were that people were unable to sleep properly, which also affected their ability to work.

Children’s schooling was also affected as school buildings were made of concrete and had no fans; staying in school beyond 9:00 am became difficult, leading to children skipping school because of the heat.

Heatwaves made it much more difficult for vulnerable groups such as the elderly and disabled to do routine activities. Cases of sunstroke-related deaths were reported among the elderly.

“It is very difficult to go outside after 10:00 am and the heatwave persists up to 4:00 pm in the daytime. After 1:00 pm the hot wind blows, and it is difficult to stay inside the home in the afternoon. I usually go to the shade of a mango tree near my home. For me, it is difficult to move because my left leg and left hand are affected by polio. So, I move by an old tricycle. Riding tricycles on a bad road in this scorching heatwave is a great challenge for me. I have to ride the tricycle only with one hand, which requires a fair amount of energy and due to this I feel tired quickly. Every day, I have to go to the pond which is around 500 meters away from my home to perform daily activities like toilet and bath.” (Man with disability, 18 years, IDI)

Summary of views from the participants about enablers and continuing challenges related to heatwaves

Enablers

- *Jal chatras* (large clay communal water pots kept under a shed) and sheds at commuting points that provide water and protection from the heat are useful.
- Sunstroke and heat-preventive units have been established at CHCs and district hospitals.
- People try to avoid venturing out during the scorching heat.
- SHGs are beneficial to a certain extent in terms of livelihoods and income during heatwaves.

Challenges

- The works and livelihoods of small businessmen, farmers, roadside vendors, daily wage laborers, rickshaw pullers, the landless, and the poor are particularly affected by heatwaves.
- Heatwaves affected livestock and the livelihoods of people engaged in cattle rearing.
- Many of the water facilities such as tube wells and irrigation are not repaired or properly functional during heatwaves.
- School buildings are not constructed to standard guidelines and it difficult for students to stay in school beyond 9:00 am. Absence of fans has made the heat situation worse.
- Generation of awareness about heatwaves forecasting, healthcare, and schemes are limited at community level.

Heatwaves affect livelihoods by impacting income and increasing food insecurity, with families finding it difficult to have a proper diet during the hot period. This effect prompted many people to engage in daily wage work for low wages in nearby areas or to migrate to Bhubaneswar, the state capital, and other places outside the state (e.g., Goa, Visakhapatnam, Thimpu) in search of employment.

“We are facing many problems for food. Ponds, rivers are dried up. Due to heatwaves, people are not able to go outside for work and when there is no work, how will we get food to eat?... These four summer months, March to June are really a challenge for my family to survive. We are not able to give nutritious food to pregnant women. From Anganwadi center, we used to get 2 eggs in a week and 1.5 to 2.5 kg of Chatua (food grains) in a month but this is not sufficient for pregnant women.... Through the public distribution system (PDS), we receive 5 kg rice per head per month through the panchayat [local government], but this is not sufficient for our survival”. (FGD participant, Sundargarh)

Heatwaves also affected livestock and the livelihoods of people engaged in cattle rearing. Not only was there a paucity of vegetation for cattle rearing during the dry season, but milk from the cattle was reduced and some cows died because of the heat. Participants said that because of these experiences, people were not interesting in keeping cattle.

Reported effects on water and sanitation. The study highlighted the fact that water scarcity is a major problem during the summer season, affecting people, agriculture, and livestock. Ponds and rivers dry up during the heat, leaving few or no reservoirs of water. The lack of water also disrupted the supply of electricity, which resulted in an irregular supply of drinking water. During heatwaves, most of the ponds, wells, and tube wells dried up, and the groundwater level and water in rivers was reduced drastically. People reported having to walk a long way to fetch water for drinking, often more than one kilometer, to perform daily activities such as bathing and sometimes stand in long queues at the tube wells; such additional travels were reported to be especially problematic for pregnant women and the elderly.

Reported effects on health. Participants noted an increase in incidences of sunstroke and death related to heatwaves. Complaints about dehydration, heat cramps, and heat exhaustion during seasonal heatwaves were common. Participants listed signs and symptoms of health issues they experienced, such as weakness, sweating, swelling, fainting, dizziness, headache, body ache, vomiting, and diarrhoea. Participants also listed ailments that they or people around them attributed (correctly or incorrectly) to extreme heat: fever, malaria, jaundice, blood pressure problems, eye infection, high white cell count, and even chicken pox and sickle cell anemia. People also said that for the last three to four years, an increased number of cases of Filarial infection (infection with roundworms of the Filarioidea type). Pregnant women, and school and college students also experienced weakness and vertigo in the heat. Some participants said that common medicine that could control skin infections no longer worked and they speculated that it was due to increased temperatures.

In many instances people became sick due to heatwave and sought medical treatment, adding to out-of-pocket expenditures and financial burden, particularly affecting the most vulnerable.

“Due to heatwave the prevalence of chicken pox is affecting our family members including myself....We are farmers and have to do hard work and due to hard work in the heat we get sunstroke. The tube well water we are using is mixed with dirt particles....[and] is not sufficient to protect us from diarrhea. We are also using dirt water of the forest stream, so we are suffering from diarrhea. There is very little water in the stream and we usually take a bath in it during summer. There is no sufficient water for drinking and no water for bathing in our area...” (Male farmer, 50 years, IDI)

People also reported suffering psychologically and feeling depressed because of these health and financial consequences perceived as attributable to heatwaves.



Mahuwa flower and mango collected by villagers for livelihood, Sundargarh, Odisha



Agricultural field being fired for Podu cultivation in Sundargarh, Odisha

Resilience in the face of heatwave **Coping and adaptation mechanisms by the community.**

Participants talked about the coping strategies, people and communities used to deal with effects of heatwave.

- To stay hydrated during heatwaves, people ate cucumbers and watermelon and drank water, rice water, lemon water, soft drinks, curd water, *Jaljiraa* (a kind of spice drink in summer) and *aam panna* (mango drink), and people poured water on their heads to keep themselves cool. They also drank ORS (oral rehydration salts) supplied by *Anganwadis*.
- To keep their homes and food cool, they stored water in earthen pots and wrapped vegetables in wet clothes. People use fans and put water on screen doors. They put water on cotton

Interpretative recommendations

A list of recommendations is outlined below to meet the needs of the population as indicated by the findings:

- **Improve public health services and drinking water facilities:**

From the interviews, people would like to see an improved capacity of local public health facilities (at the village level) to address sunstroke and heat stress–related sickness. Frontline health workers could be capacitated to communicate on different preventive measures with rural dwellers. The elderly, disabled, pregnant women, and children can be identified through vulnerability-mapping and could be provided special care by training community volunteers to provide first aid. People also need to see the renovation of traditional water bodies, and maintenance of the tube wells needs to be in place for drinking purposes as well as for livestock and irrigation during heatwaves.

- **Alternate livelihood options and employment opportunities during heatwaves:**

According to the perceptions of people, a framework needs to be developed, promoted, and facilitated by local authorities for creating sustainable alternate livelihoods for people (especially for those below the poverty line) that reduce exposure to heatwave. A summer livelihood program needs to be in place that can provide indoor employment during the peak summer months (like the livelihood security approach by Self Employed Women’s Association (SEWA) in Gujarat). Strengthening and proper monitoring of existing MGNREGA works needs to be done by ensuring that adequate work days are available and wages are paid on time directly to the beneficiaries’ accounts.

- **Building public awareness and adaptive capacity:**

The most important part of heatwave resilience is creating public awareness and improving adaptive capacity among the community. People would like to see that trainings could be imparted to villagers to enhance their adaptive capacity and improve knowledge of preventive measures and schemes. Building adaptive capacity among the community can go a long way toward mitigating the effects of heatwave.

mattresses and the floor when there was no electricity in the afternoon to make the place a little cool. Other coping mechanisms included covering asbestos roofs with straw, sprinkling it with water, and repairing tiles to keep the sun out. Those with cattle sprayed water on the roof of their cattle shed.

- People mostly avoided venturing out during the scorching heat. If it was essential to go out, people carried water bottles; wore wet clothes, hats, and slippers; and shaded themselves with an umbrella or covered their heads some other way.

- People often had to compromise on the food they ate due to lack of income/resources. Often people were compelled to engage in wage labor for their survival in the scorching heat as they had no other choice for earning, but sometimes they tried to avoid working during the peak heat hours.

“What can we do? If we do not work, who will work for us? If our rice cultivation has been affected, what will we do? We are obligated to work, we have no choices left. If anyone calls us for labor work, we used to go for 7 to 8 days, sometimes for more days and earn some money. We buy rice from

the nearby town with the earned money and eat for survival. However, whether we go to the forest for collection of wood or Tendu leaves or for other labor works, we usually take drinking water with us, cover our head with a towel, and wear slippers to protect ourselves from the heatwave.” (FGD participant, Sundargarh)

“We have a child going to school from 7:00 am to 11:00 am and his mother is involved in wage-earning activities. She wants her children to study well. His mother is going for work from 6:00 am to 11:00 am and then from 3:00 pm to 6:00 pm. We are using clothes when going outside. We are taking some precautions like wearing shoes and carrying water bottles with us and even taking water rice to our worksite and stop working between 11:00 am to 3:00 pm.” (FGD participant, Sundargarh)

Measures taken by the government for heatwave

Government stakeholders said that the state government had introduced policies and adaptive measures to address challenges posed by heatwaves, among other climatic issues. Plans are also underway to renovate ponds to increase their holding capacity and to build more check dams to augment the groundwater level, to plant trees, and improve people’s awareness of the importance of saving forests. *Chahala* (water holes) were dug in the riverbank for extracting water for drinking during heatwaves. Further, the government was said to be promoting Self Help Groups (SHGs) in the community to ensure that in times of heatwave (and other climatic events) that families were secured financially and engaged in productive activities.

Some other key actions by the government for the community reported by stakeholders included:

- Change of timings at *Anganwadi* and schools to avoid the hottest hours of the day.
- Community sensitization about heatwaves by the medical officer in each block.
- Establishment of sunstroke units in community health centers (CHC) and district hospitals.

- Set up of heat-preventive rooms (rooms with air conditioners, air cooler, or some other cooling agents) from district level to the block level.
- Beds, air conditioners or air coolers, ice packs, medicines, and ORS were also made available at CHC and district hospitals.
- Under the *Gaon Kalyan Samiti* (village welfare committee), water was distributed and sheds were set up in different places, so that people could take rest.
- At community-level hubs, *Jal Chatra* (large clay communal water pots kept under a shed) were set up to serve people water in the heat of the summer (when heatwave is most prevalent).

Despite these efforts, several shortcomings were noted by community members with regard to government measures. People had not seen any major initiatives to plant trees. Community participants said that MGNREGA, the Mahatma Gandhi National Rural Employment Guarantee Act, was of limited help during heat as the wages provided under the scheme are lower than the prevailing wage rate, they were paid irregularly, and it did not provide sufficient working days. Furthermore, participants commented that more than half of the tube wells were not working, including some newly built tube wells.

“The government has installed two tube wells in the school and another is in our village. But they are not functioning properly. The water is not available and we have already informed the village head about this problem but no action has been taken yet.” (Woman with disability, 55 years, IDI)

Participants said that although some healthcare measures had been adopted, they were not adequate for addressing the effects of heatwave on health, particularly at the village level. The study highlighted how the government can do more at the local level to deal with the daily effects of heatwaves as well as recognize the shortcomings in policy measures.

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Population Council

Zone 5A, Ground Floor
India Habitat Centre, Lodhi Road
New Delhi, India 110 003
Phone: +91-11-2464 2901

For more information contact:

Sangram Kishor Patel
(skpatel@popcouncil.org)