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Original Research Article

Community perceptions of climate change, lived experiences and health in a coastal village of Odisha: a qualitative study

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ABSTRACT

Background: Climate change poses notable risks to health and livelihoods, and overall wellbeing, particularly in coastal regions of India. Rural Coastal communities face recurring adverse climatic events that disrupt daily life, health and security. However, limited evidence exists on how such communities perceive. This study examined how community perceptions, lived experiences, and adaptive responses to climate change in a vulnerable coastal village in Odisha.
Methods: A qualitative study was conducted in Penthakata, a coastal fishing village in Puri district, Odisha, between August and November 2023. 27 residents aged 50 years and above were purposively sampled. Data were collected through in-depth interviews and analysed using Framework Analysis approach to identify themes.
Results: Participants perceived clear climatic shifts, including more frequent and intense cyclones, irregular rainfall, and rising temperatures. Extreme events caused extensive housing damage, food insecurity, livelihood disruptions, school interruptions, and increased waterborne, vector-borne, and heat-related illnesses. Mental health stress and major disruptions in healthcare access were common. Fishers reported declining near-shore fish, deeper-sea fishing, and economic instability. Misconceptions and religious attributions shaped climate and disease understanding. Limited relief, inconsistent compensation, and interstate welfare ineligibility substantially heightened vulnerability.
Conclusions: Climate impacts are shaped by the interaction of environmental exposure, livelihood fragility, cultural beliefs, health-system limitations, and structural governance barriers. Interstate welfare ineligibility emerged as a critical but overlooked determinant of vulnerability. Strengthening climate literacy, culturally aligned health communication, service preparedness, compensations, and social protection access is essential.

Keywords: Climate change, Community perceptions, Lived experiences, Health impacts, Coastal vulnerability, Odisha, India

INTRODUCTION

Climate change is the long-term alteration of the Earth's average weather patterns caused by natural processes and human activities, with profound implications for ecosystems, livelihoods, and population health. It affects agriculture, water resources, health, and the economy, leading to extreme weather events, altered precipitation, sea-level rise, biodiversity loss, and adverse health outcomes.[1] According to the World Health Organization (WHO), climate change threatens fundamental determinants of health, including clean air, safe drinking water, adequate nutrition, and safe shelter, potentially reversing decades of health gains.[2]

In India, climate change manifests through floods, cyclones, and heat waves, causing immediate and long-

term health consequences.[2] Floods, intensified by changing rainfall patterns, increase the risk of waterborne diseases, injuries, displacement, and healthcare disruption.[3,4] In 2019, India recorded 219 flood incidents, affecting over 13 million people and causing 1,700 deaths (NDMA, 2020).[3] According to a study conducted in Bihar, flood-related disorders such as diarrhea were much more prevalent in flood-affected areas.[5] Cyclones disrupt coastal livelihoods and increase hospital admissions for diarrhea and respiratory infections, as observed during Cyclone Phailin in Odisha.[2] Heat waves pose additional risks, with the 2015 heat wave in India claiming approximately 2,500 lives, primarily in Andhra Pradesh and Telangana.[6] Climate change also contributes to malnutrition, stunting, wasting, and increased incidence of infectious diseases in vulnerable populations.[7,8]

Communities residing in low-lying coastal regions face compounded vulnerabilities due to socioeconomic disadvantage, limited health infrastructure, and repeated exposure to climate hazards. Community perceptions of climate change are essential for designing locally relevant adaptation and public health interventions.[9] However, limited research has captured how coastal communities in India perceive, experience, and respond to climate-related changes affecting their health and livelihoods.[9,10]

This study explores the perceptions and lived experiences of climate change among residents of Penthakata village in Puri district, Odisha, to inform contextually appropriate adaptation strategies and strengthen community resilience.

METHODS

Study design

This study employed a qualitative research design to explore the lived experiences and community perceptions of climate change among residents of a climatically vulnerable coastal area in Odisha, India. A qualitative approach was selected to capture the depth, complexity, and contextual nuances of community experiences that cannot be quantified through structured surveys.

Study setting

The study was conducted in Penthakata village of Puri district from August to November 2023. Penthakata, is Odisha's largest fishing settlement, spanning 1.42 square kilometres along northern coastline of Puri, situated approximately 40 meters from the high tide-line. It falls within Wards 26 and 32 of Puri municipality and lies between Chakra Tirtha Road and the Bay of Bengal.

According to the 2011 census, the village has a population is 15,323, comprising 7,739 males and 7,584 females across 3,047 households. Many families migrated from the neighbouring state of Andhra Pradesh in the last 30 to 150 years ago, and Telugu continues to be the dominant language spoken within the community. Despite its origins as a traditional fishing settlement, occupational diversification has occurred over generations, with residents now engaged in fishing, fish trade, daily wage work, construction labour, and small businesses.

The sex ratio is 964 females per 1000 males. Literacy remains low, with only 50% of the individuals aged ≥7 years able to read and write in at least one language.

Penthakata was selected due to its proximity to the coastline and recurrent exposure to cyclones, storm surges, and sea-level rise, making it an appropriate context for exploring community-level experiences of climate change.

Study participants and sampling

Inclusion criteria

Men and women aged 50-70 years, residents who have lived in the coastal area of Puri district for ≥10 years

Exclusion criteria

Individuals aged <50 or >70 years, recent migrants (residing <10 years).

This age group was purposively selected to capture long-term experiences, intergenerational knowledge, and observations of environmental change over decades. Communities living close to coastlines are among the most climate-exposed, experiencing sea-level rise, cyclones, coastal erosion, and livelihood disruptions.

A purposive sampling strategy was used to identify information-rich participants with first-hand experience of climate events. A total of 27 in-depth interviews were conducted. Sample size was guided by data saturation, defined as the point at which no new themes emerged from subsequent interviews.

Data collection

Data were collected through in-depth interviews (IDIs) using a semi-structured, open ended interview schedule developed based on the study objectives. The schedule covered themes such as - perceptions of climate change, perceived causes, experiences during extreme weather events, impacts on fishing, income, migration and daily life, perceived health effects, access to and utilisation of health services.

Interviews were conducted in the Telugu language at a time and place convenient to participants. Each session lasted 45-60 minutes. Both verbal and written informed consent were obtained. All the interviews were audio-recorded with permission and supplemented with field notes documenting contextual observations.

Necessary ethical approvals were sought from the Institutional Ethics Committee (IEC) of IIPH,

Bhubaneswar (IIPH-B/IEC/2023/08). The purpose and procedure of the study were clarified to the study participants, and their consent was obtained before conducting the interview. The interview was conducted at a time and place convenient to them. In the interview, the identification, audio recordings, and data provided by the participants were kept confidential. The data were not shared with anyone outside the research team.

Data analysis

Data were transcribed verbatim and translated into English. Data were analysed using the Framework Analysis approach, which involved familiarisation, development of thematic framework, indexing, charting, and interpretation. This method enabled systematic organisation while preserving contextual meaning. Coding and thematic development were carried out using QDA Miner Lite software. Themes were developed inductively and refined through an iterative process to ensure they accurately reflected participants lived experiences and perceptions.

RESULTS

A total of 27 participants (both men and women aged above 50 years) from Penthakata village, Puri district, Odisha, were interviewed. The findings are presented under eleven thematic domains.

Socio-demographic and educational characteristics of study participants (n=27)

A total of 27 students participated in the study. Of these, 16 (59.3%) were males and 11 (40.7%) were females. With respect to educational level, 15 students (55.6%) were studying in the 5th class, 4 (14.8%) in the 7th class, and 8 (29.6%) in the 9th class.

Table 1: Socio-demographic and educational characteristics of study participants (n=27).

Variable	Category	N	%
Sex	Male	16	59.3
	Female	11	40.7
	Total	27	100
Class of study	5th class	15	55.6
	7th class	4	14.8
	9th class	8	29.6
	Total	27	100

Distribution of participants by gender and occupation (n=27)

A total of 27 participants were included in the study. Of these, 16 (59.3%) were males and 11 (40.7%) were females. Among male participants, 12 (44.4%) were fishermen and 4 (14.8%) were fish sellers. Among female participants, 7 (25.9%) were engaged in fish selling, while 4 (14.8%) were daily wage labourers. Overall, fishing-related occupations constituted the majority of livelihoods, with 23 (85.2%) participants involved either as fishermen or fish sellers.

Table 2: Distribution of participants by gender and occupation (n=27).

Gender	Occupation	N	%
Male	Fishermen	12	44.4
	Fish sellers	4	14.8
Female	Fish sellers	7	25.9
	Daily wage labourers	4	14.8
Total		27	100

Theme 1: Community observations of changing climate patterns

Participants described noticeable shifts in climatic behaviour over recent decades, particularly in cyclone characteristics, rainfall patterns, and temperature. While most associated these changes with climate change, a few indicated limited understanding of the concept.

Cyclones were widely perceived as more frequent, more intense, and of longer duration. Participants repeatedly emphasised heavier rainfall and stronger winds, often resulting in extensive structural damages. As one participant observed, "*Cyclones are more now with more intensity of rainfall and winds compared to a few decades back; all the houses are damaging*." Many recalled this with earlier decades, when cyclones were shorter and less destructive.

Rainfall patterns were also perceived as increasingly irregular and insufficient. Several described reduced seasonal rainfall and more prolonged periods of cloudy but rainless weather. One participant recalled, "*During my childhood rains were seasonal with more rainfall; now no rains but all the time cloudy*."

Most respondents reported increasing summer heat, describing progressively unbearable temperature. One participant noted, "*Feeling so hot during summer compared to before, and year by year temperatures are increasing; can't bear the heat*." A minority perceived no major temperature changes.

Theme 2: Community perceptions of the causes of climate change

Understanding of climate change causation varied widely and included scientific, personal, and religious explanations.

Some participants mentioned human-related factors such as pollution, population growth, coal burning, and

deforestation. However, a large proportion reported having "no idea" about specific causes. Religious attributions were common, with several attributing climatic changes to divine will or human wrongdoing. As one participant stated, "*All the changes in climate are happening because of God; without God nothing will happen*." Another added, "*Humans are making a lot of mistakes so all the climate changes are due to human sins*." When probed about scientific explanations, participant often responded with uncertainty, "*Yes, people say these are reasons, but no idea*."

Theme 3: Lived experiences during extreme weather events

Participants described multidimensional hardships during cyclones, which affected housing, food security, education, income, health, and daily functioning.

All reported extensive damage to homes. One participant recalled, "*Shelter damaged, wiped out whole houses in the community during Fani cyclone; we were so scared*."

Food insecurity was common, with damaged shelters, limited resources, and increased food prices making cooking difficult. One participant shared, "*During cyclones, we are unable to cook… outside all the prices were increased to purchase*."

Education disruptions were widespread due to damaged school infrastructure. One participant explained, "*Schools are damaged and it will take 2 weeks or more to resume; children's learning is affected*."

Fishing – the primary livelihood was severely affected, causing prolonged income loss. One participant said, "*If we don't go fishing, it will affect the economy… during cyclones we can't go fishing or any work for one month*."

Participants described contamination of water sources, causing rashes and skin problems after bathing. One participant stated, "*After taking a bath we have rashes and itching after rainfall; water is supplied by the municipality*."

Health problems included injuries, fever, vomiting, diarrhea, dengue, typhoid, and malaria.

Theme 4: community perceptions of changing fishing patterns

Participants reported marked changes in fishing patterns, fish availability and fishing practices.

Many attributed declining fish populations to large mechanized boats. One participant stated, "*Fishing quantity is reduced because large boats are taking all the small fishes; we are not getting the same species we used to get 20 years back*."

Participants reported moving to deeper waters with engine-enabled boats, unlike earlier periods without mechanisation. One participant added, "*We are now going deep into the sea-our boats have engines now; before, there were no engines*."

Reduced catch volumes created economic instability, prompting adaptive but costly fishing practices.

Theme 5: Perceived impacts of climate change on health

Participants described health problems linked to cyclones, rainfall, and heat.

Cyclones-related injuries were common among fishermen due to debris, waves, and damaged shelters. "*Injuries are more frequent to fishermen during cyclones… debris will hit the fisherman, and near houses the iron sheets will hit us*."

Rainfall was linked to increased waterborne diseases: fever, diarrhea, vomiting, malaria, dengue, and typhoid. "*During rains or soon after we usually get fever, diarrhea, vomiting, malaria, dengue, and typhoid*."

Rising temperatures were linked to headaches, dehydration, and fainting. "*During summers we feel so hot; we get headaches, sometimes faint, and get fevers*."

Some participants expressed misconceptions, such as typhoid and COVID-19 being caused by mosquitoes. Others linked diseases to divine will or human sins. "*Typhoid fever is common here because of mosquitoes, and COVID is increasing due to mosquitoes; all these changes we think God is doing because of human sins*."

Mental health stress was a recurrent theme due to damage, income loss, and uncertainty. "*During cyclones our houses are damaged… no fishing… very difficult to run the family, so we are stressed*."

Some participants reported community level increases in chronic diseases such as cancers, uterine tumors, hypertension, and diabetes. "*In this village, many of them have tumors in the uterus and cancers are also more common nowadays… Also, blood pressure and diabetes are increasing*."

Theme 6: Health system assistance during climatic emergencies

Most participants sought care from government hospitals, though access was significantly disrupted during cyclones. Some travelled to nearby districts or private hospitals. "*We usually go to government hospitals… but during cyclone time everything is disrupted, so we go to nearby districts and sometimes to private hospitals in case of emergency*."

Challenges included long travel times, unavailability of medicines, and costs. "*When we go to government*

hospitals, we don't get all the medicine… you have to purchase outside." While newly upgraded primary health centres were close (5 minutes), older facilities required 30–40 minutes of travel.

Dissatisfaction with government services led many to prefer private care despite higher costs. Reconstruction after cyclones took months, sometimes up to a year, requiring loans for survival. "*Recent cyclone destroyed all our houses; it took one year to rebuild. We didn't go fishing for one month and had to borrow loans to survive*."

Theme 7: Assistance during climatic emergencies

Participants reported limited external support, relying primarily on community solidarity and local NGOs. "*No one comes here to help; only the government announces evacuation, and an NGO named SPANDAN helps us if there are any difficulties*."

Transportation assistance was absent, requiring families to reach safe locations on their own. Food distribution was inconsistent and perceived as low quality. "*Government gives food during cyclones, but it's not very good; some eat, others don't*."

Theme 8: Compensation issues from the government

Participants reported gaps in compensation by government. Most reported receiving no financial support for deaths or shelter damage. "*One woman died due to lightning, and didn't get any compensation*."

Only a few received ₹1 lakh for shelter loss, others received nothing despite submitting documents. "*They announced it and collected many documents, but no money was given to us*."

Theme 9: Care-seeking interruptions for vulnerable groups

Extreme weather events disrupted care-seeking for children, pregnant women, and older adults. "*During cyclones, it is very difficult to take care of children, pregnant women, and older people*."

Families predominantly relied on self-management due to mobility barriers and disrupted services.

Theme 10: Structural factors contributing to vulnerability

Residents highlighted several structural and administrative barriers that heightened their vulnerability. Many participants reported difficulty accessing public health insurance in Odisha because their health cards were issued in Andhra Pradesh. Similarly, they were unable to avail benefits under the Public Distribution System (PDS), as their agricultural land and property remained registered in Andhra Pradesh. "*We don't get any PDS benefits here; government health insurance cards also won't work because we have all our properties in Andhra*."

These jurisdictional overlaps and administrative constraints limited access to essential health and nutrition services, exacerbating vulnerability during climatic events.

DISCUSSION

This study explored how residents of Penthakata-a socially marginalised and climatically exposed coastal settlement in Odisha-perceive and experience climate change and its implications for health, livelihood, and access to essential services. The findings indicate that communities are observing substantial environmental shifts, facing multidimensional vulnerabilities, and navigating structural constraints that amplify climate-related risks. These results are broadly consistent with evidence from coastal South Asia demonstrating increasing climate variability, inadequate public health preparedness, and disproportionate impacts on marginalised populations.[11,12]

Perceptions of changing climate and local ecological shifts

Participants consistently reported increasing cyclone frequency and intensity, irregular rainfall, and rising temperatures. These reports align with documented climatic trends in Odisha, including severe cyclones such as Phailin, Fani, and Amphan.[13-15] The community's recognition of longer and more destructive cyclonic events corresponds with scientific assessments linking warming sea surface temperatures to intensified cyclogenesis in the Bay of Bengal.[16] Similarly, community-reported reductions in predictable monsoon rainfall and increasing heat mirror national climate assessments indicating erratic monsoon behaviour and sustained warming in eastern India.[17,18]

These findings reinforce the importance of integrating local experiential knowledge into climate monitoring and adaptation planning.

Understanding of climate change causes

Participants exhibited limited scientific literacy about climate change, often attributing climatic changes to divine will, fate, or human "sin". Similar patterns have been documented in coastal communities in Bangladesh and Andhra Pradesh where traditional belief systems shape risk interpretation.[19,20] While a minority connected climate change to pollution and deforestation, uncertainty was widespread. This underscores the persistent gap in climate literacy, suggesting that risk communication must be culturally grounded and community-specific.[21] Recognising the role of spirituality and local beliefs is essential for designing communication strategies that resonate with fishing communities like Penthakata.

Lived experiences during extreme weather events

Participants described severe disruptions during cyclones - including loss of shelter, food insecurity, interrupted schooling, livelihood constraints, water contamination, vector-borne diseases, and injuries. These narratives reflect established evidence regarding the disproportionate physical, social, and economic impacts of cyclones on coastal communities in Odisha.[13,22] The high vulnerability of fisher households, due to their dependence on weather-sensitive livelihoods, parallels findings from coastal Tamil Nadu and Andhra Pradesh.[23,24]

The study adds to this evidence by capturing granular, household-level experiences-particularly the intersection of infrastructure damage, income loss, and emotional distress.[25]

Changing fishing patterns and livelihood impacts

Participants' accounts of declining fish availability, shifts in species composition, and increased dependence on engine-equipped boats correspond with ecological research showing climate-driven changes in marine ecosystems in the Bay of Bengal.[26,27]

Importantly, fishers also highlighted anthropogenic pressures, particularly mechanized trawlers, as major contributors to reduce near-shore fish stocks-consistent with CMFRI findings on livelihood stress among small-scale fishers.[28]

These combined environmental and human pressures intensify livelihood precarity, leading to debt cycles and reduced adaptive capacity.

Health impacts and misconceptions

Participants reported a range of climate-sensitive illnesses-fever, diarrhea, dengue, malaria, dehydration-as well as chronic conditions such as hypertension, diabetes, cancers, and uterine tumours. The linkage between extreme weather and infectious diseases is widely documented.[29-31]

However, the presence of misconceptions-e.g., "typhoid caused by mosquitoes" or "COVID-19 spread by mosquitoes"-reflects major gaps in health literacy. Similar misinformation has been reported in disaster-affected coastal communities with limited health communication reach[31,32]

Participants also attributed some illnesses to divine causes, highlighting the role of belief systems in health interpretation, and underscoring the need for culturally sensitive public health messaging.

Psychosocial stress linked to damaged houses, income loss, and prolonged uncertainty aligns with global evidence on the mental health burden of climate-related disasters.[33]

Healthcare access and preparedness during climatic events

The study documents significant disruptions in healthcare access during cyclones due to transportation barriers, unavailability of medicines, and reliance on costlier private care. These findings mirror research from cyclone-affected districts of Odisha showing that road damage, power outages, and overburdened facilities constrain the health system's surge capacity.[13,34]

Reports of government facilities lacking medicines reflect systemic issues in supply-chain reliability and resource allocation.[35,36]

The reliance on self-evacuation and community support observed in this study further suggests gaps in disaster preparedness, early-warning integration, and last-mile service delivery.

Assistance and compensation

Participants described limited formal assistance, inconsistent food distribution, and gaps in compensation, especially for shelter damage. These experiences are consistent with evaluations of post-cyclone relief in Odisha highlighting bureaucratic delays, eligibility inconsistencies, and inequitable benefit distribution.[25,37]

Perceived inequities in compensation may erode trust in state-led disaster management mechanisms, reinforcing the importance of transparent and participatory governance.

Care-seeking interruptions and vulnerability factors

Care-seeking interruptions for children, pregnant women, and older adults align with global evidence of heightened vulnerability among these groups during disasters.[38,39] A uniquely salient finding in this study is the administrative mismatch between Andhra Pradesh-linked welfare cards and residency in Odisha, which restricts access to PDS and state health insurance. This interstate eligibility barrier is a structural determinant of vulnerability and has received little attention in previous climate-health research.[40] The study highlights how policy and governance misalignments can magnify ecological vulnerability, limiting adaptive capacity despite geographic proximity to health facilities.

Limitations

This study is limited by its qualitative design and small, purposively selected sample from a single coastal village, which restricts generalizability. Findings are based on self-reported and retrospective accounts and may be influenced by recall bias and personal beliefs. Only older adults were included, excluding perspectives of younger age groups. The study also lacked triangulation with climatic or health

system data, and minor loss of nuance may have occurred during translation.

CONCLUSION

This study deepens understanding of climate vulnerability in coastal India by documenting how a socially marginalised fishing community in Odisha perceives and experiences climate change. It shows that climate impacts arise from the interaction of environmental exposure, livelihood dependence, cultural beliefs, health-system limitations, and governance barriers. A key contribution is the identification of interstate welfare ineligibility as a critical yet under-recognised factor that exacerbates climate vulnerability. As climate extremes intensify, the findings highlight the need for community-informed adaptation strategies that strengthen climate literacy, culturally appropriate health communication, health-system preparedness, transparent compensation mechanisms, and equitable access to social protection to build resilience in coastal fishing communities.

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