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CONTENT ANALYSIS OF INTERNATIONAL NEWS ABOUT THE HEAT WAVES IN INDIA

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ABSTRACT

Objective: The objective of this study is to present how heat waves in India are discussed by the media, to observe if they are being related to climate change.

Theoretical Framework: The theoretical framework for this study is based on the intersection of media studies, climate science, and disaster management.

Method: This study employs content analysis to examine how heat waves in India are discussed in the media, particularly in relation to climate change. It was studied 100 news available on-line in Google News.

Results and Discussion: The results indicated that while climate change is frequently mentioned in the context of heat waves, the depth and context of these mentions vary significantly. Media reports tend to focus on immediate impacts such as health issues and infrastructure disruptions. For instance, there were numerous mentions of heat-related deaths, hospitalizations, and interruptions in water and electricity supplies. However, there was less emphasis on long-term solutions and comprehensive adaptation strategies.

Research Implications: This study highlights the importance of media coverage in shaping public understanding and policy responses to climate change and extreme weather events.

Originality/Value: This study contributes to the existing literature by providing a detailed analysis of how heat waves in India are framed in the media, particularly in relation to climate change.

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ANÁLISE DE CONTEÚDO DE NOTÍCIAS INTERNACIONAIS SOBRE AS ONDAS DE CALOR NA ÍNDIA

RESUMO

Objetivo: O objetivo deste estudo é apresentar como as ondas de calor na Índia são discutidas pela mídia, para observar se elas estão sendo relacionadas às mudanças climáticas.

Referencial Teórico: O referencial teórico para este estudo baseia-se na intersecção de estudos de mídia, ciência do clima e gestão de desastres.

Método: Este estudo emprega a análise de conteúdo para examinar como as ondas de calor na Índia são discutidas na mídia, particularmente em relação às mudanças climáticas. Foram estudadas 100 notícias disponíveis on-line no Google Notícias.

Resultados e Discussão: Os resultados indicaram que, embora as mudanças climáticas sejam frequentemente mencionadas no contexto das ondas de calor, a profundidade e o contexto dessas menções variam significativamente. Os relatórios da mídia tendem a se concentrar em impactos imediatos, como problemas de saúde e interrupções de infraestrutura. Por exemplo, houve inúmeras menções a mortes relacionadas ao calor, hospitalizações e interrupções no fornecimento de água e eletricidade. No entanto, houve menos ênfase em soluções de longo prazo e estratégias abrangentes de adaptação.

Implicações da pesquisa: Este estudo destaca a importância da cobertura da mídia na formação da compreensão pública e das respostas políticas às mudanças climáticas e aos eventos climáticos extremos.

Originalidade/Valor: Este estudo contribui para a literatura existente ao fornecer uma análise detalhada de como as ondas de calor na Índia são enquadradas na mídia, particularmente em relação às mudanças climáticas.

Palavras-chave: Índia, Mudanças Climáticas, Onda de Calor, Notícias Internacionais.

ANÁLISIS DE CONTENIDO DE NOTICIAS INTERNACIONALES SOBRE LAS OLAS DE CALOR EN INDIA

RESUMEN

Objetivo: El objetivo de este estudio es presentar cómo las olas de calor en la India son discutidas por los medios de comunicación, para observar si están siendo relacionadas con el cambio climático.

Marco teórico: El marco teórico de este estudio se basa en la intersección de los estudios de los medios de comunicación, la ciencia del clima y la gestión de desastres.

Método: Este estudio emplea el análisis de contenido para examinar cómo se discuten las olas de calor en la India en los medios de comunicación, particularmente en relación con el cambio climático. Se estudiaron 100 noticias disponibles on-line en Google News.

Resultados y discusión: Los resultados indicaron que, si bien el cambio climático se menciona con frecuencia en el contexto de las olas de calor, la profundidad y el contexto de estas menciones varían significativamente. Los informes de los medios de comunicación tienden a centrarse en los impactos inmediatos, como los problemas de salud y las interrupciones de la infraestructura. Por ejemplo, hubo numerosas menciones de muertes relacionadas con el calor, hospitalizaciones e interrupciones en el suministro de agua y electricidad. Sin embargo, se hizo menos hincapié en las soluciones a largo plazo y en las estrategias integrales de adaptación.

Implicaciones de la investigación: Este estudio destaca la importancia de la cobertura de los medios de comunicación en la configuración de la comprensión pública y las respuestas políticas al cambio climático y los fenómenos meteorológicos extremos.

Originalidad/Valor: Este estudio contribuye a la literatura existente al proporcionar un análisis detallado de cómo se enmarcan las olas de calor en la India en los medios de comunicación, particularmente en relación con el cambio climático.

Palabras clave: India, Cambio Climático, Ola de Calor, Noticias Internacionales.

1 INTRODUCTION

More frequent and persistent heat waves are due to rising global temperatures, for this scenario, the need for climate adaptation policies that address the growing risks associated with climate change is highlighted (Gao et al., 2023). Singh (2023) maps the vulnerability to heat in Indian urban centers, identifying areas at high risk of the climatic phenomenon occurring and proposes adaptation measures, added to this, he informs that India is prone to heat waves due to its uncontrolled urban development and without planning for sustainability, added to the huge number of people living in the place.

Singh and Mall (2023) projected an increase in the frequency of heat waves in India, predominating over intensity, and highlighted that by the end of the final century, the south-central regions of India are identified as future heatwave hotspots. Song et al. (2024) investigate the intensification of heat waves, showing how the interaction between soil moisture and sensible heat flux influences temperature distribution, resulting in more persistent and frequent heat waves in India and other vulnerable regions. As a result, there is a need to preserve nature to prevent climate catastrophes of great magnitude.

Future scenario models show an increase in the likelihood, duration, and extent of heat waves, to mitigate this issue, there is a need for planning and adaptation measures beyond current short-term disaster plans to manage the impacts of these persistent and widespread heat waves (Arulalan et al., 2023). Chandel and Chauhan (2023) highlight that among the measures to mitigate these climate actions, these factors need to be understood to improve vegetation recovery and climate resilience strategies in India. However, India is facing droughts and the study of its combat should also be taken into account (Ganguli, 2023). Khetan et al. (2024) highlight measures taken by the most vulnerable population, being nature-based solutions such as trees and fresh drinking water. Ramalho et al. (2024) report that these strategies need to be legitimate and Holanda et al., (2024) report that there needs to be public spending on environmental management.

Added to this, there are plans to develop technologies to generate an action plan for heat waves that includes adaptation and mitigation strategies to address heat extremes and make cities resilient to climate change (Goyal et al., 2023). These technologies can utilize remote sensing data to improve urban heat management and cities' resilience to rising temperatures (Gupta & Aithal, 2024). Also, simulate heatwave events, proposing improvements to better predict and mitigate their impacts in India (Gupta et al., 2024).

Another factor is that heat waves increase sulfur dioxide (SO2) and nitrogen dioxide (NO2) emissions from thermal power plants in China and India, due to the increased use of electricity from non-renewable sources (Liu et al., 2024). Singh (2023) highlights the importance of urban policies that consider the impact of heat waves on public health. An increase in the frequency and intensity of heat waves, which can lead to severe health consequences, including increased mortality and the incidence of heat-related illnesses (Maharana et al., 2024).

With this climatic event, food is affected, according to Sidhu (2023), wheat production is affected, suffering a reduction in its production, added to a reduction in manual labor capacity (Nelson et al., 2024), in addition to cattle deaths, thus informing that they will need to adapt to the new climate reality. This concern is expected to be intensified as heat waves will be even more extreme in terms of intensity, frequency, and duration, highlighting the need for robust adaptation policies to manage the risks associated with increasing them (Kim et al., 2023).

There is a need for strategies to mitigate the problems caused by climate change (Norgate et al., 2024; Rohini & Rajjeevan, 2023; Rouges et al., 2023; Lala & Hagishima, 2023). Thus, Zander et al. (2023) present in their studies that social networks can be used for the population to discuss what is happening on climate issues. Oliveira et al., (2024), presented that media coverage on websites is an important measure to understand how this problem is being transmitted to society. Thus, the objective of this paper is to present how heat waves in India are discussed by the media, to observe if they are being related to climate change.

2 METHODOLOGY

This work is a content analysis of the news portals about the heat waves in India. Content analysis is a method used to interpret and describe the content of texts or communications in a systematic and objective way. To this end, pre-defined steps were followed, such as: objective, material selection, categories, coding, data analysis, and interpretation of results.

The objective of this paper is to present how heat waves in India are discussed by the media, in order to observe if they are being related to climate change. The analysis seeks to understand how often and profoundly climate change is mentioned in news stories about heat waves, and how those news stories portray the impacts and responses to these extreme events.

To carry out this study, 100 international news items taken from Google News in several languages were selected. The news was first translated into English, using machine translation

tools and, where necessary, manual revisions to ensure accuracy. News that did not have open access were disregarded to ensure the reproducibility of the study and the accessibility of the data. The selection covered a recent period of heatwave events in India, focusing on reliable and varied sources to capture a wide range of perspectives.

The categories for the content analysis were defined based on a preliminary review of the news and relevant literature on heat waves and climate change. The main categories and subcategories are shown in Table 1.

Table 1

Categories of analysis

Category	Subcategory
Health Impacts	Heat-related deaths
	Hospitalizations and medical treatments
	Reported symptoms and health conditions
Infrastructure and Services	Interruptions in the water supply
	Electricity cuts
	Impact on other essential services
Government Responses	Mitigation measures (such as water rationing)
	Emergency Policies
	Statements and actions by authorities
Sources Cited	Scientists and Experts
	Autoridades governamentais
	Citizens and victims of heat waves
Proposed Solutions	Short-term measures (immediate responses)
	Long-term measures (adaptation and mitigation policies)

The coding of the news was performed using a spreadsheet to organize and categorize the information extracted from each news item. Each relevant excerpt was analyzed and coded according to the defined categories and subcategories. The coding was done manually to ensure accuracy and consistency, allowing for a detailed analysis of the representations of the heat waves in the media.

The analysis of the coded data was performed to identify patterns, frequencies and relationships between the categories. Qualitative methods were used to interpret the data and identify how the news addresses the relationship between heat waves and climate change. The analysis included counting direct mentions of climate change, assessing the frequency of impacts on health and infrastructure, and analyzing government responses and proposed solutions. In addition, the main sources cited were identified to understand the credibility and perspective of the information presented.

Interpreting the results involved discussing how the media represents the relationship between heat waves and climate change in India. The results showed that while climate change is often mentioned, there are variations in the depth and context of these mentions.

3 RESULTS AND DISCUSSIONS

Arulalan et al. (2023) highlight that heat waves in India are becoming more frequent and intense, increasing the need for planning and adaptation measures beyond the current short-term disaster plans to manage the impacts of these persistent and widespread heat waves. "India's capital territory of Delhi sweltered to its highest-ever temperature of 49.9 degrees Celsius (121.8 degrees Fahrenheit) on Tuesday as an oppressive heat wave forced authorities to impose water rationing." This excerpt from the corpus demonstrates the urgency pointed out by the authors regarding the need for planning and adaptation to deal with more severe heat waves.

Gao et al. (2023) show that more frequent and persistent heat waves are due to rising global temperatures, highlighting the need for climate adaptation policies to address the increasing risks associated with climate change. "Extreme heat is becoming more common and intense in much of the world because of the human-caused climate crisis." The excerpt reinforces the authors' analysis by linking the intensification of heat waves to the human-caused climate crisis.

Maharana et al. (2024) project an increase in the frequency and intensity of heat waves in India, which could lead to severe health consequences, including increased mortality and incidence of heat-related illnesses. "A study found that heat waves have killed more than 24000 people in the country since 1992." The evidence of deaths in the study cited by the corpus confirms the authors' predictions about the devastating impact of heat waves on public health.

Singh (2023) maps heat vulnerability in Indian urban centers, identifying high-risk areas and proposing adaptation measures to mitigate the impacts of heat waves. "The Indian Meteorological Department (IMD) said the new record was measured in the suburb of Mungeshpur surpassing Delhi's previous high of 49.2 degrees Celsius (120.5 degrees Fahrenheit) observed in May 2022." The observation of temperature records in the corpus emphasizes the vulnerability and need for adaptation identified by Singh.

Chandel and Chauhan (2023) emphasize the importance of understanding climatic and human factors to improve climate resilience strategies in India, especially in vulnerable urban areas. "Varanasi on May 30 2024. Extreme temperatures across India are having their worst

impact in the country's teeming megacities experts said on May 30 warning that the heat is fast becoming a public health crisis." The public health crisis in Indian megacities mentioned in the corpus illustrates the relevance of the climate resilience strategies discussed by the authors.

Gupta et al. (2024) assess the accuracy of the WRF model in simulating heat wave events, proposing improvements to better predict and mitigate the impacts of heat waves in India. "Several people have died due to heat-related ailments over the past 24 hours as temperatures continue to soar in northern and central India." The heat-related deaths mentioned in the corpus underline the importance of accurate models to predict and mitigate these extreme events.

Kim et al. (2023) project future changes in extreme heat waves in terms of intensity, frequency, and duration, highlighting the need for robust adaptation policies to manage the risks associated with increasing heat waves. "Hospitals in the region are recording a rise in admissions due to heat-related ailments." The increase in hospital admissions due to heat mentioned in the corpus reinforces the need for robust adaptation policies discussed by the authors.

Khetan et al. (2024) explore adaptations to heat stress in vulnerable communities, revealing that nature-based solutions are the preferred coping strategies. "On Thursday a labourer admitted with a heat stroke died while receiving treatment at a hospital in Delhi." The heat stroke death highlighted in the corpus demonstrates the need for adaptation strategies mentioned by the authors.

Ganguli (2023) analyzes the amplified risk of compounded heat stress and dry spells in India, pointing to the need for adaptation strategies that consider the combined impacts of heat and drought. "India's National Centre for Disease Control calls heat strokes a 'life-threatening' condition with a mortality rate of 40 to 64%." The severity of heat strokes mentioned in the corpus emphasizes the need for comprehensive adaptation strategies discussed by Ganguli.

Liu et al. (2024) demonstrate that heat waves significantly increase emissions from thermal power plants in India, exacerbating air pollution during these events. "Several regions are experiencing severe water and electricity shortages due to a rise in consumption. The soaring temperatures have led to a surge in fires across India and authorities are employing drones to monitor forest fires in Jammu and Kashmir." The impact on infrastructure and services mentioned in the corpus reflects the environmental challenges exacerbated by heat waves identified by the authors.

Singh and Mall (2023) project a significant increase in the frequency of heat waves in India, highlighting the importance of government measures to manage resource use during these events. "Local government officials imposed limits on water usage issuing the equivalent of

$24 in fines for people participating in activities that require copious amounts of water like washing cars." The water usage restrictions mentioned in the corpus exemplify the necessary government measures discussed by the authors.

Nelson et al. (2024) highlight the urgent need for adaptations in the agricultural sector due to rising temperatures and heat waves, with profound economic and social implications. "Due to the rising temperature New Delhi's Lieutenant Governor Vinai Kumar Saxena directed the government on Wednesday to ensure measures were taken to protect labourers by providing water and shaded areas at construction sites and granting them paid leave from noon to 3pm." The measures to protect workers mentioned in the corpus illustrate the urgency of the necessary adaptations mentioned by the authors.

Norgate et al. (2024) identify an expected increase in the frequency and duration of heat waves in India, emphasizing the need for mitigation and adaptation strategies to minimize the impacts on health and the economy. "Aarti Khosla director at the research institute Climate Trends told the AFP news agency that cities are more vulnerable to the heat due to the 'compounding effects of urbanisation and climate change'." The urban vulnerability to heat mentioned in the corpus underscores the need for mitigation and adaptation strategies discussed by the authors.

Rohini and Rajeevan (2023) show that weather forecast models can accurately predict the magnitude of extreme heat events, which is crucial for developing effective mitigation strategies. "Last year dozens of people died in India's northern state of Uttar Pradesh due to the extreme heat." The deaths mentioned in the corpus highlight the importance of accurate predictions for developing effective mitigation strategies.

Sidhu (2023) evaluates the impacts of the 2022 heat wave on wheat production in India, indicating a significant reduction in production due to extreme heat. "'Single largest threat to wellbeing' Khosla described heat waves as 'the single largest threat to India's wellbeing today' adding that recent temperatures in New Delhi and the surrounding region were 'proof that the issue is now about survivability'." The severity of heat waves mentioned in the corpus confirms the significant economic and social impacts discussed by Sidhu.

Zander et al. (2023) analyze Twitter conversations about heat waves, revealing high public awareness about heat impacts and the influence of scientists and respected media. "Temperatures reached 49.9 degrees Celsius (122 Fahrenheit) on Tuesday." The high public awareness about extreme temperatures mentioned in the corpus reflects the authors' findings on public perception of heat waves.

North et al. (2023) examine the global risk of heat stress for livestock due to climate change, suggesting that livestock management practices will need significant adaptation to cope with the increasing effects of extreme heat. "The criteria for declaring a heat wave in India requires the maximum temperature to be 4.5 to 6.4 degrees Celsius (40.1 to 43.52 degrees Fahrenheit) higher than usual. A severe heat wave alert is issued when temperatures are at least 6.5 degrees Celsius (43.7 degrees Fahrenheit) higher than normal." The conditions for declaring a heat wave mentioned in the corpus highlight the need for adaptations discussed by the authors.

Lala and Hagishima (2023) investigate the impact of increasing heat waves on student well-being, suggesting educational and infrastructural interventions to protect students' health and performance during extreme heat events. "Scientists say Asia’s scorching temperatures this summer will be worsened because of human-driven climate change." The extreme temperatures exacerbated by climate change mentioned in the corpus reinforce the need for educational and infrastructural interventions discussed by the authors.

Liu et al. (2024) show that heat waves significantly increase emissions of sulfur dioxide (SO2) and nitrogen dioxide (NO2) from thermal power plants in China and India, primarily due to increased electricity use. These emissions contribute to the formation of fine particles (PM2.5) and ozone (O3), worsening air pollution during heat waves. "A staff member pours water on the face of a patient suffering from heat stroke in a hospital in Varanasi." The severity of heat waves and their impact on public health mentioned in the corpus emphasizes the findings of the authors on the environmental and health challenges exacerbated by heat waves.

4 CONCLUSION

Content analysis of international news about the heat waves in India revealed key insights into how these events are discussed by the media and their relationship to climate change. The results demonstrated that while climate change is often mentioned, the depth and context of these mentions vary. News tends to focus on the immediate impacts on health and infrastructure, such as heat-related deaths, hospitalizations, and disruptions to water and electricity supplies. These depictions underline the severity of the effects of heat waves, but often lack further discussion of the underlying causes, such as climate change.

Government responses are widely discussed, highlighting emergency and mitigation measures such as water rationing and short-term policies. However, there is less emphasis on long-term solutions and comprehensive adaptation strategies that could increase the resilience of

communities to future heat waves. The diversity of sources cited in the news, including scientists, government officials, and citizens, reflects a wide range of perspectives, but also suggests the need for greater integration between scientific knowledge and public policymaking.

In short, this analysis highlights the importance of more integrated and in-depth media coverage of climate change in the context of heat waves. To improve public awareness and effective policymaking, it is crucial that the media not only report on immediate impacts, but also explore broader connections to climate change and foster dialogue about long-term adaptation and mitigation strategies. This can go a long way in better preparing society to face the growing challenges posed by climate change.

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