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GLOBAL TRENDS IN CLIMATE COMMUNICATION RESEARCH ON PRINT MEDIA

ABSTRACT

This article reports on a bibliometric investigation of peer-reviewed research articles on climate change reporting in the press, primarily in newspapers, from January 2013 to December 2023. The results indicate that while there has been a general increase in the amount of climate communication research, it is heavily tilted towards high-income countries in terms of the region of research focus and the host countries of the authors. Moreover, the discipline was found to be restricted in its discussion of public response and the influence of stakeholders in climate conversations. Additionally, the study points to an emerging pattern of interconnectedness between research on communication of global health crises like Covid-19 and climate change. The study highlights an urgent need for diversity in accommodating voices from the Global South for more holistic growth of climate communication.

Keywords: climate change, climate change press, climate communication, climate reporting, Global South

INTRODUCTION

Climate change-related discourses have dominated the global stage for decades. Traditionally, these discourses focused on concerns involving fossil fuel consumption by high-income economies and, in the recent past, emerging economies. This has led to a rise in atmospheric carbon dioxide and, in turn, a rise in unnatural climate variability (World Meteorological Organisation, 2023; Hansen *et al*., 2013), resulting in large-scale destructive environmental phenomena like floods, droughts, the rise in sea levels, and heat waves (Calvin *et al*., 2023).

The United Nations Environment Programme (UNEP), along with the World Meteorological Organisation, established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to assess the threat of anthropogenic climate change. The IPCC is now considered an authoritative scientific voice around the world for mitigation efforts. While discussions of

climate change and mitigation efforts at their core are rooted in science, the material consequences of environmental degradation and ecological crises have brought such discussions to the foreground of international politics, with nations coming together to discuss climate change as a defining issue of our time as a part of the United Nations Framework Convention on Climate Change (UNFCC) at the Conference of Parties (COP) meetings held every year since 1995.

This has also led to the evolution of climate change as a topic of contention among world nations. Anthropogenic climate change has become integral to national agendas and international diplomacy as various countries like the United States of America and China, or entities like the European Union – the major carbon-emitting groups – attempt to protect their economic and environmental interests against international pressure (Hansen *et al*., 2013). Therefore, climate change as a discursive concept, as it is understood today, goes beyond the geographical destructions caused by it to include issues of geopolitical consequences like habitat loss, global health emergencies, and financial crises (Dryzek *et al*., 2011).

Communicating information about these crises brought about by climate change, and the realisation of a sense of urgency in formulating mitigative policies to the general public, continues to be a challenge that plagues the scientific community (Moser, 2016). The science of climate change is considered “difficult to perceive and understand” for lay audiences (Moser, 2016: 6), and it is said that the general public often encounter and form opinions on climate change and related discourses through news media (Hase *et al*., 2021). The media plays a significant role in framing public opinion and tend to influence public policy across the globe (Carmichael & Brulle, 2017; Weingart *et al*., 2000). In recent years, there has been heightened interest in the academic study of climate change coverage in mass media.

The present article explores different facets of such research to reveal patterns that may help further the goals of climate communication as a discipline. A bibliometric investigation of peer-reviewed research articles on climate change reporting in the press, primarily in newspapers, from January 2013 to December 2023, was conducted. The review is based on the following parameters: the publication year, the geographical regions of focus, the geographical region/s the first author/s belongs to, the topics of focus, and the themes of discussion. The study also seeks to identify the major themes that have emerged in newspaper-centred climate change communication research in the past decade and attempts to shed light on the importance of research on traditional print media-based climate communication in a world where traditional print media is also taking a digitised life online as subscription-based e-papers and online news portals, even in low and middle-income regions of the world.

These regions (referred to as the Global South in this article), despite their relatively lower carbon footprints, have been disproportionately bearing the consequences of climate change (Calvin *et al*., 2023) compared to the wealthier nations of the Global North. This review, therefore, attempts to understand the themes of climate communication research in such regions of the world and compare them with those of high-income regions.

PREVIOUS RESEARCH

Several systematic studies on media-centred climate change communication have been conducted over the years. Schäfer and Schlichting (2014), in their meta-analysis of 133 peer-reviewed articles on media representations of climate change, found that research activities in the field had risen over time and that the sphere of analysis for such articles was expanding to include more countries with the popularisation of the field. Their meta-analysis also revealed that research on newer media systems was flourishing despite a considerable amount of existing literature on print media in Western countries. Other studies (Agin & Karlsson, 2021; Comfort & Park, 2018) also found the field to be "methodologically limited", while focusing more on Western print media. The present study seeks to draw from the existing systematic and bibliometric reviews to understand whether any significant themes can be constructed from the selected literature throughout the period of study.

METHODOLOGY

This study borrows from the methods suggested by Denyer and Tranfield (2009) in the construction of a systematic literature review. The current study included articles written in English and published in peer-reviewed journals from 2013 to 2023, with climate change reporting in the print media as the primary focus. Initially, a total of 1035 items were identified from ScienceDirect, Scopus, and Web of Science databases using search terms like "climate change press", "climate change media", "climate communication and print media", and "climate communication and press". Using the advanced search engine to specify the study period and exclude review articles, book reviews and other non-peer-reviewed, and non-open access materials in the selected databases, the number of articles for consideration were brought down to 261. Further screening of abstracts and keywords to ensure that the studies exclusively dealt with print media and climate communication left the researchers with 107 articles, out of which 61 were selected based on screening the full text as depicted in the PRISMA flow diagram (Figure 1).

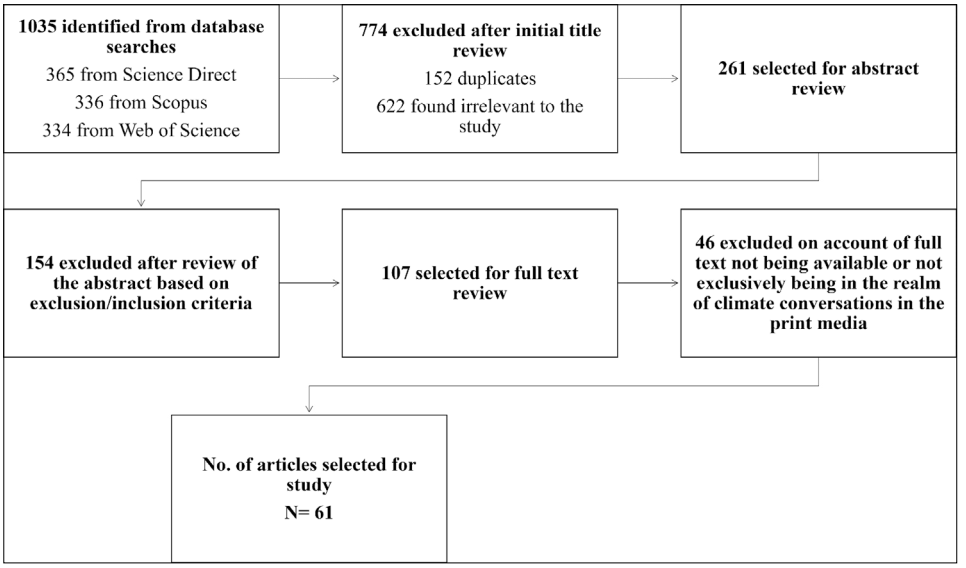

FIGURE 1: PRISMA FLOW DIAGRAM FOR THE ARTICLES SELECTED FOR STUDY

RESULTS

The present study adopted a two-step process in analysing the 61 identified research articles: quantitative analysis of the metadata related to publication year, geographical locations, and publication venue followed by a thorough thematic analysis of the selected articles. The results indicate that there is an increased interest in the field, with 18.03 % (n=11) of all the articles reviewed having been published in 2023. The growth rate of interest in the field is also stable, with n=5 from the sample articles being published in 2018 and 2019, n=7 published in 2020 and 2021 each, and n=9 published in 2022. In keeping with the growth patterns in the previous years, more than 70% of the articles that were found relevant to the study appeared in the latter half of the period of study (2018-2023). Thus, the results indicate that there is a stable upward trend in the growth of the field and that research in climate change reporting in the press continued to grow, even as new media systems gained prominence in the late 2010s and early 2020s.

Geographic regions in focus

To gain a clearer understanding of geographic representation in the research related to climate change reporting in the press, a broader geographical classification of world regions by The World Bank (The World Bank, 2017) was used. Figure 2 shows that approximately half of the studies associated with climate change reporting in the press have Europe and Central Asia (n=30) as the focus regions. However, the data did not contain any Middle East and North Africa (MENA) focused press-centric climate change-related studies in English for the period under investigation. This is

especially interesting as many Middle Eastern and North African economies depend on oil and natural gas resources found in the region, the use of which is credited with the increase in carbon emissions and, subsequently, the rise of anthropogenic climate change. The MENA region is also considered one of the most climate-vulnerable regions of the world, with the region warming at a rate above the global average (Calvin *et al*., 2023). For countries already struggling with the effects of endless civil wars, refugee crises, a global pandemic, and fossil fuel-dependent economies, the mounting threat of anthropogenic climate change is a pressing problem, and the absence of significant studies from the region is glaring.

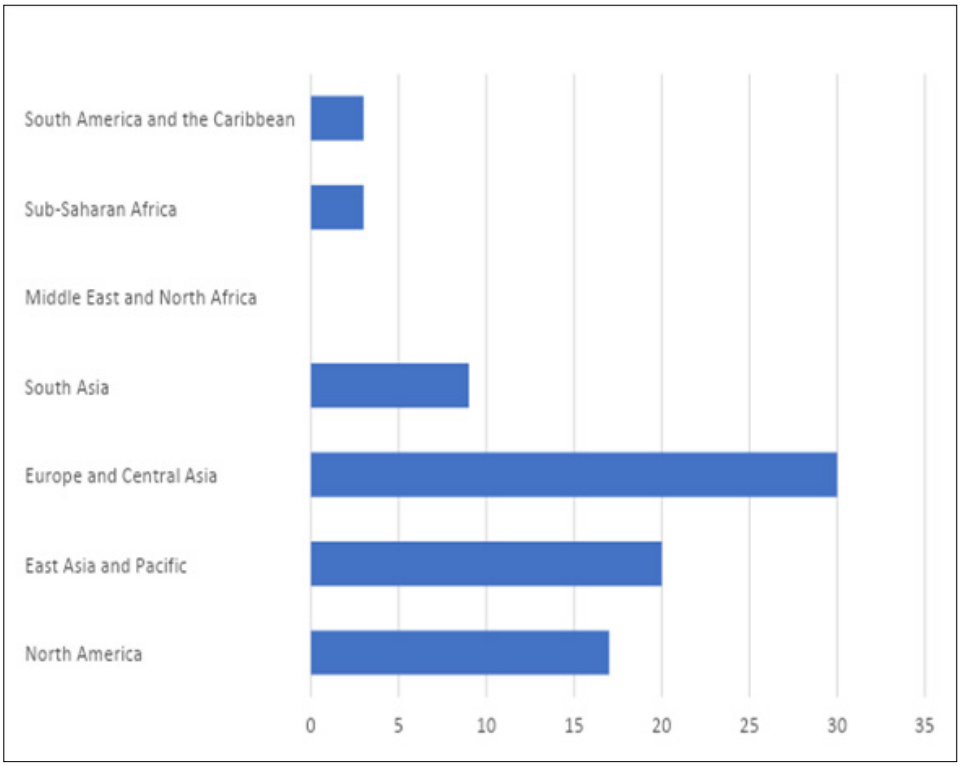

FIGURE 2: GEOGRAPHIC REGION IN FOCUS

A significant number of research articles selected for review also focused on East Asia and the Pacific (n=20) and North America (n=17). N=9 articles were found to be based on South Asian regions, while n=3 reported on South America and the Caribbean (Rudge, 2021; Dayrell, 2019; Kleinen-von Königslöw *et al*., 2019) and sub-Saharan Africa (Mulaudzi & Kioko, 2022; Günay *et al*., 2021; Hase *et al*., 2021) respectively. These results indicate an apparent disparity between the high-income and low or middle-income regions in the amount of research produced on climate change communication, which may result from linguistic differences and the dominance of English in academia.

Host country of the first author

To understand whether there is a concentration of scholarship in specific countries or regions, an analysis of the data related to the host countries or country of affiliation of the authors of the selected articles was explored (Figure. 3). Here, the maximum number of articles (n=11) appeared to have originated from the United States of America, followed by the United Kingdom (n=10). Among Asian countries, China appeared to be the origin point of the highest number of articles at six. The graph indicates that the countries from the Global North have more articles published in journals indexed in the major databases selected for the study when compared to the ones from the Global South.

Interestingly, while the meta-analysis of regions of focus revealed that n=18 articles focused on East Asia and the Pacific, a look into the host countries of the first authors revealed that only n=8 articles (Das, 2019; Yacoumis, 2018; Chand, 2017; Freeman, 2017; Irwansyah, 2016; Xie, 2015) originated in countries from the region, as mentioned earlier. In a similar vein, while n=9 articles discussed press behaviours on climate change in South Asian regions, only one article was found to have originated in a South Asian country, namely, India (Umamaheswaran *et al*., 2022).

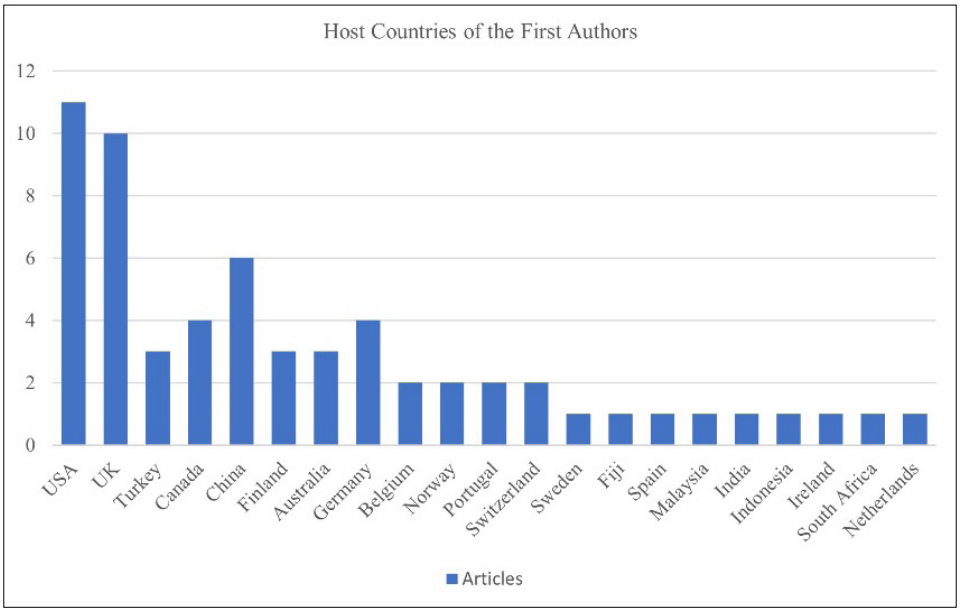

FIGURE 3: ARTICLES AND THEIR COUNTRIES OF ORIGIN

Thus, while studies on press reporting on climate change topics in East Asia and the Pacific, as well as South Asia, are present on the global stage, a significant amount of this research, in English at least, is conducted outside of these regions. The trend may align with the fact that institutions in high-income economies often offer better funding and opportunities than those in developing economies.

Topical distribution

An analysis of the diverse topics covered in the selected research articles reveals general patterns of representation, which subsequently could prove useful for mapping future studies in the area. The popular topics for consideration included the state of representation of perceived causes or consequences of climate change in the press (Berglez & Lidskog, 2019; DeLaurier & Salvador, 2018; Painter & Schafer, 2018; Cody *et al*., 2017), the representation of public discourses related to climate change in the media (Baykal Fide, 2022; Cooley, 2022; Uzelgun & Castro, 2014), and longitudinal analysis of the reportage of climate change and related issues in the press over a period of time (Shea *et al*., 2022; Umamaheswaran *et al*., 2022; Hase *et al*., 2021; Bohr, 2020; Lyytimäki *et al*., 2020).

Studies also increasingly dealt with topics like climate scepticism, uncertainty, and bias (Gunster *et al*., 2018; Rice *et al*., 2018; Brüggemann & Engesser, 2017; Bailey *et al*., 2014; Uzelgun & Castro, 2014). Some of the studies discussed topics like the relationship between public policy and the media when it comes to climate change (Cooley, 2022; Yagodin, 2021; Kleinen-von Königslöw *et al*., 2019), the representation of domestic climate policy issues in the foreign media (Schouten *et al*., 2023; Tavares *et al*., 2020), as well as the differences in the reportage on climate change between countries in the developed and developing world (Schouten *et al*., 2023; Wang & Downey 2023; Hase *et al*. 2021).

Additionally, some studies looked at the relationship between economic development and climate change in the media (Rudge, 2021; Yacoumis, 2018), linguistic choices in the representation of climate change and related discourses, and the presence of news values in climate change (Moernaut *et al*., 2019; Dahl & Fløttum, 2017). Research following the Covid-19 pandemic on climate change reportage also dealt with the effects of the pandemic on climate reporting (Augé, 2023; Stoddart *et al*., 2023; Lyytimäki *et al*., 2020). Overall, the results show that the vast majority of the research in the discipline is preoccupied with representation issues related to climate change and the media's role in communicating climate change-related discourses to influence public perception.

Thematic representations

The thematic analysis of the selected studies brings forth an understanding of the commonalities and differences in the studies based on their chosen topics of discussion. The qualitative thematic analysis of the sampled articles revealed that research in the field has been primarily occupied with exploring patterns of representation of climate change and related issues to the general public. The results of the studies indicate an increasingly common trend of studying print media representation of climate change as a political issue (e.g., Cooley, 2022; Kleinen-von Königslöw *et al*., 2019). Studies from the Global North that focus on the respective regions are concerned with the representations of climate change and their effect on the public understanding of the term or the effect of the representations in internal politics. For example, Almiron and Zoppeddu (2015) and Berglez and Lidskog (2019) studied Spain, Italy, and Sweden's

cultural perceptions and their effect on the representation issues chiefly concerned with the responsibility of climate change. These studies engage with the media's portrayal of topics like meat eating, wildfires, or cyclones within the context of climate change and how such portrayals reveal the internal conflicts of the particular geographic region. A large number of studies from the Global North touch upon the representation of climate change science in traditional media (e.g., Rice *et al*., 2018; Ruiu, 2021). However, these studies are predominantly concerned with the representation of uncertainty, bias or hypocrisies relating to climate science, as well as the debates surrounding climate scepticism.

Studies focusing on the low to middle-income economies, on the other hand, are at least partially preoccupied with the representation of "blame"; that is, the responsibility associated with climate change when it comes to the use of fossil fuels and the effect such discourses have on public perceptions at national as well as international level (Chen & Zhao, 2022; Pan *et al*., 2021; Das, 2020). These studies also deal with the disconnect in the representation of climate change and related discourses in various print media (Baykal Fide, 2022; Cooley, 2022) as well as the representation of climate action, policy actions at national and international level, climate justice, humanitarian activities to mitigate the effects of climate change, climate finance, and the cost of mitigative action (Chen & Zhao, 2022; Das, 2019, 2020). The results of the studies examined indicate climate action and its economic cost as major frames in traditional media (Manzo & Padfield, 2016). Studies also focus on the representation of environmental values in the news and strategies for communicating the science of climate change (Moernaut *et al*., 2019; Dahl & Fløttum, 2017).

The trends in the thematic preoccupations of the selected articles show that while there are shared interests in the manner of representation of climate change issues in the Global North and Global South, the studies from the Global North tend to focus on the representation of climate science with respect to scepticism, bias or uncertainties. In contrast, the studies from the Global South are preoccupied with correlating the representation of climate science with public policy issues, as well as mitigation efforts.

Additionally, Covid-19 was found to have an impact on climate communication research. Post-pandemic studies (Augé, 2023; Stoddart *et al*., 2023; Lyytimäki *et al*., 2020) have pointed out an apparent decline in the reportage on climate change and related discourses during the Covid-19 crisis as reports of the pandemic took precedence over other crises. However, the studies also pointed to the interconnectedness between communicating the science and politics of the pandemic and communicating the science and politics associated with climate change due to similar strategies and challenges involved in the communication of both crises.

DISCUSSION AND CONCLUSION

The results of the review of research on print media representations of climate change strongly indicate a corroboration with the results of previous studies performed on media-centred climate change literature (Dhaher & Gümüş, 2022; Agin & Karlsson, 2021; Comfort & Park, 2018; Schäfer & Schlichting, 2014). As other studies have

revealed, there is a consistent level of interest in the field of print media-centred climate change communication, which has continued to increase over the period of study. However, the results also reveal a repetition of patterns that have plagued the field since its inception. While the lack of representative studies from the Global South has long been pointed out by various researchers, more needs to be done regarding the same. While it can be argued that the results of this study are limited by the databases used for data collection, Scopus and Web of Science, and their intensely Global North-centric nature when it comes to scientific literature, the counterargument remains that the visibility of print media-centric research in Global South research is low owing to their geographic locations and linguistic differences. This is corroborated by the general state of research in climate science from the Global South, as revealed by the Carbon Brief Project (Tandon, 2021), which looked at the 100 most cited studies in the field of climate research, only to find that 90% of the studies originated in North America, Europe or Australia. The media concerns in these countries might also differ vastly from those in the low and middle-income regions. Pasgaard *et al*. (2015) state that the production of climate knowledge in more affluent countries is concerned with cooler climates, while Global South concerns deal with hotter climates. The present study also noted that the MENA regions that rely on a fossil fuel economy and have relatively higher temperatures that keep on rising at a faster rate every year have very little literature originating in the countries of the region concerning the communication of anthropogenic climate change. Furthermore, the predominance of English language research over other languages remains a concern (Bahji *et al*., 2023) that contributes to the exclusion of scientific research in languages from the Global South. This lack of research, or lack of visibility of research, from the Global South regions is worth noting as these countries remain the worst affected regions regarding climate change (Calvin *et al*., 2023).

While a more recent review (Agin & Karlsson, 2021) explored the methodological and, to an extent, the geographical limitations of these kinds of research, the current review takes it further by highlighting the role of geographical and holistic developmental aspects in climate communication research. Similarly, while the lack of visibility of research from the Global South has long been discussed, a practical solution for the problem has not yet been identified. Additionally, climate communication, in general, has undergone significant changes in a post-pandemic world, with researchers also having to consider the effect of the Covid-19 crisis on the communication of climate events. Challenges in pandemic communication, such as science denial, anti-vaxx movements, and health diplomacy, are also intricately connected with the communication of anthropogenic climate change. Therefore, research in both arenas is bound to influence each other.

To conclude, while the field of press-centric climate change communication research dominates media-centric research, it faces a significant number of challenges. At present, the lack of geographical, methodological, theoretical, and thematic diversity curbs not only the growth of the discipline, it also contributes to the public understanding of science and its subsequent effect on policy decisions. Because anthropogenic climate change poses such a multifaceted and complex threat to

collective human health and well-being, academic voices from the worst-affected regions must also be heard. As there are huge differences between the developed and developing regions of the world in multiple latitudes, such as economic development, energy structure, and climate characteristics, the research in climate communication in these developing countries requires a collective effort from all corners of the world. There is also a need for interactions between the researchers of climate communication and the practitioners (journalists, media organisations, etc.) to better understand the communication goals and the effects of such communication in the real world. Therefore, the diversification of topics, methodological approaches, and nurturing the growth of media-centred climate change research in climate-vulnerable regions remain the key focus for the field's growth.

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