Systematic Review

Health Equity in Climate Change and Health Policies: A Systematic Review

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Abstract: The complex interconnections between climate change policies and health equity are well established, and policy research to understand the health impacts of climate change in multiple domains is growing. Policy analysis theories/frameworks are an important aspect of policy analysis. Many frameworks exist to understand the health equity considerations in policies across various disciplines and the health impacts of climate change-related policies in the health and climate change sectors. However, a closer examination is required to understand whether there is explicit attention to health equity issues in relation to climate change policies in an integrated way. This systematic review attempted to identify existing health equity-focused policy analysis frameworks for understanding health equity considerations in climate change and public health policies. Eight papers were identified through five database searches. Policy analysis frameworks exploring the integration of health equity and climate change are fragmented, and frameworks encompassing several aspects of the policy-making process could not be found. Problem framing and policy-focused solutions were common approaches to understanding health equity in climate change policies. Concepts of social determinants of health and social justice were central to the intersection of climate change and health equity.

1. Introduction

Health equity and climate change are closely interconnected [1]. Climate change affects health through multiple pathways, including direct impacts from heat waves, floods and storms, increased spread of communicable disease vectors, and air pollution, among others [2]. Indirect effects of climate change on health include food insecurity, risks to mental health after disasters, and increased malnutrition [3,4]. Health equity is central to the discussions about climate change as the health effects of climate change are amplified in the most vulnerable groups (children and elderly, pregnant women, socially marginalized groups, and people with underlying health conditions) [5]. Health equity in times of climate change is increasingly becoming a strategic priority within various international organizations and policy-creating platforms, including the United Nations Framework Convention on Climate Change (UNFCCC) [6], the Kyoto Agreement in Paris, Sustainable Development Goals (SDGs) [7], World Health Organization's (WHO) Commission on Social Determinants of Health (SDOH) [8], or the Intergovernmental Panel on Climate Change (IPCC). Efforts are also made at national levels for concentrated action to reduce the health equity effects of climate change [9].

The concept of equity can differ in the health and climate change sectors. The WHO defines equity as "the absence of avoidable, unfair, or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically or by other means of stratification" [10]. "Health equity" or "equity in health" implies that ideally, everyone should have a fair opportunity to attain their full health potential and that no one should be disadvantaged from achieving this potential [11]. Equity in the context of climate change is more about sharing both the burdens and opportunities of the global transition to low-carbon development. The UNFCCC ties equity to "common but differentiated responsibilities and respective capabilities (CBDRRC)", where they distinguish between the responsibilities of developed and developing countries to combat climate change. They emphasize the need for developed countries to take the lead in addressing climate change as they are responsible for most of the greenhouse gas emissions and have more capacity in terms of financial and technological resources [12]. Equity is also one of the core elements of sustainability, and having equity pro-climate change policies lead to more sustainable development [13]. In the context of health equity, environmental justice is a common concept used in the environmental health space to ensure equity for all [14]. It is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. However, it is a broad concept encompassing principles and policies and a social movement seeking to eliminate the disproportionate impacts of environmental health hazards on affected communities [15].

Policies are crucial to promoting health equity by addressing the social, economic, and environmental determinants of health [16,17]. Policy analysis is often conducted to understand how and why governments enact certain policies and their consequences on intended outcomes [18]. There are many definitions of policy analysis based on the context in which it is used. Approaches to policy analysis also depend largely on the scope of the analysis and the discipline where it is conducted. Nonetheless, there is a consensus in terms of the purpose of "policy analysis" to identify a policy problem, assess the differential impact of proposed and/or existing policies, identify potential policy options and compare policy options to determine the most effective, efficient, and feasible one [19].

Policy analysis as a research method lacks a unified definition in terms of the methods, and little guidance is offered in the literature on conducting a robust and comprehensive policy analysis [19,20]. Kayesa Shung (2021) [21], Walt et al. (2008) [22], and Mwije (2013) [23] have highlighted inconsistencies and critiqued the current methods of conducting policy analysis owing to their limitations to account for all the factors contributing to the eventual decision making and policy actions. Concerns have been raised on the ability of these methods to capture the dynamic process of policymaking, providing a limited understanding of the policy and further questioning the authenticity of information generated on the policy process [24]. Policy (theoretical) frameworks or policy analysis frameworks to gather insights from diverse and multifaceted areas of policymaking have been suggested [25]. These policy analysis frameworks characteristically address policy process, content, and performance and are believed to provide more clarity and conceptual footing for conducting policy analysis [26].

1.1. Policy Analysis Approaches in Climate Change and Health

Several policy analysis frameworks have been proposed to understand health equity in various policies. For example, The WHO's approach to public health policy puts health on the agenda of policymakers in all sectors and levels, directing them to be aware of the health consequences of their decisions and to accept their responsibilities for health [27]. Similarly, the policy cycle framework, initially known as the "stages heuristic framework" (Lasswell 1956; Brewer and deLeon 1983), provides valuable guidance for policy analysis and is a widely used framework to understand the policymaking process [22]. It outlines seven major steps or stages of a policy cycle: (a) problem identification, (b) agenda setting, (c) policy formulation, (d) policy legitimization/decision making, (e) policy implementation,

(f) policy evaluation and (g) policy change [22]. As discussed extensively in the protocol of this paper, even in the context of climate change and public health, both the health and climate change sectors seem to have used different policy analysis frameworks for different purposes [28]. This includes assessing the impact of policy actions, including the health outcomes, evaluating policy alternatives, understanding the co-benefits, and identifying the unintended consequences. However, the extent of using these frameworks to understand the equity aspects of climate change-related policies is unclear. While a multidisciplinary body of research addressing the effects of climate change on health has emerged in the last decade, most of them have focused almost exclusively on the impacts of climate change on health outcomes while overlooking the importance of policies addressing health inequities [28]. Policy analysis studies adopting a holistic view of health equity and climate change seem underexplored.

1.2. Rationale for the Study

As noted above, climate change worsens health inequity and having equity-centred policies is key to guiding climate change plans and actions responding to the needs of the vulnerable population. Where the importance of equity-focused response to climate change is increasingly recognized, the incorporation of health equity measures in climate change policy decisions is unknown. There is a limited account of policy analysis studies reviewing how national health and climate change policies address health equity and whether these studies have used any policy analysis framework to understand the integration. We believe having identified different policy analysis frameworks for understanding health equity in the context of climate change would benefit both the public health and climate change sectors to enhance their understanding of the integration of health equity in climate change-related policies and lay the foundation for future efforts to reduce climate vulnerabilities. This knowledge would also benefit policy researchers and practitioners seeking (to develop) an integrative policy analysis framework linking health equity and climate change. Against this background, this study aimed to review the current evidence base to systematically synthesize existing health equity-focused policy analysis frameworks and policy analysis in climate change policies and health policies related to climate change. Various terms and concepts about SDOH, health equity and climate change-related policies were used to explore existing papers against the study domains [28].

1.3. Specific Review Question

What policy analysis frameworks exist in the peer-reviewed literature to understand health equity in climate change and public health policies related to climate change?

2. Materials and Methods

The study was registered in PROSPERO (CRD42021248734), the International Prospective Register of Systematic Reviews and drew upon the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guideline [29].

2.1. Database Search

We searched five databases (PubMed, CINAHL, GreenFILE, Web of Science Core Collection and Wiley Online Library) in February 2022 covering public health, climate change/environment, and cross-disciplinary sectors. Search terms for all databases included key terms such as "Health Equity", "environmental justice", "climate change", "Public Health", "Environment and Public Health", and "Policy Making" with their synonyms. These search terms were chosen to help include papers that linked climate change-related policies to health equity and had some mention of policy analysis. Health equity is a cross-cutting issue and a critical component in many different concepts of "justice". In environmental studies, some concepts, like social justice, were often discussed beyond health and hence not included as a keyword. Similarly, other terms like "climate debt" and "environmental determinant" were not included as keywords, as they did not produce

relevant health-specific papers during the initial search. Further, the term "climate justice" was also not included as a keyword with a view that the keyword "environmental justice" would capture this.

A broad search strategy was developed in PubMed and included the following combination of search terms:

("Policy analysis framework" [All Fields] OR "policy making" [MeSH Terms] OR "policy making" [All Fields] OR "policy analysis" [All Fields) AND ("health equity" [MeSH Terms] OR "health equit*" [All Fields] OR "health status disparities" [MeSH Terms] OR "health status disparit*" [All Fields] OR "healthcare disparities" [All Fields] OR "healthcare disparit*" [All Fields] OR "health care disparit*" [All Fields] OR "health inequ*" [All Fields] OR "health vulnerab*" [All Fields] OR "social determinants of health" [MeSH Terms] OR "social determinants of health" [All Fields] OR "environmental determinant*" [All Fields] OR "climate vulnerab*" [All Fields] OR "environmental equit*" [All Fields] OR "environmental justice" [All Fields]) AND ("Environment and Public Health" [MeSH Terms] OR "Environment and Public Health" [All Fields] OR "Environmental Health" [MeSH Terms] OR "Environmental Health" [All Fields] OR "Environmental policy" [MeSH Terms] OR "environmental polic*" [All Fields] OR "climate change" [MeSH Terms] OR "climate change" [All Fields]) AND 2000/01/01:2021/12/31 [Date—Publication]

This search strategy was adapted to other databases in consultation with a librarian at the University of Bielefeld (Supplementary Material S1).

2.2. Data Management

Records from scientific databases were imported into EndNote (X9). The results from different databases were combined, and duplicate citations were removed.

2.3. Study Selection

Two reviewers (SK and LR) independently evaluated the papers for inclusion in stage 1: titles and/or abstracts, and stage 2: full text. We searched for English language papers published after the year 2000 whose title, abstract or keywords contained the words policy, climate change and health equity. We further looked for any mention of a health equity framework, policy analysis model or conceptual models for analyzing climate change policies or public health policies related to climate change.

We only selected articles that focused on policy analysis studies analyzing health equity, specifically in the context of climate change-related policies. Any papers discussing the following were excluded:

(a) generic policy analysis (frameworks) that could be applicable in multiple policy domains (like "Health in All Policies", Universal Health Coverage, intersectionality-based policy analysis frameworks)
(b) policies domains with indirect linkage to climate change (like housing, nutrition, healthy living, land use planning, insurance schemes etc.)
(c) Assessment studies assessing or evaluating the impacts of climate change policies or climate change-related health policies on health equity outcomes.
(d) Articles that mentioned "environmental justice" without explicit linkage to concepts of health equity in relation to climate change

The initial and full-text screening were piloted against the screening criteria by the two reviewers (SK and LR), and the results were discussed. During the full-text review, any studies found not to match the inclusion criteria were removed, and a log of the excluded studies was kept. Any differences in opinion were solved through an agreement between the reviewers and, in case of disagreement, through discussion with a third reviewer (MB).

2.4. Quality Assessment

Two independent reviewers carried out the quality assessment of the papers (SK and LR). The nature of the included articles varied widely in terms of their type and research design, making selecting an appropriate quality assessment tool difficult. While there were a few studies describing frameworks, many of the studies employed qualitative approaches. We used the Critical Appraisal Skills Program (CASP) 2016 [30]. The CASP checklist consists of 10 questions answered with a 'yes', 'no' or 'cannot tell'. This includes two screening questions on the study's aims and appropriateness of qualitative methodology and eight appraisal questions on research design, recruitment strategy, data collection, reflexivity-related issues, ethical issues, the rigor of data analysis, and the reporting and value of findings. We assigned a score to each question (1 = Yes, 0 = No) and the total score was used to classify the quality of papers as good (score more than 8), moderate (score between 4 and 7) and poor (scoring less than 4). None of the papers were excluded based on the quality assessment.

2.5. Data Management and Extraction

Data extraction was undertaken by the first reviewer (SK) and recorded into a pre-developed and piloted form (Supplementary Material S2) based on the aim of the study and covering different variables of interest. The extraction accuracy was confirmed by a second reviewer checking the data extraction of all the included studies. Any discrepancies in extraction were discussed until a consensus was reached. Information extracted from each paper included: author and year, country and/or location/setting, purpose/objective, the general focus of the paper, methods used, theories and frameworks cited and applied, coverage on the issue of health equity, implications for practice, and conclusion/recommendation. Data analysis was conducted using thematic analysis [31] and included synthesizing, analyzing, and presenting descriptive summaries, identifying frameworks and theoretical foundations and the extent of coverage of "health equity" in the context of climate change.

3. Results

The database search yielded 1609 studies. Of these, 163 were identified as duplicates and 41 were identified as abstracts, posters, protocols, or reviews. Removing these, the 1405 studies were screened by title and abstract and assessed for eligibility in the study, out of which 55 articles met the inclusion criteria and full texts were retrieved. Of these, eight articles served the exact scope of our review and were included. The PRISMA flow diagram of the study (Figure 1) depicts the process of selection and identification of articles.

3.1. Quality Assessment

Four papers were assessed to be of good quality [32–35], two of moderate quality [36,37] and two of poor quality [38,39]. The papers assessed as poor quality either weren't research-oriented or lacked methodological detail preventing us from conducting the detailed quality assessment.

3.2. Overview of the Studies

All eight papers included in the review were published between 2010 and 2020, with two papers published in 2010 [38,39] and one every year from 2014 onwards [32–37], except in 2019. Two of the papers analyzed policies of multiple European countries [32,35], another one analyzed policies of the USA and China [38], and other papers analyzed policies of the USA [36], Australia [34], Scotland [39], Sweden [33], and India [37].

The studies also considered different levels of policies for analysis. Two looked at the regional level (comparing national policies of 19 and 5 European countries respectively) [32,35], one analyzed the national level policies [39], and four considered subnational level policies, including policies of municipalities [33,38], states [36] and cities [37]. One study analyzed policies at regional and subnational levels (state) [34].
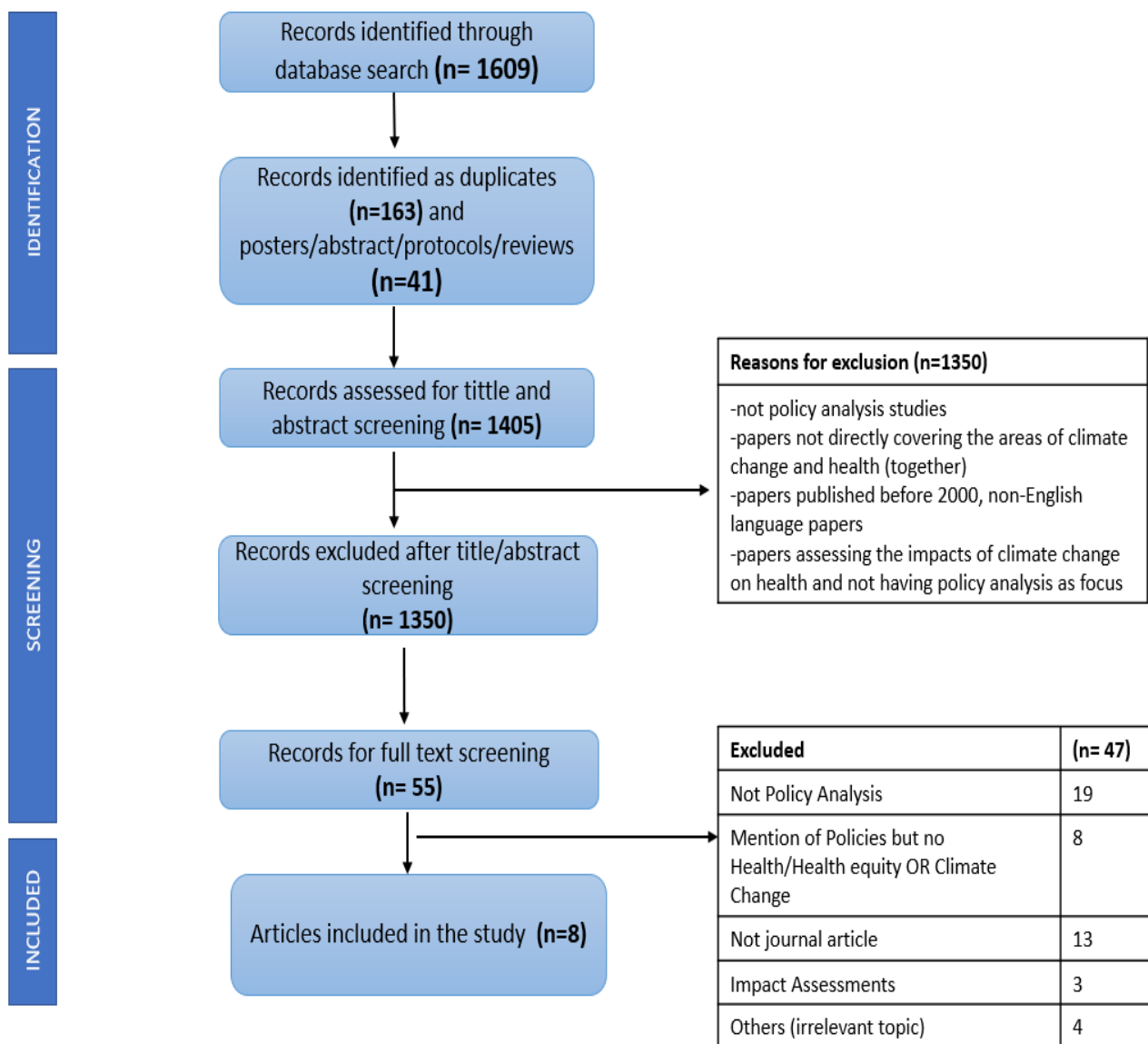
Figure 1. The PRISMA flow diagram of the study.

3.3. Purpose of the Studies

The purpose of the studies conducted was quite diverse. While we found no studies to exclusively understand "health equity" in climate change-related policies per se, many of the included papers aimed to explore wider vulnerabilities and implications of climate change policies on public health or vice versa and some noted the integration within the broader issue of social justice. Three papers focused on the interconnectedness between the effects of climate change and public health. They shed light on the complexity and barriers to integrating these two in policies [35,36,39], and one compared emission-mitigation authority, drivers, barriers, and activities at the subnational (city) level in two countries [38]. Health wasn't the major focus of this paper, and health promotion co-benefits were explored as a component of wider municipal policy initiatives. Most other papers explored how health and climate vulnerabilities are understood, defined, prioritized, and approached by different groups to formulate policy responses to address these issues [33,34,37]. Furthermore, one paper specifically assessed the inclusion of SDOH through a social justice lens in climate change adaptation strategies [32].

3.4. General Focus of the Papers

Most papers exploring climate change and health equity did not adopt a holistic view of climate change and were confined to certain impacts of climate change on health. Extreme weather events [32,33], air pollution [36,38] and water-related impacts of climate change on public health [39] were the most frequently explored areas while discussing the unequal health impacts of climate change and the need for integrated policies to address these. Morris, G (2010) [39] focused on policymaking in environmental public health using a case study on water and health under climate change. Similarly, White et al. (2020) [35] explored barriers to integrating climate change and public health policies in general. Other papers also discussed public health issues specific to climate change effects (heat/extreme weather being more common) or specific health outcomes. Only one of the papers assessed the public health services' perspective, focusing on the incidences of malaria, dengue fever and leptospirosis [37]. Two papers addressed the effects on mental health [32,36].

3.5. Methods and Data Sources in the Included Papers

Most of the papers used a combination of analysis approaches. Four incorporated "review" of documents alongside other methods or as a standalone method [33,34,36,38]. The terms used to describe these processes varied and were reported as document analysis, policy scan, review of policies initiatives, and content analysis. Papers reporting to have used "document analysis" or "content analysis" were more explicit in the methodological description than others. One of the papers used only document review for policy analysis [38].

Discourse analysis was used in two of the studies [32,34]. Four studies employed qualitative methods using various participatory methods—Focus Group Discussion (FGDs) and vulnerability card games [33], a citizen engagement panel [34], and a workshop [35]. One employed semi-structured interviews within the "policy experiments" approach, applying embedded cross-case comparative methods [37]. One other study only described the applicability of a specific model within the context of a traditional environmental health agenda [39] without using any established research methods or data sources.

3.6. Consideration of Links between Climate Change Policies and Health Equity

The papers gave varying levels of attention to the interlinkage between health equity and climate change. For example, three papers acknowledged the links between the two explicitly [32,33,36], whereas in two papers, references to health inequity were more implicit [35,39]. In the remaining three, the health equity issue was limited to general statements [34,37,38] within broader discussions around the impact of climate change policies. Regardless, all papers acknowledged the unequal distribution of climate vulnerability in health outcomes between different population segments and reflected the need for understanding different forms of health and social vulnerability because of climate change effects.

Boeckmann & Zeeb (2014) [32] described the link between climate change and health equity as "double exposure", discussing not only the direct health effects of climate change but also its indirect effects that exacerbate social inequities and vulnerabilities. Similarly, Ganesh & Smith (2018) [36] sought to study the public health implications of climate change (in various populations, including disadvantaged communities) and to understand how local-level policies addressed climate change and mental health. On the other hand, Jonsson & Lundgren (2015) [33] focused on social vulnerability and heat stress. They further emphasized the need to address social vulnerability through multiple sources of knowledge, perceptions, perspectives, and priorities and to co-design programs and policies with affected populations. Morris, G (2010) [39] and White et al. (2020) [35] argued for the need for a more integrative approach to policymaking to shape an effective and proportionate response to environmental health.

Characteristics of the papers included in the review are shown in Table 1.

Table 1. Characteristics of the papers included in the review.

Study	Country (ies) [35]	Level of Policies Analyzed	Research Methods Used	General Focus of the Paper	Specific Public Health Issues Covered
Boeckmann & Zeeb, 2014 [32]	19 European countries	Regional	document analysis, critical discourse analysis and ranking of strategies against a social justice framework	Effects of Climate change on health in general. However, more emphasis on health and extreme weather events	Impacts of Heat and extreme weather, vectors, infections, aeroallergens, air pollution, UV-radiation, mold, food security and mental health.
Chu, E.K 2016 [37]	India	Subnational (Cities)	policy experiments using embedded and cross-case comparative methods	community-based hazard response, water infrastructure upgrading and urban health capacity building	Key Climate impacts were heatwaves, cyclones, and flooding; water scarcity, river flooding, diseases and flooding, diseases and sea level rise of the three cities, respectively. One of the policies experiments included piloting an urban services monitoring system, particularly concerning malaria, dengue fever and leptospirosis.
Ganesh & Smith, 2018 [36]	USA	Subnational (State)	Policy scan, use of public data to examine the burden of mental health in the region	Impacts of climate change on human health with emphasis on the contribution of anthropogenic activities to various climate emergencies, including drought and air quality.	Effect of climate change on heat-related emergencies/hospitalization, cardiovascular illnesses and exacerbation of asthma symptoms, valley fever due to a combination of heat waves, dust storms, and changing weather patterns, mental health and psychological consequences among populations affected by extreme weather events.
Jonsson & Lundgren, 2015 [33]	Sweden	Subnational (municipalities)	Literature search, use of the framework to build the Vulnerability Factor Card Game, focus group discussion	Heat waves and extreme heat and their impacts on health Also included in the discussion in FGDs: flooding, earthquake, tornado	Impacts as discussed in the FGDs: death, hospitalization, Illnesses, loss of income, loss of assets and reduced well-being

Table 1. *Cont.*

Study	Country (ies) [35]	Level of Policies Analyzed	Research Methods Used	General Focus of the Paper	Specific Public Health Issues Covered
Koehn, P, 2010 [38]	China and USA	Subnational (municipalities)	Policy analysis using the framework	Emission Control and Benefits on Health	While explaining health promotion co-benefits as incidental climate initiative, uses air pollution as an example linking to brain damage, respiratory problems and infection, lung cancer and emphysema. Also, it links non-motorized transportation practices to health, urban population, decreasing obesity in children, diabetes etc. Citing the example of the US, the authors state that many US cities have begun to approach GHG emission reductions 'as part of broader efforts to address public health concerns through improved air quality.
Morris, G, 2010 [39]	Scotland	National	It doesn't apply specific study methods and describes the modified DPSEEA Model's applicability within the traditional toxic/infectious environmental health agenda.	Water-related health challenges	General public health without mentioning any specific issue or condition
Schlosberg et al.,2017 [34]	Australia	Regional, local (State)	content analysis, a participatory method using a citizen engagement panel	Health vulnerability due to general climate change	discusses vulnerability in general (due to the impacts of climate change on health)
White et al., 2020 [35]	Five European countries	Regional	workshop-based approach	General climate change and health	General public health without mentioning any specific issue or condition

3.7. Use of Frameworks and Theoretical Constructs

A total of eleven frameworks, theories, models, and guiding principles were identified across the papers included in this review. Of these, four were frameworks, four were theories, one was a model, two were sets of guiding principles, and one was an approach that could be used for policy analysis. None of the two papers used the same framework, theory, or model (Table 2).

Table 2. List of frameworks, theories, models, and guiding principles identified in the included studies.

Frameworks	(1) Social justice framework [32] (2) Extreme health vulnerability framework-used to develop vulnerability factor card games [33] (3) Policy framings-climate driven and incidental climate framing [38] (4) Capabilities approach framework for framing [34]
Theories	Theories for discourse analysis [32] (1) Wodak and van Dijk (2) Fairclough and Fairclough Two theories on governance experimentation and innovation [37] (1) Theory of institutional change and (2) Theory of urban transitions data
Models	(1) Modified version of the Drivers-Pressures-State-Exposure-Effect-Action or environment "DPSEEA Model" [39]
Guiding principles	(1) 4 key principles to evaluate health policies focusing on climate change-mainstreaming: process, linked approach, population perspective and coordination [36] (2) Use of policy processes as identified by Cairney (2016) as a guiding frame [35]

Two major approaches were noted in most existing frameworks and theories to understand the integration of health equity in climate change-related policies. The first category of frameworks and theories seemed to have adopted a bottom-up approach. The starting point to explore health equity was the health effects of climate change, which led to a discussion on the (policy) measures that should and could be taken to mitigate or minimize the effect. The papers taking this approach largely emphasized the effects of climate change on health [32,33] and stressed how climate change affected various social stratifiers, thus further driving health outcomes. Most of these frameworks/theories depicted social determinants of health at their core.

Boeckmann & Zeeb (2014) [32] and Jonsson & Lundgren (2015) [33], both in their respective papers, explicitly used a social justice framework to conduct policy analysis to assess current European adaptation efforts. The framework used by Boeckmann & Zeeb (2014) described an interplay between climate change, social determinants of health and health equity and is based on the understanding that inequity is caused by unequally distributed social determinants of health. This framework further highlighted existing health risks that could be exacerbated by climate change and adaptation measures that could support health equity by targeting these social determinants of health. Adaptation measures in the strategy documents to health impacts were categorized into four major types (a) data and surveillance, (b) technological adaptation, including emergency plans and warning systems, (c) behavioral adaptation and awareness raising and (d) infrastructural adaptation.

Jonsson & Lundgren (2015) [33], on the other hand, used an extreme heat vulnerability framework to build a Vulnerability Factor Card Game for stimulating focus group discussions to identify vulnerable groups to extreme heat. The framework presented a multi-faceted, top-down, and bottom-up analysis of local vulnerability to extreme heat to

explore the relationship between people and location by connecting exposure to heat, sensitivity and adaptive capacity to possible impacts and adaptation responses at the societal level. Various vulnerabilities to heatwaves covering a range of SDOH were considered in the card game, including health and lifestyle factors, disabilities and health and lung disease. The qualitative analysis in this paper focused on aspects of sensitivity, adaptive capacity, and adaptation at the levels of the individual/household, local community, and local government.

The second category of frameworks and theories sought to emphasize the importance of problem framing as the basis for cross-cutting policy solutions [34,38]. These papers mainly explored the co-benefits of climate change and adopted a top-down mechanism to maximize the co-benefits of climate change and public health policies. For example, Schlosberg et al. (2017) [34] used a "capabilities approach" as a frame for an adaptation policy with justice at its core. This capabilities approach framework is part of a broader capabilities-based framework of environmental justice that includes social and political recognition– including different cultural understandings, values, and priorities concerning the loss, procedural or participatory aspect of justice is incorporated in capabilities approach as a basic right to have 'control' over one's political environment. They identified a top-down approach to risk assessment, possible mismatch of timescales of concern to communities and policymakers and lack of community engagement in developing adaptation plans as essential causes for the disconnect between policymakers' concerns and communities' basic needs and capabilities.

Koehn, P (2010) [38] also applied theories of policy framing to compare emission-mitigation authority, drivers, barriers, and activities in relation to emission control/mitigation at the city level in two countries. When assessing and comparing municipal policies, he emphasised the importance of distinguishing climate-driven from climate-incidental municipal framings. He described climate-driven framings to be focused on expected positive (stabilization/restoration) and negative (destabilization) climatic consequences of policy action and inaction, while in climate-incidental framings, the emphasis is laid on other anticipated (co-) benefits and costs rather than on climatic impact. This paper doesn't directly talk about analyzing policies to understand health equity but does provide a framework for broader policy analysis in the climate change field either using all four factors as components of analysis (i.e., authority, drivers, barriers, and analysis of policy initiatives) or just analyzing the inclusion of health in overall climate change initiatives climate-driven or climate incidental framings.

Other theories identified in the papers included the theory of institutional change and the theory of urban transitions [37]. Where authors describe the potential of both these theories to deal with different approaches to learning, replicating, and embedding [12] experiments in large policy structures, they were used in a range of policy experiments, and neither of these was specific to understanding the interconnections of health equity and climate vulnerability.

None of the papers reported to have used the overarching programmatic frameworks and guidance documents recommended by international organizations.

3.8. Components of Health Equity Discussed

The interconnections between health equity and climate change vulnerability were mostly articulated in terms of wider social determinants, though not all the papers exclusively used the term "health equity" or "social determinants of health", and many discussed factors causing increased vulnerability to certain climate phenomenon or health conditions impacted by climate change. Climate change-related vulnerability resulting in poor health outcomes was described using multiple SDOHs, and a few papers had also chosen the study sites based on disparities and risks. Vulnerability based on geographic location, exposure, health outcome (diseases), gender, age, and socioeconomic groups, including specific occupations, were commonly identified as SDOH across all studies. Jonsson & Lundgren (2015) [33] related the causes of climate vulnerability to increased

exposure to climate change (sensitivity) with limited ability to cope with its effects due to unfavorable socio-economic conditions (adaptive capacity). They explain how factors such as gender, health status, age, income, and education may vary substantially between different population segments and contribute to either higher sensitivity or lower adaptive capacity of groups such as women, people with illnesses or disabilities, elderly, and children, unemployed and people with low income or education.

We also noted the increasing attention being placed on the issue of social justice while understanding health equity aspects of climate change actions or policy framings. Three papers discuss climate vulnerability in light of social justice [32,34,39]. Both Schlosberg et al. (2017) [34] and Boeckmann & Zeeb (2014) [32] in their papers presented social justice as a core principle of adaptation planning. While Boeckmann & Zeeb (2014) explicitly focused on the importance of social justice for health equity, Scholsberg et al. (2017) focused on the issue of justice to the wider adaptation planning, including the planning for health. Boeckmann & Zeeb (2014) also adopted an inclusive approach to social justice and incorporated key terms like justice and fairness alongside social determinants to examine climate adaptation policy documents. The paper considered socioeconomic factors in scenario design or impact analysis and scanned for factors like antidiscrimination, gender equity, fairness, and protecting cultural diversity in the documents. Schlossberg et al. (2017), on the other hand, stressed the participatory policy process conducted to allow for the recognition and representation of the values, interests, and reflections of community members and stakeholders impacted by climate change. While analyzing the policy documents, unlike Boeckmann & Zeeb (2014), this paper did not predefine social justice-related keywords. Instead, it mined for the critical social justice-related terms from the document inductively.

In contrast, Morris, G (2010) [39] emphasized the socio-ecological complexity of environment and health policymaking. He acknowledged that environmental health could not remain blind to social inequity and suggested including environment, human biology, lifestyle, and healthcare in addition to the other social determinants of health when designing policy.

4. Discussion

4.1. Underrepresentation from Low-and Middle-Income Countries (LMICs)

Even though the interest in understanding the effects/co-benefits of climate change and health policies among the most vulnerable communities/countries is increasing in international forums, current literature shows scanty evidence. This review identified very few policy papers analyzing the incorporation of health equity in climate change-related policies. Though represented by a single publication, most countries included in the papers reflected high-income nations. This shows that current research has not sufficiently explored the nexus of health equity and climate change policies, particularly from the LMICs. This finding adds to the much-debated concern in climate change about the disparities between and within regions in terms of contribution and vulnerabilities to the effects of climate change [40]. Coordinated policy development approaches across sectors and regions and integration at national/regional/global levels are essential to understand trade-offs, avoid inadvertent consequences, and capitalize on potential synergies for multiple benefits for health, equity, and the environment [41]. Information gaps from LMICs could make it difficult to draw valuable conclusions about successful (and unsuccessful) strategies across multiple, varying contexts. This could further have implications for facilitating integrated action to support evidence-based policymaking.

4.2. Different Lens to View Health Equity

The policy literature in climate change and public health related to climate change views health equity as a narrow concept, with the evidence base being concentrated on a few effects of climate change. More notably, the health impacts of some climate change effects like heatwaves, climate emergencies, and water and air pollution (among

others) are researched relatively more from the health equity point of view, while others are still understudied. This lack of policy research in this field raises many questions regarding the knowledge and importance of this subject at the decision-making level. With a heterogeneous focus in policy research to address health disparities and climate injustices together to move forward equitably in protecting all people from the harmful effects of a rapidly changing climate [42], much must be done to bridge this gap.

The health and climate change literature hasn't moved away from drawing insights on health equity through the SDOH approach/framework. However, social justice concepts are emerging to gain better insights into health equity related to climate change. Health equity is multidimensional, and several definitions have been proposed in the literature. Braveman et al. (2003) define equity in health as the absence of systematic disparities in health (or in the significant SDOH) between groups with different levels of underlying social advantage/disadvantage—that is, wealth, power, or prestige [11]. Braveman et al. (2014), in another paper, have also implied how "health disparities and health equity cannot be defined without defining social disadvantage. They stress disparities in health determinants as relevant to assessing health disparities [43]. Similarly, Marmot et al. (2012), while discussing the Commission on Social Determinants of Health, concluded that health inequities are manifestations of societal inequities and reduction of these inequities is a matter of social justice requiring action at the societal level—globally, nationally, and locally [44].

There are also many concepts of social justice based on the context in which it is explored [45]. Buettner et al. (2012), in their systematic review, describing how various literature have used health equity and social justice interchangeably [46], have proposed a synthesized definition of social justice. They define it as "full participation in society and balancing benefits and burdens by all citizens, resulting in equitable living and a just ordering of society." Its attributes include (a) fairness; (b) equity in the distribution of power, resources, and processes that affect the sufficiency of the social determinants of health; (c) just institutions, systems, structures, policies, and processes; (d) equity in human development, rights, and sustainability; and (e) sufficiency of well-being. On the other hand, Fabienne et al. (2001) summarized the interlinkage between social inequalities in health and social justice by two approaches. First, an indirect approach where inequitable differences in health outcomes are attributed to unjust social arrangements—the emphasis is laid on the social processes rather than the pattern of health outcomes and a second is a direct approach, which determines health outcomes as an indicator of the unfair social processes and arrangements in the society [45]. The authors argue that the indirect approach is more compatible with a social model of health, considering various social factors on health and establishing health equity within a broader framework of social justice. Along this line, the report from WHO has discussed the need to discuss health equity in relation to other social values [47].

SDOH and social justice concepts are central to the intersection of climate change and health equity. Social justice is the view that everyone deserves equal economic, political and social rights and opportunities. Likewise, health equity means equalizing opportunities to be healthy and addressing the different SDOHs [44]. Owing to the similarities in the basic principles of these approaches, it is challenging to discuss social justice without discussing the SDOH. Braveman et al. (2011) describe health equity as social justice concerning health, reflecting ethical and human rights concerns [44]. Given this inseparable link between the health consequences of climate change and social justice while discussing health inequities, taking a social justice lens offers a wider perspective bringing the notions of all health equity, climate change and social justice together, which instead seems confined within their respective fields [48]. Therefore, a social justice framework would allow a more holistic reflection of SDOH and social justice components, thus contributing to a more integrated approach to policymaking. However, as social justice is multifaceted and encompasses various dimensions, including economic, political, and social rights and opportunities,

policy analysis frameworks can be adapted to specifically understand the determinants contributing to achieving a just society with equitable health outcomes.

4.3. Methodological Approaches for Policy Analysis

There is little evidence in the literature around the most suited methods to conduct policy analysis, and researchers have highlighted methodological and conceptual challenges to undertaking policy analysis as a research method [22]. Several policy analysis researchers have suggested approaching policy situations as complex phenomena and employing multiple ways of looking at things to understand the essential elements [49]. One such approach is presented by Browne et al. (2019), who have categorized the orientations and approaches of policy analysis studies into three broad types: traditional, mainstream, and interpretive. They describe traditional approaches as those that aim to identify the 'best' solution through undertaking objective analyses of possible solutions, mainstream approaches as those that focus on the interaction of policy actors in policymaking and finally, interpretive approaches as those that examine the framing and representation of problems and how policies reflect the social construction of problems [18]. With this frame as a reference, five of the studies were found to take the interpretive policy analysis approach, and three were more inclined to the mainstream approach. The five papers with an interpretive approach largely discussed the importance of policy frameworks to represent better health or social equity issues in climate adaptation.

Existing policy literatures have also raised concerns about the policy analysis studies being too focused on policy content analysis, often undermining other factors contributing to policy making [21]. This review also echoed this with document analysis as one of the most used methods in the identified papers. Many papers in their policy analysis included policy content analysis and used document analysis either as a standalone method or combined with other (qualitative) methods. To take transformable actions and reduce climate change-related vulnerability and inequity, future research should take a systems view using multiple methods to explore the complexity of the policy-making process and develop a holistic understanding.

4.4. Policy Cycle Framework as a Potential Way Forward

This review identified a few frameworks to understand the integration of climate change and health equity. Policy analysis studies to understand the integration of health equity and climate change is fragmented, and none of the (policy analysis) studies conducted so far has used a comprehensive approach or a framework encompassing various aspects of policymaking. Most of the papers situated in the field of climate change centred around "problem framing". In contrast, papers primarily focusing on health are concerned with factors contributing to or affecting the integration of equity issues or necessary actions to tackle them.

Literature in policy research is consistent in its recommendation about the need for guidance to conduct policy analysis studies [50]. Moreover, Gill Wat et al. (2008) [22] highlight the need to use existing frameworks and theories of the public policy process more extensively, making research design an explicit concern in their studies. There are many policy analysis theories and frameworks, but researchers have raised concerns about many of these theories being focused on distinct policy process stages [51].

As aforementioned, the policy cycle framework is established and has been widely used for analyzing policies in the public health sector and beyond [22]. Though none of the papers identified in his review used or made any kind of reference to the policy cycle, many explored different components of the cycle as individual factors contributing to policymaking and not necessarily in an integrated way. For example, many of the papers highlighted the need to understand climate vulnerability and adaptation capabilities from the perspectives of community people, not just the decision-makers. This can be related to the problem identification stage of the policy cycle. Similarly, budgetary allocation and

availability of funding sources were discussed in a few papers [36,37] which could be a part of the policy formulation stage of the policy cycle framework.

In a context lacking the availability of adequate frameworks to explore the integration between health equity and climate change, a comprehensive policy analysis framework like that of the policy cycle could serve as a valuable approach for understanding policymaking in the climate change field in light of health equity. The policy cycle is an established framework for policy analysis to provide thorough insights into content, process, and consequences [23]. Using a policy cycle framework to capture these individual factors could add a new perspective giving a more holistic understanding of the integration of health equity in climate change issues and further facilitating an easy comparison and understanding across the climate change and public health policy fields.

4.5. Strengths and Limitations

This study is the first to synthesize the existing published literature on health equity-focused policy analysis frameworks and map out various policy analysis studies specifically related to health equity and climate change policies. Some of the strengths of this review include the use of systematic methods and processes, the broad scope of search terms to ensure inclusion of a wide range of studies, coverage of comprehensive search capturing databases of public health, climate change/environmental specific and cross-disciplinary domains. The limitation of the review includes difficulties in defining and limiting health equity to a particular concept due to its complexity and links to other forms of equity and justice. For example, we acknowledge that "environmental justice" and "social justice" encompasses health equity as an integral component. However, we only considered papers on environmental and social justice that explicitly mentioned health equity in the context of climate change. We also included only published literature after 2010 and English language papers. This could have led us to exclude some relevant papers, particularly in the grey literature and other languages. Further, the listed theories, models and frameworks specifically exploring health equity and climate change may not be exhaustive, as we may have excluded the paper if they did not classify their approach as a theory, model, or framework. The study also focused on policy studies in public health and climate change/environment domains and may have missed potentially relevant studies from other cross-cutting areas.

5. Conclusions

This study presents a descriptive analysis of various policy analysis frameworks and studies undertaken so far in the public health and climate change domains to understand the area of health equity and climate change. Having identified only a handful of health equity-focused policy analysis frameworks /theories for analyzing climate change-related policies, we note the very little work done in this area. Moreover, the absence of a consolidated framework comprehensively capturing health equity consideration in various stages of policymaking was evident. Discussing the characteristics of peer-reviewed papers that utilize policy analysis theories/frameworks, we present the concepts and methods used in the existing literature to explore the integration of climate change and health equity. We focus on the conceptual overlap between SDOH and the social justice framework and discuss their commonalities and synergies for exploring health equity in the context of climate change-related health policies. Using the policy cycle framework as a reference, we show the need and potential for moving from a sectoral to an integrated approach to understanding this complex area.

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