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Title: Environmental Governance Challenges in the Context of Climate Change: A Scoping Review

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Abstract

Background: Climate change is one of the greatest threats to human health in the 21st century. This study aimed to explain the challenges of environmental governance in the context of climate change.

Material and Methods: The present study was conducted using a scoping review method according to the Arksey and O'Malley framework without applying time limits.

Results: This review showed that environmental governance in the face of climate change is confronted with multiple factors, which can be categorized into four main groups: institutional and policy challenges, economic and financial challenges, social challenges and climate justice, and scientific, technological, and knowledge-related challenges.

Conclusion: The challenges of climate change within the framework of environmental governance are complex and multifaceted. Addressing these issues requires strengthening governance at local, national, and international levels, enhancing inter-institutional cooperation, developing financial mechanisms, and incorporating climate justice into national and international policymaking. Furthermore, future research should focus on identifying and analyzing successful governance models.

Keywords: Climate; Climate Change; Environmental Governance; Challenge.

Introduction:

Climate change is one of the greatest threats to human health in the 21st century [1] that present and future generations of humanity face [2]. According to the latest report of the Intergovernmental Panel on Climate Change (IPCC), scientists are resolving the observed changes in the Earth's climate in each region and in the climate system as a whole. Many of the observed changes in climate have been unprecedented for thousands, if not hundreds of thousands of years, and some of the changes that have already begun - such as the ongoing rise in sea level - are irreversible over hundreds to thousands of years [3]. The IPCC reports that the Earth's average temperature has increased by 1.09°C from 2011 to 2020 compared to 1850-1900 levels and predicts that even with low greenhouse gas emissions, there is a 50% chance of reaching or exceeding 1.5°C of warming [4]. The Earth's surface temperature is rising, and the frequency and intensity of extreme weather events, such as heat waves, droughts, floods, and storms, are expected to increase in the coming decades. Humans, animals, and the environment in general will be affected by climate change [1]. This trend is directly related to human activities, especially the consumption of fossil fuels and land use change [5].

In the meantime, the concept of "environmental governance" has been proposed as a framework for managing natural resources, protecting the environment, and coping with global environmental crises. Environmental governance refers to the control of human-environment interactions through a set of tools aimed at combating ecological degradation and climate change, ranging from simple protection to comprehensive strategies for conservation and evolving ecosystem management [6]. Environmental governance focuses on new alternatives to state organizations. These alternatives include market actors and civil society, their partnerships with each other, which combine the expertise and authority of state organizations with new governance actors. Research on environmental governance has shown that these new arrangements can solve environmental problems, sometimes more effectively and at lower cost than state organizations [7].

Despite global progress such as the Paris Agreement (2015) aimed at limiting global warming, the reality is that many countries have failed to meet their commitments. The Paris Agreement is a milestone in the multilateral process on climate change and a binding agreement that brings all nations together to combat climate change [8]. The various studies show that climate change has wide-ranging impacts on the economy, human health, water resources, food systems, economic growth, labor productivity, energy markets, and poverty [4]. Policies must reduce

greenhouse gas emissions and promote sustainable development to combat climate change. Implementing environmental justice interventions is essential to ensure that all communities have equitable access to environmental resources and protections [9]. Environmental justice is the idea that all people and communities have the right to live and thrive in safe and healthy environments with equal environmental protections and meaningful participation in these actions [10]. Despite extensive research in the field of climate change, there is still no comprehensive view on the challenges of climate change and environmental governance. Therefore, the researcher aims to conduct a scoping study to reveal research gaps and provide a context for policymaking. Therefore, the aim of the present study is to conduct a scoping review of the challenges of environmental governance in the context of climate change.

2. Method:

2.1. Study design

The present study was conducted using a scoping review method according to the Arksey and O'Malley framework without applying time limits [11, 12]. The current study was conducted on research conducted in the field of climate change challenges and environmental governance based on the PRISMA-ScR framework. No time limits were applied. Due to the diversity of designs, statistical integration was not performed.

2.2. Research question

This study was conducted based on the following question:

What challenges have been identified in the interaction between climate change and environmental governance at the global and national levels?

2.3. Identifying relevant studies

The search for related articles was conducted without considering time limits in various scientific database. The articles were extracted using keywords related to the topic via reputable English databases such as Web of Science, PubMed, and Science Direct with the keywords of "Climate change", "Environmental governance", "Climate challenges", "Environmental challenges", "Adaptation and mitigation". The initial search found 1409 articles. Of these, 1202 articles were excluded after reviewing the titles, 156 articles after reviewing the abstracts, 22 articles after reviewing the full text, 10 articles due to unavailability of full text, and 5 articles due to non-English language based on our study exclusion criteria. (Diagram 1). No articles were excluded during the article review stage using the article evaluation checklists. In addition, Reports excluded JBI Screened (JBI assessment score is under 75%). At the end of

this stage, 14 articles were selected and analyzed in line with the objectives of this study. The results were presented qualitatively. The method of selecting articles is shown in Diagram 1 and the search strategies are shown in Table 1.

Table 1. Search strategies

Search Date	Database	Articles Number	Query
2025/September/30	Pubmed	122	((((((Change, Climate[Title/Abstract]) OR (Changes, Climate[Title/Abstract])) OR (Climate Changes[Title/Abstract])) AND (Environmental governance Climate policy[Title/Abstract])) OR (Governance challenges[Title/Abstract])) AND (Adaptation[Title/Abstract]))
	Science Direct	521	((((((Change, Climate[Title/Abstract]) OR (Changes, Climate[Title/Abstract])) OR (Climate Changes[Title/Abstract])) AND (Environmental governance Climate policy[Title/Abstract])) OR (Governance challenges[Title/Abstract])) AND (Adaptation[Title/Abstract]))
	Web of Science	688	((((((Change, Climate[Title/Abstract]) OR (Changes, Climate[Title/Abstract])) OR (Climate Changes[Title/Abstract])) AND (Environmental governance Climate policy[Title/Abstract])) OR (Governance challenges[Title/Abstract])) AND (Adaptation[Title/Abstract]))
	Scopus	78	((((((Change, Climate[Title/Abstract]) OR (Changes, Climate[Title/Abstract])) OR (Climate Changes[Title/Abstract])) AND (Environmental governance Climate policy[Title/Abstract])) OR (Governance challenges[Title/Abstract])) AND (Adaptation[Title/Abstract]))

2.4. Inclusion and Exclusion Criteria:

Inclusion criteria:

This study included all types of studies that addressed challenges related to climate change and environmental governance conducted from inception up to September 2025.

Exclusion criteria:

Studies published in languages other than English, studies for which the full text was not available, or studies that did not address climate change and environmental governance were excluded.

2.5 Quality appraisal

The methodological quality of the selected studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal checklists. Studies scoring less than 75% were excluded. Quality appraisal was conducted independently by two reviewers, and any disagreements were resolved through discussion. At the end of this stage, no studies were excluded.

2.5. Data Extraction

Data extraction was conducted in two stages, including independent screening and extraction of information from titles, abstracts, and full texts by two authors. Relevant data were extracted using a single, standardized form. The extracted information included the study title, author(s), country, study design, year of publication, and main findings. These data are presented in (Table 2).

2.6 Data synthesis and management of heterogeneity

Given the heterogeneity in study designs, a narrative and thematic synthesis approach was used to synthesize the data and manage heterogeneity. Initially, the data were coded and then compared [1]. Similar findings were subsequently grouped together.

Table 2. Characteristics of selected studies

No	Study title	Type of study	Study location	Year	Main result	Author (s)
1	Institutional challenges to climate change adaptation: A case study on policy action gaps in Uganda شماره رفرنس	A case study	Africa	2017	Multidimensional factors cross the policy development and implementation cycle, and governance levels affect smallholder adaptation.	Ampaire, Edidah L., Laurence Jassogne, Happy Providence, Mariola Acosta, Jennifer Twyman, Leigh Winowiecki, and Piet Van Asten
2	Examination of barriers to climate change adaptation: experience from Semarang city – Indonesia	Multiple qualitative study	Indonesia	2025	The findings indicate that sectors prioritizing water, coastal, and marine resources face lower barriers and challenges compared to non-priority sectors such as agriculture, health, and other related sectors.	Putri, Intan Hapsari Surya, Wiwandari Handayani, Fajar Agung Mulia, Jun Ichihara, Mega Anggraeni, and Rukuh Setiadi
3	Conflict between Developing Economic and Protecting Environment	Descriptive analytical study	England	2009	Concerning on the situation of economic and environment whether has the intrinsic relation or has any type relation, this still has the dispute.	Guo, Longlong, and Hongbo Ma
4	Environmental protection or economic growth? The effects of preferences for individual freedoms	Correlation study	Czech	2023	The importance of God in lives proved to increase preferences for environmental protection but was negatively related to preferences for economic growth.	Čábelková, Inna, Luboš Smutka, David Mareš, Akhmadjon Ortikov, and Stanislava Kontsevaya
5	Circular economy innovations: Balancing fossil fuel impact on green economic development	Analytical study	Philippines	2024	The findings show that countries with higher adoption rates of circular economy practices exhibit better performance in green economic indicators, improved resource efficiency, and reduced environmental degradation.	Zhang, Yiwen

6	Climate Change and the Developing World: A Disproportionate Impact	Descriptive analytical study	United States of America	2021	The effects of climate change are vast and varied. We're witnessing more hot days, heat waves, intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms, and declining biodiversity.	U.S. Global Leadership Coalition
7	Global warming has increased global economic inequality	Observational study	United States of America	2019	Our results suggest that low-carbon energy sources have the potential to provide a substantial secondary development benefit, in addition to the primary benefits of increased energy access.	Diffenbaugh, Noah S., and Marshall Burke
8	Climate change inequalities: A systematic review of disparities in access to mitigation and adaptation measures	Ssystematic review	Australia	2025	Most studies focus on economic inequalities in climate change adaptation at the global level, few focus on within country inequalities.	Zahnow, Renee, Ali Rad Yousefnia, Mahnoosh Hassankhani, and Ali Cheshmehzangi
9	Climate Justice and Inequality	Case report	United States of America	2015	The result showed three key strands of such an approach: inclusive climate justice, deepening climate justice and governance for climate justice.	Harlan, Sharon L., David N. Pellow, J. Timmons Roberts, Shannon Elizabeth Bell, William G. Holt, Joane Nagel, Riley E. Dunlap, and Robert J. Brulle
10	Public resistance to climate policy amid energy crisis and populism: The case of the European Green Deal in the Czech Republic	Case study	Czech	2025	Their findings contribute to the study of EGD adoption in the Central and Eastern European region, enrich the debate on populism, and foster a better understanding of the societal impacts of the energy crisis.	Durdovic, Martin, Marta Kolářová, and Daniel Čermák
11	Uncertainty in climate change projections	Analysis study	Germany	2011	*Climate* extremes are becoming more unpredictable, demanding a shift from reaction to anticipation. Learn how preparedness strategies must evolve.	Latif, Mojib

12	Adopting Clean Technologies to Climate Change Adaptation Strategies in Africa: a Systematic Literature Review	Systematic Literature Review	Finland	2023	The findings reveal that current research focuses dominantly in four key areas: (1) renewable technology transfer, (2) climate change-adaptability, (3) climate policy, and (4) technology adoption.	Daka, Ephraim
13	Science Makes the World Go Round - Successful Scientific Knowledge Transfer for the Environment	Book Chapter	Germany	2016	One of the key players in Europe in envi-ronmental policy support, we had the chance to develop our model further and to generate the RIU (research, integration and utilization) model	Böcher, Michael, and Max Krott
14	A scoping review of environmental governance challenges in southern Africa from 2010 to 2020	Scoping review	South Africa	2021	the review highlights critical gaps – the limited engagement with governance-related frameworks, specifically polycentricism, adaptive governance and social-ecological stewardship.	Falayi, Menelisi, James Gambiza, and Michael Schoon

3. Study findings:

The findings of this scoping review study were included in 4 main categories including: "Institutional and policy challenges", "Economic and financial challenges", Social challenges and climate justice", "Scientific, technological, and knowledge challenges", which are described in detail in Table (3).

Table 3. Main categories, Categories and Subcategories.

Main Categories	Categories	Subcategories
Institutional and policy challenges	Policy implementation Challenges	Key challenges to effective policy implementation exist [13]
	Lack of stakeholder involvement in policy development	Policy formulation mainly by central government agencies [13]
		Lack of involvement of all stakeholders in policy development [13]
	Disconnection between national, regional and community levels	Disconnection between national, regional and community levels [13]
	Structural and managerial weaknesses	Structural and managerial weaknesses in climate change management [13]
	Lack of binding laws and ineffective implementation of international treaties	The fundamental principle of environmental law, which is embodied in treaties, is a major reason for the failure of environmental law [14]
Economic and financial challenges	Limited financial capacity	Limited technical and financial capacity [13]
	Limited budget for climate change adaptation	Limited budget for climate change adaptation [15]
	Conflict of interests between economic growth and environmental protection	The impact of economic growth on environmental protection [15]
		Environmental protection is often at odds with individual freedom and economic growth [15]
	Economic growth and the use of fossil fuels	Environmental degradation with economic growth resulting from the use of fossil fuels [16-18]
		Adverse effects of fossil fuels [16-18]

Continue of Table 3. Main categories, Categories and Subcategories.

Social challenges and climate justice	Lack of climate justice	100 million people could be pushed below the poverty line by 2030 due to the effects of climate change [19]
		The impact of adverse weather results in $520 billion in annual consumption losses [19]
		Increasing economic inequality between developed and developing countries due to climate change [19]
	Intensification of social vulnerabilities with climate change	Parabolic relationship between temperature and economic growth (warming increases growth in cold countries and decreases growth in hot countries) [19]
		The close link between climate change and patterns of inequality at global and local spatial scales [19]
		Exacerbating social vulnerabilities with inequitable access to climate change mitigation and adaptation strategies [19]
		Climate change will have a greater impact on the poor people [19]
	Social resistance to policies restricting energy consumption	Uncertainty about public support for the implementation of the European Green Deal (EGD) [15]
Scientific, technological, and knowledge challenges	Uncertainty in climate models and long-term projections	Increasing concentrations of greenhouse gases in the atmosphere [20]
		Model and scenario uncertainty of greenhouse gas emissions [20]
	Technological and knowledge gaps	The impact of clean technologies on improving the environment [21]
		The need for a new model for the transfer of scientific knowledge [22]

4. Discussion

This review showed that environmental governance in the face of climate change faces several factors. One of these factors is institutional and policy challenges. Weak inter-institutional coordination at national and local levels [13], conflict of interest between economic development and environmental protection [18], and lack of binding laws and ineffective implementation of international treaties [14] are among the causes of the ultimate and policy challenges. This finding is in line with the finding of the study by L. Cochrane (2016). This study also mentioned that the lack of sufficient participation of actors in policy formulation and insufficient coordination of actions related to climate change lead to limited compliance with it [23]. Therefore, solutions should be found for institutional and policy challenges.

Another challenge to environmental governance in the face of climate change is economic and financial challenges. Limited financial resources for measures to reduce greenhouse gas emissions [13] and the dependence of countries' economies on fossil fuels [16-18] are among the factors that cause climate change. Therefore, using new ways instead of using fossil fuels and taking measures to reduce greenhouse gas emissions can make a significant contribution to preventing rapid climate change. Social challenges and climate justice are also among the other factors causing climate change. Increasing climate inequality between developed and developing countries [19] and social resistance to policies that restrict energy consumption [15] are also among the other challenges of climate change. Developing countries contribute to climate change by producing more pollutants, while vulnerable segments of society are further pushed into poverty.

Scientific, technological, and knowledge challenges are also among the other factors causing climate change. Uncertainty in climate models and long-term projections [20], poor communication of scientific knowledge to policymakers [22], and lack of clean technologies in low-income countries [21] are also contributing factors to climate change. This finding is consistent with the findings of Daka et al. (2023). This study also noted that cutting down trees for heating energy not only contributes to deforestation and environmental degradation, but is also a significant contributor to diseases, air pollution, and climate change [22]. In addition, Cook et al.'s study suggests that professionals should honestly negotiate their goals, acknowledge the values that drive those goals, and develop tools that can achieve the jointly chosen goals [24]. Therefore, using anti-pollution technologies in low-income countries, identifying climate models and long-term forecasts, conducting effective research and

transferring it to policymakers can help solve scientific, technological, and knowledge challenges in preventing climate change.

Study limitations

One of the limitations of this article was that due to the newness of the concept of environmental governance, there are few resources and studies conducted in this field. Also, given the diversity of geographical regions and climates of different countries around the world, it is not possible to generalize the findings to all locations. Therefore is suggested that the policy makers, managers, administrators, and executives will be discussed based on this Climatic variations.

5. Conclusion

The challenges of climate change in the context of environmental governance are complex and multifactorial. To improve these conditions, it is necessary to strengthen governance at various local, national and international levels, increase inter-institutional cooperation, and establish financial mechanisms and climate justice in national and international policymaking. It is also necessary for future research to focus on identifying successful governance models.

This study indicates that policymakers should focus on designing evidence-based policies. Paying attention to climate justice can also help increase public acceptance of climate policies. Training managers in the challenges of climate change and environmental governance can contribute to mitigating these challenges. Enhancing the capacity of responsible organizations can likewise play a significant role in this regard. The implementation of these programs requires clear and comprehensive strategic goal-setting. If the designed programs prove to be effective, the private sector, public sector, and society as a whole will face a more promising future. Therefore, it is recommended that future studies focus on identifying successful models of environmental governance.

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Conflict of Interest: There are no conflicts of interest.

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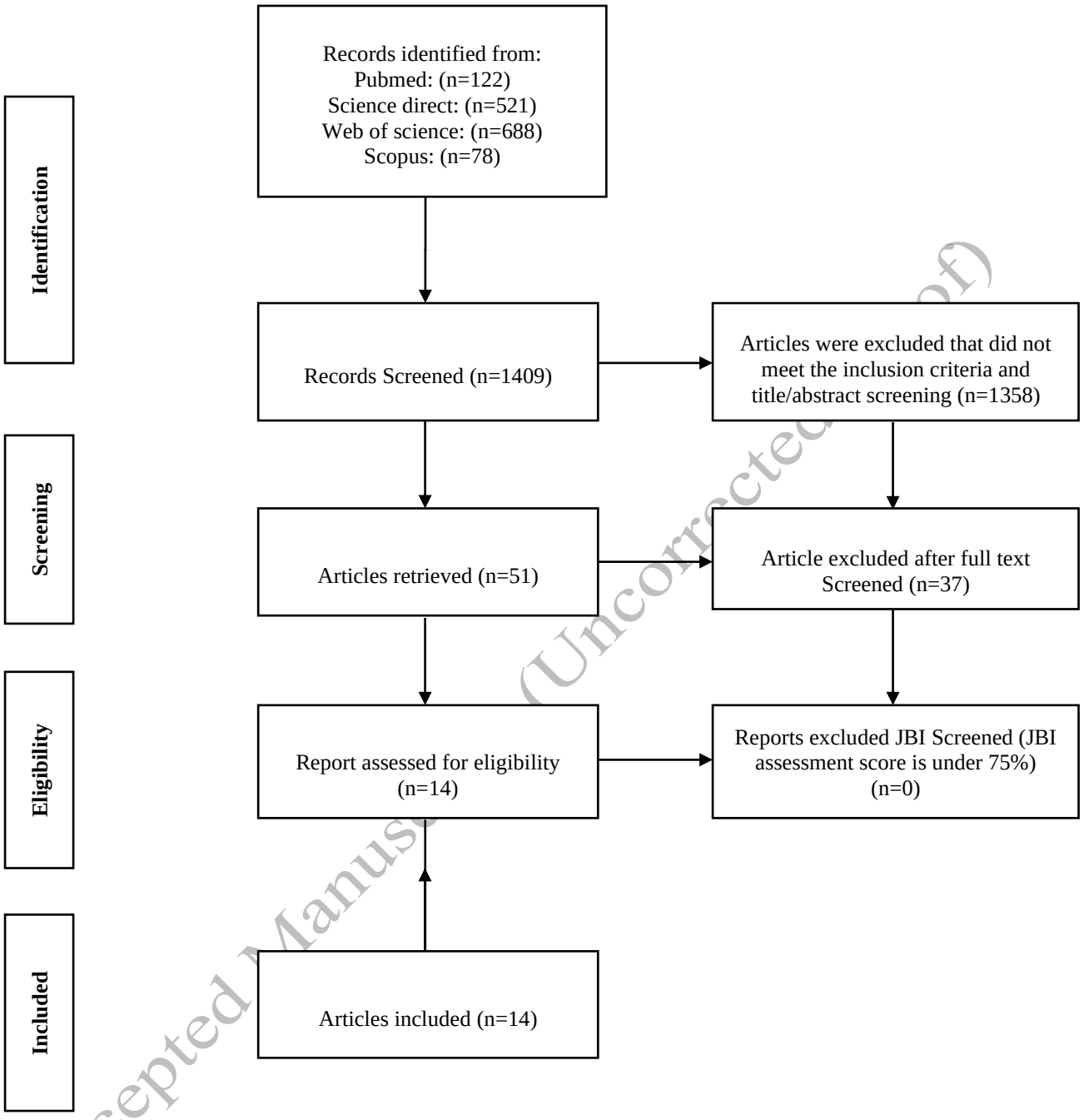

Figure (1): Study Flowchart Diagram

Appendix 1. PRISMA-ScR Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	1
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	2
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	2
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	3
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	3
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	2
Selection of sources of evidence!	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	3
Data charting process!	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	3
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	3
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	3

Appendix 1. PRISMA-ScR Checklist (Continue)

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	3
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	3
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	3
Summary of evidence	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	3
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	4
Limitations	20	Discuss the limitations of the scoping review process.	4
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps	5
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	5