PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	The Health Impact of Urban Green Spaces: A Systematic Review of Heat-Related Morbidity and Mortality
AUTHORS	Nazish, Ahsana; Abbas, Kiran; Sattar, Emmama

VERSION 1 - REVIEW

REVIEWER NAME	Murillo-Zamora , Efrén
REVIEWER AFFILIATION	Mexican Institute of Social Security Coordination of Health Education
REVIEWER CONFLICT OF INTEREST	None to declare.
DATE REVIEW RETURNED	20-Nov-2023

GENERAL COMMENTS	I appreciate the invitation to critically review the manuscript titled "The Health Impact of Urban Green Spaces: A Systematic Review of Heat-Related Morbidity and Mortality," in which the authors examine the impact of green spaces in urban settings on health. I congratulate the authors for their notable effort in rigorously reviewing over three thousand published articles, narrowing it down to just twelve. Unfortunately, this latter aspect rendered a quantitative analysis impossible, which would have been of great interest to readers in the field. I have only a couple of minor comments that I would like to bring to your attention. Comment 1: The authors focused exclusively on green areas in urban locations, which is highly relevant. However, I suggest defining the term "urban" in the main document, clarifying the definition employed in your systematic review. Comment 2: The time span of the studies included is heterogeneous. For instance, reference 11 included data from 1988 to 2007, while there are studies that only included data from 2021 (reference 19) or 2022 (reference 18). I recommend discussing the implications of this diversity on the narratively described data. Comment 3: One of the systematic review's findings is that children and older adults are particularly vulnerable to the negative effects of urban green spaces. I suggest briefly discussing this aspect. Comment 4: It is appropriately noted that one limitation of the study is the inability to measure highly relevant aspects such as accessibility to green areas. As a perspective, I suggest briefly discussing how this could be measured, with emphasis on the scenario where most studies (at least those meeting eligibility criteria) were conducted in countries with high economic development.

REVIEWER NAME	Wang, Ruoyu
REVIEWER AFFILIATION	Queen's University Belfast Centre for Public Health
REVIEWER CONFLICT OF INTEREST	None.
DATE REVIEW RETURNED	30-Dec-2023

GENERAL COMMENTS	The Health Impact of Urban Green Spaces: A Systematic Review of Heat-Related Morbidity and Mortality
	This paper reviews the association between UGS and heat-related morbidity and mortality. There are some issues to be solved before publication.
	Introduction
	There should be more introduction regarding why and how UGS is related to heat and heat-related morbidity and mortality.
	The focus of this study is not clear. For example, first green space can influence temperature so it may be related to morbidity and mortality through temperature. Second, there is also evidence that green space may modify the association between temperature and morbidity /mortality. However, it is unclear which aspect the authors want to focus on.
	Method
	Why there is no keyword search for 'garden', 'tree' and 'temperature'?
	What does morbidity refer to? All diseases or the general well-being?
	Results In Table 1, there should be more information regarding the characteristics of the cohort. Also, the authors should report the analysis units. For example, is the analysis based on the neighbourhood or city level?
	As for the main findings, what does the 'effect on the vulnerable' refer to? Vulnerable groups or areas?
	As for the main findings, what does the 'positive effect on heat-related mortality /morbidity' refer to? Does it mean that more green space is related to more heat-related mortality /morbidity?
	Is it possible to stratify the result by different diseases such as CVD and respiratory diseases?
	Discussion There should be more discussion regarding the lack of evidence in the global south.

REVIEWER NAME	Danilack, Valery
REVIEWER AFFILIATION	Yale University
REVIEWER CONFLICT OF INTEREST	None
DATE REVIEW RETURNED	31-Jan-2024

GENERAL COMMENTS	Thank you for the opportunity to provide a methodological review this original research article. The authors conducted a systematic review of studies of the effect of urban green space on heat-related morbidity and mortality. Major Comments: 1) Methods, page 3, line 54. What is meant by "modelling studies?" 2) Methods, page 4, line 48. CHARMS is for prediction models. Please explain why more appropriate risk of bias assessment tools were not used, such as the Cochrane Risk of Bias 2 tool for randomized studies and the ROBINS-I tool for observational studies. 3) Methods. It would be helpful to add that, besides heat stroke/illness/exhaustion, you did not define what types of disorders were included in health-related morbidity and mortality for the search terms, but rather sought articles that defined outcomes as heat-related. 4) Table 1. Can outcomes be more specifically defined based on what was found in the articles? "Heat-related health burden" is nebulous. 5) Results, page 10, risk of bias. What characteristics warranted a medium risk of bias for the 4 studies appraised as medium risk of bias? 6) Figure 1. The flowchart numbers at the end are unclear. The database articles box does not note the overall number of records excluded, but the other methods article box does. Regardless of this detail, it looks like 8 articles make it past full text review for database articles and 5 articles make it past full text review for other articles. This would add to 13, not 12. 7) Supplemental Table S1 should include all search terms, including dates and English language filters. 8) The unlabeled table after Table S1 is only readable at 300% zoom. Minor Comments: 1) Table 1. The type and source of exposure data (green space) is mentioned for some articles, but not others. 2) Table 1. Would be helpful to have last name of first author and year of publication in the table. 3) Table 1. Agree with listing city and not just country, but suggest changing column heading to "Location."

VERSION 1 – AUTHOR RESPONSE

Reviewer	Comment	Response (Empty)
Reviewer 1	Define "urban" in the main document.	Added

Reviewer 1	Discuss implications of the heterogeneous time span of studies included.	Added a section in the discussion section.
Reviewer 1	Discuss the vulnerability of children and older adults to negative effects of urban green spaces.	Added a section in introduction section
Reviewer 1	Suggest how accessibility to green areas could be measured, especially in economically developed countries.	Added in second last paragraph for discussion
Reviewer 2	Provide more introduction on UGS's relation to heat and heat-related morbidity and mortality.	Edited the introduction
Reviewer 2	Why the keywords 'garden', 'tree', and 'temperature' not included?	We conducted a preliminary search using the terms 'garden', 'tree', and 'temperature' before initiating our study but were unable to find relevant studies. This informed our decision to not include these specific keywords in our research focus.
Reviewer 2	Define what morbidity refers to in the study.	Added a definition in the methods section.
Reviewer 2	In Table 1, there should be more information regarding the characteristics of the cohort. Also, the authors should report the analysis units. For example, is the analysis based on the neighbourhood or city level?	Edited the table 1 to add more information.
	Table 1. Can outcomes be more specifically defined based on what was found in the articles? "Heat-related health burden" is nebulous.	Edited the table 1 to specify the outcomes
	Table 1. The type and source of exposure data (green space) is mentioned for some articles, but not others.	Edited/added in detail
	Table 1. Would be helpful to have last name of first author	Edited

	and year of publication in the table.	
	Table 1. Agree with listing city and not just country, but suggest changing column heading to "Location."	Edited
	4) Table 1. Can outcomes be more specifically defined based on what was found in the articles? "Heat-related health burden" is nebulous.	We have specified the outcomes and rephrased the word heat related health burden to heat related mortality.
Reviewer 2	Is it possible to stratify the result by different diseases such as CVD and respiratory diseases?	Stratifying the results by different diseases such as cardiovascular diseases (CVD) and respiratory diseases was considered. However, majority of the studies reported heat realted mortality while only one study reported (12th reference Nguyen et al) on Heat-related respiratory hospitalization among children under 5 years of age. Therefore, we focused on capturing the overall impact of green spaces on morbidity and mortality, rather than disease-specific outcomes.
Reviewer 2	Discuss the lack of evidence in the global south.	The lack of evidence in the Global South refers to the scarcity or inadequacy of research findings, data, and knowledge originating from and applicable to countries in regions such as Africa, Asia, Latin America, and the Caribbean.
Reviewer 3	Clarify what is meant by "modelling studies" in the methods.	"An analytical methodology that accounts for events over time and across populations, that is based on data drawn from primary or secondary sources…" (1)
Reviewer 3	Justify the use of CHARMS over other risk of bias assessment tools.	CHARMS (CHecklist for critical Appraisal and data extraction for systematic Reviews of prediction Modelling Studies)

		offers several advantages over other risk of bias assessment tools, making it a preferred choice for evaluating prediction models in systematic reviews. Unlike many other risk of bias assessment tools, CHARMS is tailored specifically for evaluating prediction models. This specificity ensures that the checklist is aligned with the unique characteristics and requirements of prediction modeling studies, making it more suitable and effective for this purpose. (2)
Reviewer 3	Methods. It would be helpful to add that, besides heat stroke/illness/exhaustion, you did not define what types of disorders were included in health-related morbidity and mortality for the search terms, but rather sought articles that defined outcomes as heat-related.	We did not limit our search to predefined types of disorders such as heat stroke, illness, or exhaustion. Instead, we sought articles that identified health outcomes as heat-related, irrespective of the specific disorder, to ensure comprehensive coverage of the literature on the health impacts of heat. This approach allowed us to capture a wide spectrum of heat-related health effects without constraining our search to specific diseases or conditions.

1. Weinstein MC, O'Brien B, Hornberger J, Jackson J, Johannesson M, McCabe C, Luce BR, ISPOR Task Force on Good Research Practices: Principles of good practice for decision analytic modeling in health-care evaluation: report of the ISPOR Task Force on Good Research Practices–Modeling Studies. Value Health. 2003, 6: 9-17. 10.1046/j.1524-4733.2003.00234.x.

2. Moons KGM, de Groot JAH, Bouwmeester W, Vergouwe Y, Mallett S, Altman DG, et al. Critical appraisal and data extraction for systematic reviews of prediction modelling studies: the CHARMS checklist. PLoS Med. 2014;11(10):e1001744.

VERSION 2 – REVIEW

REVIEWER NAME	Wang, Ruoyu
REVIEWER AFFILIATION	Queen's University Belfast Centre for Public Health
REVIEWER CONFLICT OF INTEREST	N/A
DATE REVIEW RETURNED	19-Jun-2024

GENERAL COMMENTS	The Health Impact of Urban Green Spaces: A Systematic Review of Heat-Related Morbidity and Mortality
	Most of my comments have been addressed.
	Minor issues:
	In Table 1, please keep the format consistent. For example, "2008-2017" vs. "1988 to 2007."
	In Table 3, full names should be reported for all abbreviations.

REVIEWER NAME	Danilack, Valery
REVIEWER AFFILIATION	Yale University
REVIEWER CONFLICT OF INTEREST	None
DATE REVIEW RETURNED	05-Jun-2024

GENERAL COMMENTS	The authors have addressed my comments

VERSION 2 – AUTHOR RESPONSE

In Table 1, please keep the format consistent. For example, "2008-2017" vs. "1988 to 2007."

Fixed

In Table 3, full names should be reported for all abbreviations.

Fixed