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INTRODUCTION

The global increase in non-communicable diseases (NCDs) presents a critical public health concern (Beaglehole et al., 2011). NCDs are the leading cause of death and disability worldwide, especially in low- and middle-income countries, and account for seven out of ten deaths (Budreviciute et al., 2020).

Emerging evidence suggests that exposure to natural environments may reduce the risk of developing NCDs through multiple pathways. To date, no comprehensive systematic review has been published analyzing the association between exposure to both green and blue spaces and NCDs related hospital admissions.

As it may be crucial to establish future policies concerning urban planning and environmental interventions, the objective of the present systematic review is to synthesize and evaluate the observational evidence regarding associations between exposure to green and blue spaces and NCD related hospital admissions.

METHODOLOGY

The methodological details of the present systematic review have been described in a protocol registered on PROSPERO before initiating the review process (reference CRD42023392945). This systematic review has been conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-P) statement. A comprehensive literature search strategy was conducted in Embase (Ovid), PubMed, and Web of Science. The risk of bias and quality of the evidence were assessed using The Navigation Guide methodology, an approach specifically designed for environmental health research. The eligibility criteria is described in a table below:

	INCLUSION	EXCLUSION
Population	Humans across lifespan	Animals
Exposure	Greenness assessed via objective or subjective methods Blue spaces assessed via objective or subjective methods	Exposure to indoor green spaces Exposure to indoor blue spaces
Comparator	Comparatively lower levels of exposure or lack of exposure	-
Outcome	NCD related hospitalization	Communicable disease related hospitalization
Study Design	Observational	Experimental

REFERENCES

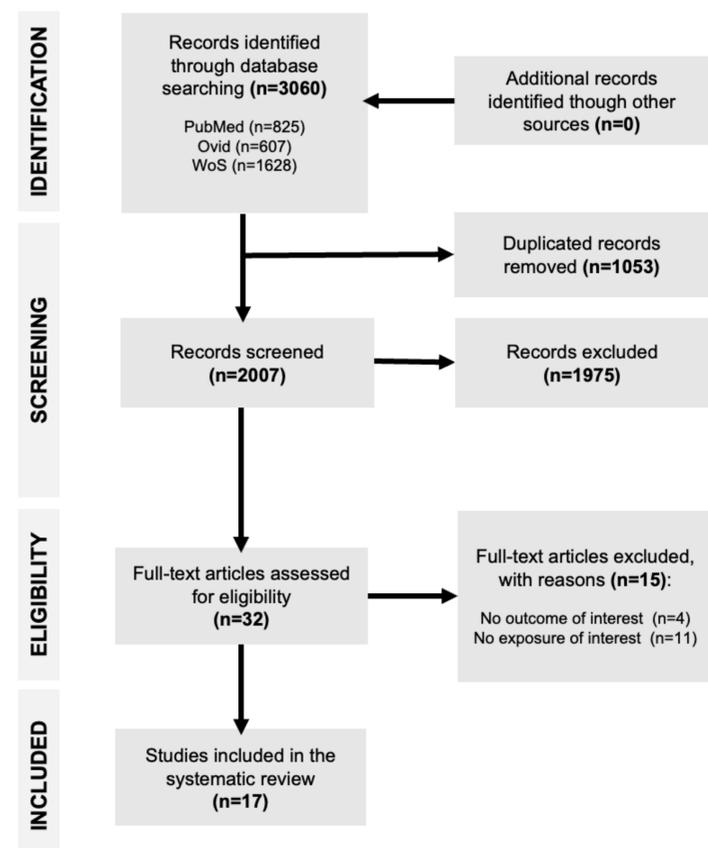
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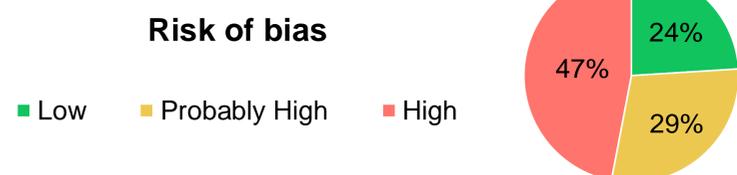
Published article: <https://doi.org/10.1016/j.envres.2023.118059>

RESULTS

Of 3060 search results, 17 articles were included. Notably, the majority of the studies (n = 14; 82.4%) were published from 2020 onwards. Most studies were conducted in the United States (n = 6; 35.3%) and China (n = 4; 23.5%).



Exposure to green spaces was assessed through all studies, while only three included blue spaces. In terms of study design, cohort design was employed in nearly half of the studies (n = 8; 47.1%), followed by case-crossover design (n = 3, 17.6%). Over 75% of the included studies (n = 13) had a high or probably high rating in the risk of bias assessment.



The studies encompassed diverse NCD outcome domains; cardiovascular diseases (n = 10), respiratory diseases (n = 2), heat-related diseases (n = 1), metabolic diseases (n = 2), cancer (n = 1), neurodegenerative diseases (n = 2), and mental health disorders (n = 2).

CONCLUSIONS

While evidence for blue spaces is both limited and inconsistent, most of the studies included in this review found a protective association between exposure to green spaces and NCD related hospital admissions. However, the direction of these associations varied across differing outcome domains. The heterogeneity among the NCD domains, together with the limited number of studies, emphasizes the need for more robust evidence.