International Journal of Community Medicine and Public Health
Aikat A et al. Int J Community Med Public Health. 2024 May;11(5):2116-2120
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20241215

Review Article

Harnessing nature-based solutions for health in post-COVID era: a narrative review

Aditi Aikat[1]*, Megha Roy[2]

[1]Department of Community Medicine, JIMSH, Kolkata, West Bengal, India
[2]Research Analyst, International Journalism AND Social Sciences, BBC, Wales, UK

Received: 21 March 2024
Revised: 14 April 2024
Accepted: 15 April 2024

***Correspondence:**
Dr. Aditi Aikat,
E-mail: Aikat_aditi@yahoo.com

ABSTRACT

In the post-COVID era, nature-based solutions (NBS) has emerged as a promising paradigm to address the health challenges at the human-animal-environment interface. This narrative review explores the dynamics between NBS and human health and the diverse mechanisms involved, substantiated through different domains of evidence like biomechanistic studies, exposure science, epidemiology, and implementation science-based research. Ranging from forest management, urban green spaces to control health hazards from air pollution to blue infrastructure safeguarding against waterborne diseases, NBS interventions has the potential to favor public health outcomes positively. Besides, psychological benefits of NBS, in reducing stress, and improving mental well-being has been pivotal in addressing the mental health crisis. Although differential access to green and blue spaces is a vexing issue that needs equitable distribution of NBS interventions to maximize health equity. Harnessing the inherent capacity of natural ecosystems, NBS provides tangible health benefits while fostering sustainable, healthy living.

Keywords: NBS, Human health, Nature based solutions, IUCN

INTRODUCTION

Nature is referred as the phenomenon of physical world and life, while nature-based solutions (NbS) according to IUCN (The International Union for Conservation of Nature) is "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits".[1-3] Health on the other hand is known as, "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" By W.H.O.[4] The state of human health, well-being, along with social cohesion are significantly affected by the natural environment, more precisely the ecosystems, the climate and biodiversity.[5] These two words, health and nature though have their connection rooted a long back in history, in the post COVID era, the emphasis has been renewed and valued. But at the same time, human health interests and ecological interests have been found to clash with one another.[6] Extreme weather, biodiversity loss, ecosystem collapse, alongside critical change to Earth systems, coupled with definitive risks like disinformation, geo-political competition and inflation figure in the top ten global risks based on World Economic Forum Global Risks Perception Survey 2024.[7,8] These clashing viewpoints have resulted in different school of thoughts. This narrative review would be critically engaging into nature-based solutions and its impact on human health by assessing certain key domains.

METHODOLOGY

This narrative review has attempted comprehensive coverage of relevant literature and empirical evidence, synthesising insights from various domains, including

biomechanistic studies, exposure science, epidemiology, and implementation science-based research. A systematic search of electronic databases such as PubMed, Scopus, Web of Science, and Google Scholar was conducted using relevant keywords including "Nature-Based Solutions," "human health," "green spaces," "blue infrastructure," and "COVID-19."Besides, additional sources such as government reports, policy documents, and academic journals were hand-searched to supplement the electronic database search. The articles were assessed for their relevance to the intersection of NbS and human health in the post-COVID era. The diverse mechanisms through which NbS influence human health, including their role in mitigating air and waterborne diseases, reducing stress, and promoting mental well-being were stressed upon. Quality and reliability of included studies were critically appraised to ensure the robustness of the evidence base. Methodological strengths and limitations of individual studies were considered.

DISCUSSION

Today we live in a world that is making efforts to recover from the global shock due to the COVID-19 pandemic, battling one of the worst recessions leading to jeopardised health and sustainable development.[9] The same time, we are losing 6.7 million premature deaths per year to air pollution, approximately half a million deaths owing to diarrhoea from polluted water sources, along with loss of genetic biodiversity.[10,11] Zoonotic infectious diseases are emerging at a fast pace owing to the encroachment of natural habitats, land use change, consumption of meat protein, overfishing, and intensified agriculture.[12,13] The problems have been identified but the relentless search for sustainable developmental solution ensuring harmonious coexistence of nature and human health that comes from the nature but not at the expense of it, remains elusive.

In the recent times, World Health Organisation is strongly propounding the “One Health” approach of interdependent human, animal and plant health bound to the health of their ecosystems to anticipate and address global health risks. We need to increasingly recognise that socio-economical angle to health is not sufficient, this critical interface between people and nature has to be addressed. The recent ongoing COVID-19 pandemic of zoonotic origin have focused on the inter-connectedness with nature, while re-emphasising the need for biodiversity conservation, restoration, climate change adaptation and mitigation for ensuring health.[14]

Public health is the science and art to prevent disease, prolong life, and promote health through organised efforts and informed choices of all strata of life.[15] But presently the new public health recognises the social aspects of lifestyle disorders. It aims to bring together the environmental changes and individual preventive measures with appropriate therapeutic interventions.[16] Nature based solutions for health are looked at as complement to technological solutions in achieving the sustainable developmental goals and ensure co-benefits. The grey infrastructures are to be complemented with green and blue infrastructures through NBS to strengthen the health system resilience along with social and ecological resilience.[17] UK is a good example of the above, where the national parks have spelt out aims and purpose as, “the conservation and enhancement of natural beauty, wildlife and cultural heritage, and the promotion of opportunities for the understanding and enjoyment of their special qualities by the public”.[18] The public duty towards human wellbeing is also a part of it. These aims are led by the Sanford principle, which states that where there is conflict of interest, more weight should be given to conservation.[19]

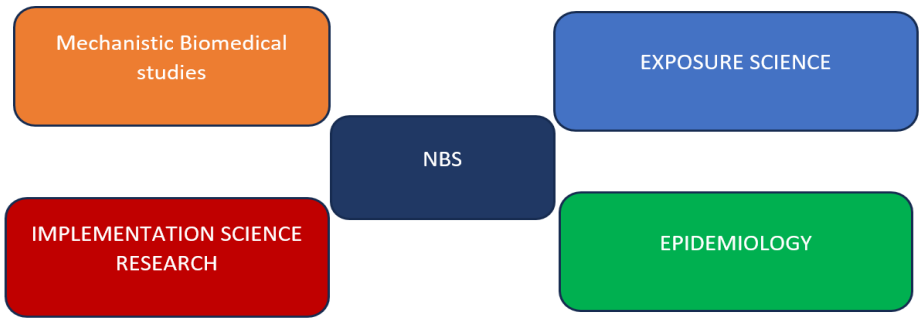

Figure 1: Domain based assessment of NBS (nature based solutions).

There have many ways in which nature has been linked to human health, by conferring psychological, physiological, spiritual, cultural benefits, diminished disease prevalence, tangible materials and resiliency.[20]

If we look into the domain of mechanistic biomedical studies to assess the observed health effects of nature, it comes across that, humans who have access to adjacent natural environments are often healthier than others as understood through psychological pathways, enhanced immune function, physical activity, social contact, and improved air quality.[21]

The role of psychological and physiological pathways has shown many possible concepts, such as the stress recovery theory that suggests nature helps human health in relieving physiological stress, while attention restoration theory (ART) explores the role of nature in relieving psychological stress.[22,23] One of the works on nature-based health defines environment as therapeutic landscapes, where physical, social, and human elements combine to create an atmosphere conducive to healing.[24]

Along with that it is also believed that, "… nature provoked feelings of renewal, restoration, and spiritual connectedness".[25] Better satisfaction levels of life in general were found as long-term and secondary impacts of living close to greens. It has been observed that outdoor activities improve motor strength, balance and co-ordination in children.[26] Besides, social connections are promoted by nature contact which is associated health benefits.[27]

In the non-infectious disease regulation several studies have substantiated lowering of blood pressure, improved control of type 2 Diabetes mellitus, better eyesight through nature contact, that happens to be a persuasive construct for addressing health, social and environmental problems.[28,29]

It has been noted that many of the health benefits of nature are due to improved immune function based on "hygiene hypothesis" along with improved natural killer (NK) cell activity from exposure to natural substances.[21]

This has also been substantiated through "Exposure science" (or exposure assessment) that studies on environmental impacts on people concerning pathogens, medications, toxic chemicals, social circumstances, etc.[30]

The major types of exposure metrics used are "cumulative opportunity" and distance to green space.[31] Cumulative opportunity is the total amount of nearby greenness, presuming that nature contact is directly proportional to it.

The domain involving epidemiology of health benefits, spread over true experiments, "natural experiments," and observational studies have also solidified the benefits of nature contact over health.[21] Apart from these approaches, the benefits of nature contact in context of policy propositions measuring the co-benefits based on ecological economics provide valuable insights, integrating human health into ecosystem services analyses.[32,33]

Another concerned domain is that of implementation science research that "supports movement of evidence-based effective health care and prevention strategies or programs from the clinical or public health knowledge base into routine use".[34] NBS like developing stress-tolerant crops and livestock leads to diversification of urban food systems and resilient agroecosystems that go on to mitigate the SDG-13, SDG-2, and SDG-3, about climate change effects, food and nutrition security at household level, and good health for all.[35] A holistic view of nature based health, implementational studies need to be carried out, in the line of bench to bedside translation.[21] These different domain-based research findings strongly support the claim that natural environments have positive benefits on mental, physical, social, emotional and spiritual health and wellbeing. These evidences increasingly support the role of NBS in the new circular economic model for climate change adaptation, with forest management, wetland, watercourse restoration, agroforestry, and expanded green spaces emerging as potent tools (Figure 2).

Figure 2: Nature-based solutions as a tool.

Despite, the multifunctional nature-based health approaches, various barriers limit the adoption and implementation of these solutions. Of the many deterring factors, the political barriers, institutional barriers and knowledge-based ones are the prominent ones. Interestingly, these barriers are not mutually exclusive and rather are inter-dependent. It appears that as political decision-makers tend to prefer interventions having short-term outcomes, suited to their re-election purposes, they are averse to NBS, that provides long term societal benefits.[37] However, political commitment to actively engage the stakeholder for NBS is highly desired. Besides,

the lack of clarity regarding the concepts of NBS and unclear liability within the organizational structures and between local governments in the current legal system are also hindrances in the path. Populism favouring the aesthetic attributes of the landscape over restorative aspects for the ecosystem and lack of equity between urban and rural areas are other identified barriers. Lack of public awareness and knowledge discrepancy regarding nature-based health is also an important barrier.[38] IUCN's nature 2030 programme calls for equitable distribution of nature-based solutions for all. Notwithstanding these barriers, it remains an evidence-based fact that nature has been playing a harmonious role in the world of health, creating a connection between individual and the environment. This relational kernel has been realised by health geographers, leading to coinages like 'therapeutic taskscapes', and 'therapeutic mobilities' in a bid to unravel the matrix of health and wellbeing in a place.[39,40]

CONCLUSION

The right to nature emerges as a fundamental right to ensure healthful society. Human world that has become increasingly disconnected from nature, needs to rebuild the bridge with nature. We need to strengthen the health system resilience along with social and ecological resilience by investing in strong healthcare delivery system backed with green energy facilities, sustainable food systems, wetland restoration, forest management restoration and complementing technological solutions with nature-based solutions. The future lies in walking the path to healthful society with nature and not against it!

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Ducarame F, Couvet D. What does 'nature' mean? PALGRAVE COMMUNICATIONS. 2020. pp.1-7. Available at: https://www.nature.com/articles/s41599-020-0390-y#citeas. Accessed on 16 March 2024.
2. Nature based Solutions; IUCN; Accessed from: https://www.iucn.org/our-work/nature-based-solutions. Accessed on 16 March 2024.
3. Cohen-Shacham E, Janzen C, Stewart M, Gretchen W. Nature-based Solutions to address global societal challenges; Publication Year: 2016; Available at: https://portals.iucn.org/library/node/46191. Accessed on 16 March 2024.
4. World Health Organisation (WHO); Available at: ho.int/about/accountability/governance/constitution#:~:text=Health%20is%20a%20state%20of,belief%2C%20economic%20or%20social%20condition. Accessed on 16 March 2024.
5. Naeem S, Ingram JC, Varga A, Agardy T, Barten P, Bennett G, Bloomgarden E, et al. Get the science right when paying for nature's services. Science. 2015;347(6227):1206–7.
6. Sandifer AP, Ward P, Sutton-Grier BE. Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation. ELSEVIER, [online] 12; 2015: pp.1-15. Available at: https://www.sciencedirect.com/science/article/pii/S2212041614001648. Accessed on 16 March 2024.
7. World Economic Forum Global Risks Report 2024; Available at: https://www.weforum.org/agenda/2024/01/global-risk-report-2024-risks-are-growing-but-theres-hope/. Accessed on 16 March 2024.
8. World Economic Forum Global Risks Report 2024; CLIMATE CHANGE; These are the top 3 climate risks we face — and what to do about them; Jan 11, 2024; Available at: https://www.weforum.org/agenda/2024/01/climate-risks-are-finally-front-and-centre-of-the-global-consciousness/. Accessed on 11 January 2024.
9. WHO Manifesto for a healthy recovery from COVID-19. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO. Available at: https://www.who.int/docs/default-source/climate-change/who-manifesto-for-a-healthy-and-green-post-covid-recovery.pdf. Accessed on 16 March 2024.
10. Household air pollution. Key facts; Available at: https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health#:~:text=The%20combined%20effects%20of%20ambient,6.7%20million%20premature%20deaths%20annually. Accessed on 15 December 2024.
11. Drinking-water; 13 September; Key facts; Available at: https://www.who.int/news-room/fact-sheets/detail/drinking-water#:~:text=Microbiologically%20contaminated%20drinking%20water%20can,000%20diarrhoeal%20deaths%20each%20year. Accessed on 13 September 2024.
12. Rohr JR, Barrett CB, Civitello DJ. Emerging human infectious diseases and the links to global food production. Nat Sustain. 2019;2:445–56.
13. Jones BA, Grace D, Kock R, Alonso S, Rushton J, Said MY, et al. Zoonosis emergence linked to agricultural intensification and environmental change. Proceedings of the National Academy of Sciences of the United States of America. 2013;110(21):8399–404
14. World Health organisation; One Health; Key Facts. Available at: https://www.who.int/news-room/fact-sheets/detail/one-health#:~:text=One%20Health%20is%20an%20integrated,the%20number%20of%20malaria%20cases. Accessed on 23 October 2023.
15. Introduction to Public Health; CDC, PH series 101. Available at: https://www.cdc.gov/training/publichealth101/public-health.html. Accessed on 16 March 2024.
16. Peterson A, Lupton D. The new Public Health: health and self in the age of risk;London;sage publications;

1996. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1381933/?page=1. Accessed on 16 March 2024.
17. Romaneli C. Programme officer, Biodiversity, Climate Change and Health, WHO; Nature-based Solutions and Health | Geneva Nature-based Solutions Dialogues. Available at: https://www.genevaenvironmentnetwork.org/events/nature-based-solutions-and-health-geneva-nature-based-solutions-dialogues/. Accessed on 16 March 2024.
18. MacBride-Stewart S. 2019. Discourses of wellbeing and environmental impact of trail runners in protected areas in New Zealand and the United Kingdom. Geoforum, [online]. 2019;107:134-42.
19. Snowdonia Society; Appendix 2: Commentary on the Sandford Principle. Available at: https://snowdonia-society.org.uk/wp-content/uploads/2017/09/Appendix-2-Sandford-commentary.pdf. Accessed on 16 March 2024.
20. Sandifer PA, Sutton-Grier AE, Ward BP. Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation, Ecosystem Services. 2015;12:1-15.
21. Frumkin H, Bratman GN, Breslow SJ, Cochran B, Kahn PH, Lawler JJ, et al. Nature Contact and Human Health: A Research Agenda. Environmental health perspectives. 2017;125(7):075001.
22. Ulrich RS. Aesthetic and Affective Response to Natural Environment. In: Altman I, Wohlwill JF (editors). Behavior and the Natural Environment. Human Behavior and Environment. Volume 6, Springer, Boston, MA; 1983.
23. Berto R. The role of nature in coping with psycho-physiological stress: a literature review on restorativeness. Behavioral sciences (Basel, Switzerland). 2014;4(4):394–409.
24. Gesler W. Lourdes: healing in a place of pilgrimage, Health & Place. 1996;2(2):95-105.
25. Finlay J, Franke T, Mckay H, Sims-Gould J. Therapeutic landscapes and wellbeing in later life: Impacts of blue and green spaces for older adults. Health & Place, [online]. 2015;34:97-106.
26. Fjørtoft, Ingunn. The Natural Environment as a Playground for Children: The Impact of Outdoor Play Activities in Pre-Primary School Children. Early Childhood Education Journal. 2001;29:111-7.
27. Maas J, Verheij RA Groenewegen PP, de Vries S, Spreeuwenberg P. Green space, urbanity, and health: how strong is the relation?. Journal of epidemiology and community health, 2006;60(7):587–92.
28. Astell-Burt T, Mitchell R, Hartig T. The association between green space and mental health varies across the lifecourse. A longitudinal study. Journal of epidemiology and community health. 2014;68(6):578–83.
29. French AN, Ashby RS, Morgan IG, Rose KA. Time outdoors and the prevention of myopia. Experimental eye research. 2013;114:58–68.
30. Armstrong BK, White E, Saracci R. Principles of exposure measurement in epidemiology. Environmental health perspectives, 1992;125(7):075001.
31. Ekkel ED, de Vries S. Nearby green space and human health: Evaluating accessibility metrics. Landsc Urban Plan. 2017;157:214–20.
32. Jo BS, Brit S, Raz B, Basurto X, Carothers C, Charnley S, et al. Conceptualizing and operationalizing human wellbeing for ecosystem assessment and management. Environmental Science & Policy. 2016;16:250-9.
33. Bayles BR, Brauman KA, Adkins JN, Allan BF, Ellis AM, Goldberg TL, et al. Ecosystem Services Connect Environmental Change to Human Health Outcomes. EcoHealth. 2016;13(3):443–9.
34. Colditz, Graham A., 'The Promise and Challenges of Dissemination and Implementation Research', in Ross C. Brownson, Graham A. Colditz, and Enola K. Proctor (editors), Dissemination and Implementation Research in Health: Translating Science to Practice, 1st edn. 2012; online edn, Oxford Academic; 2012.
35. Ebenso B, Otu A, Giusti A, Cousin P, Adetimirin V, Razafindralambo H, et al. Nature-Based One Health Approaches to Urban Agriculture Can Deliver Food and Nutrition Security; Frontiers in Nutrition. 2022;9;1-10.
36. Stefanakis, Calheiros A, Nikolaou C, Ioannis. Nature-Based Solutions as a Tool in the New Circular Economic Model for Climate Change Adaptation. Circular Economy and Sustainability; 2021.
37. Gillard, Gouldson, Paavola, Van Alstine. Can national policy blockages accelerate the development of polycentric governance? Evidence from climate change policy in the United Kingdom Global Environ. Change. 2017;45:174-8.
38. Han S, Kuhlicke C. Barriers and Drivers for Mainstreaming Nature-Based Solutions for Flood Risks: The Case of South Korea. Int J Disaster Risk Sci. 2021;12:661–72.
39. Dunkley CM. A therapeutic taskscape: theorizing place-making, discipline and care at a camp for troubled youth. Health & place. 2009;15(1):88–96.
Gatrell AC. Therapeutic mobilities: walking and 'steps' to wellbeing and health. Health Place. 2013;22:98-106.

Cite this article as: Aikat A, Roy M. Harnessing nature-based solutions for health in post-COVID era: a narrative review. Int J Community Med Public Health 2024;11:2116-20.