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COMMENTARY

Greenspaces: A natural solution to childhood malnutrition?

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Childhood undernutrition remains a global public health challenge. According to the World Health Organization, an estimated 149 million children under 5 were stunted (too short for their age) and 45 million were wasted (too thin for their height) globally in 2022. These conditions not only adversely affect immediate health but also have long-term implications for cognitive development and economic productivity.[1] Although the global burden of disease has shifted markedly in recent decades from communicable to non-communicable diseases (NCDs) such as cardiovascular disease and diabetes with projections suggesting that NCDs will account for 77% of the total burden by 2030, childhood undernutrition remains a separate and persistent risk factor contributing to both mortality and morbidity, particularly in low- and middle-income countries (LMICs) . Addressing undernutrition is thus a critical public health priority that requires multi-faceted approaches.[2]

Recent research has begun to explore the role of environmental factors, particularly greenspace, in influencing childhood nutritional outcomes. The study by Li et al.[3] in this issue of *The Innovation Medicine* examining the relationship between greenspace exposure and childhood undernutrition in multiple LMICs offers a significant contribution to our understanding of environmental health determinants. The findings indicate that increased exposure to greenspaces is associated with lower odds of stunting, underweight, and wasting among children under five years of age. In high-income countries, greenspaces are often associated with recreational opportunities that promote physical activity and social contacts and reduce environmental hazards such as air and noise pollution.[4] However, in LMICs, greenspaces serve additional ecosystem functions that are less recognized but equally vital. These areas can enhance food availability by providing grazing land for livestock, supporting small-scale agriculture, and offering access to wild fruits and medicinal plants, thereby potentially supporting more diverse and adequate diets and improving general food availability.[3] While this connection is plausible, direct empirical evidence remains limited and controversial. The extent to which such mechanisms contribute to better nutritional outcomes is likely context-specific and shaped by factors such as land use, socioeconomic conditions, and local ecological dynamics. For instance, recent findings from Sub-Saharan Africa suggest that exposure to greenspaces, measured via the enhanced vegetation index (EVI), was associated with stunting in complex and sometimes contradictory ways.[5] In areas with sparse vegetation, greenspaces appeared to reflect improved water availability and food production, potentially protecting against undernutrition. Conversely, in densely vegetated regions, high EVI values were more often linked to rural poverty and limited access to infrastructure, thereby correlating with a higher likelihood of stunting. These findings underscore the importance of local context in shaping how greenspaces interact with child health outcomes. This dual role of greenspaces as both recreational and functional spaces is critical in understanding their impact on childhood nutrition. The present study found that higher levels of total vegetative cover (normalized difference vegetation index (NDVI)) and specific types of greenspaces such as forest, shrubland, grassland, and wetland were generally associated with lower odds of childhood undernutrition, although the strength of associations varied by vegetation type and outcome. These findings were based on a large and geographically diverse sample of over 500,000 children across 49 LMICs and were robust across multiple sensitivity analyses, including models stratified by climate zone, exclusion of India, and the use of alternative greenspace indicators such as the EVI and the soil adjusted vegetation index (SAVI). However, some limitations should be noted. As the study uses a cross-sectional design, causal relationships between greenspace exposure and nutritional outcomes cannot be inferred. It is also important to consider the potential for reverse causality, as households with higher socioeconomic status, greater health literacy, or more nutritious dietary patterns may be more likely to reside in greener environments. This self-selection could partially confound the observed associations between greenspace exposure and nutritional outcomes. Additionally, although remote sensing indicators such as NDVI, EVI, and SAVI provide objective estimates of vegetative cover, they do not account for the actual accessibility, usability, or perceived safety of greenspaces, factors that may strongly influence whether greenspaces are effectively utilized and thus impact health outcomes.

The implications of these findings extend beyond academic interest and raise important questions about how we can leverage greenspaces to combat undernutrition effectively. For instance, urban planning initiatives that prioritize the creation and maintenance of greenspaces could be instrumental in enhancing food security and promoting healthier lifestyles among children in LMICs. Additionally, community education programs that teach families how to utilize local greenspaces for food production could further improve dietary diversity. Given that a substantial proportion of children in LMICs live in rural areas, where greenspace is often abundant but not systematically leveraged for nutritional benefit, the present findings may hold particular relevance for informing rural public health strategies. However, it is crucial to recognize the broader context of childhood nutrition within LMICs. While access to greenspaces can provide protective benefits against undernutrition, structural factors such as poverty, education levels, and healthcare access must also be addressed comprehensively. The interplay between these determinants is complex and therefore interventions must be multidimensional to tackle the root causes of undernutrition effectively. This circumstance is especially important, as the study revealed that factors like maternal education, household wealth, and residential setting influenced the relationship between greenspace exposure and childhood undernutrition, particularly showing stronger protective effects of greenspace for children from lower socioeconomic backgrounds. However, the direction and strength of such associations may vary by context. As discussed above,[5] greenspaces may serve as a heterogeneous indicator, reflecting varying contextual conditions across different settings ranging from enhanced access to natural resources and food production in some environments to markers of socioeconomic deprivation and infrastructural deficits in others. This underscores the importance of accounting for underlying structural and environmental determinants when assessing the equity implications of greenspace-related interventions.

In summary, although the available evidence remains limited, greenspace may play a meaningful role in shaping childhood nutrition, particularly in LMICs where it may provide both indirect and direct ecosystem functions. Understanding this relationship will require moving beyond ecological associations. Future research should prioritize longitudinal and interventional study designs that integrate geospatial greenspace data with dietary and anthropometric measures, especially in low-resource and urbanizing settings. Investigating the role of access, usability, and community engagement will also be crucial. Such efforts will require close collaboration between environmental scientists, nutrition experts, and urban planners to ensure that findings are translated into equitable and context-specific policy interventions. The findings serve as a call to action for researchers and policymakers alike to prioritize environmental considerations within public health frameworks aimed at reducing childhood undernutrition. By fostering healthier environments through enhanced access to greenspaces and integrating these efforts with broader nutritional initiatives, we can create conditions conducive to improved child health outcomes.

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DECLARATION OF INTERESTS

The authors declare no competing interests.