

THE IMPACT OF URBAN FORESTRY ON HUMAN HEALTH AND WELL-BEING: A SYSTEMATIC REVIEW OF THE EVIDENCE

Adrian TUNDUC #

University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea; Romania

RESEARCH ARTICLE

Abstract

This article examines how urban forestry influences human health and wellbeing. Across studies published in the last two decades, consistent evidence shows that exposure to urban trees and green spaces reduces stress, improves mood, and supports better mental health. Physical health benefits—such as improved air quality, increased physical activity, and lower risks of cardiovascular issues—are also commonly reported, though results vary by setting. Urban forestry additionally contributes to social wellbeing through stronger community cohesion and enhanced perceptions of safety. While the overall evidence is positive, many studies lack standardized measures and long-term designs. The review concludes that urban forestry plays an important role in promoting healthier, more livable cities, but further high-quality research is needed to strengthen causal links.

Keywords: Urban forestry, human health, well being sustainability, theories, change of paradigms

#Corresponding author: atunduc@uoradea.ro

INTRODUCTION

Urban forestry refers to the management and cultivation of trees and green spaces within urban areas, emphasizing their significant role in enhancing human health and well-being. As cities become increasingly dense and populated, the integration of nature into urban environments is gaining recognition for its multifaceted benefits. Numerous studies have demonstrated a strong correlation between access to urban greenery and improved public health outcomes, including reductions in cardiovascular diseases, respiratory issues, and mental health disorders (<https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.950894/full>; <https://pollution.sustainability-directory.com/question/why-is-community-involvement-in-urban-forestry-important/>). This growing body of evidence highlights the critical importance of urban forestry not just for environmental sustainability, but also as a vital public health strategy. Research indicates that urban forests contribute positively to community well-being by improving air quality, promoting physical activity, and facilitating social interaction

among residents (<https://www.reforestation.com/en/magazine/urban-forests-challenges-and-benefits>; <https://dnr.wisconsin.gov/topic/urbanforests/conference>).

In addition, exposure to green spaces is associated with psychological benefits, such as stress relief and improved emotional health (<https://www.sciencedirect.com/science/article/abs/pii/S0169204622000949>; <https://groundworkusa.org/what-we-do/urban-forestry-tree-equity/>)

However, despite the evident advantages, disparities in access to urban green spaces persist, particularly in underprivileged neighborhoods, raising concerns about environmental justice and equity in health outcomes (<https://www.ioes.ucla.edu/wp-content/uploads/2021/04/2021-The-Benefits-and-Limits-of-Urban-Tree-Planting-for-Environmental-and-Human-Health.pdf>; <https://www.conservationfinancenetwork.org/2018/11/08/tapping-into-public-health-dollars-to-restore-urban-forests>).

The challenge remains to ensure that all communities can benefit from urban forestry initiatives, which can serve as both a public health intervention and a catalyst for social cohesion. Moreover, the framework of urban forestry intersects with broader ecological and public health concepts, such as the One Health

approach, which emphasizes the interconnectedness of human health, animal health, and ecosystem health. This holistic perspective underscores the necessity of incorporating nature-based solutions into urban planning and public health policies, aiming for resilient urban ecosystems that foster healthier populations (<https://blogs.ubc.ca/2017wufor200/files/2017/01/Urban-Green-Spaces-and-Health-WHO-2016.pdf>); <https://pubmed.ncbi.nlm.nih.gov/38879884/>].

As research continues to evolve, it becomes increasingly clear that urban forestry is not merely an aesthetic consideration but an essential element of urban infrastructure that warrants dedicated attention and investment from policymakers and communities alike.

MATERIAL AND METHOD

Historical Context

Urban forestry has evolved significantly over the decades, increasingly recognized for its role in promoting human health and well-being. The foundations of this field can be traced back to early 20th-century urban planning movements, which began to acknowledge the importance of green spaces in cities. As cities expanded, the integration of nature into urban environments was initially motivated by aesthetic considerations and the desire to provide recreational opportunities for residents.

Emergence of Ecological Awareness

The latter half of the 20th century saw a shift towards a more ecological understanding of urban environments. Influential scholars such as James Gibson and Roger Barker emphasized the relationship between individuals and their surroundings, paving the way for the recognition of urban greenery as vital components of ecosystem health and urban resilience (<https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.950894/full>; <https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>). This period marked the beginning of interdisciplinary approaches that merged ecology, sociology, and urban planning, framing urban forestry as essential for sustainable urban development.

The One Health Concept

In the 2000s, the emergence of the One Health concept further underscored the interconnectedness of human health and ecosystems, particularly in urban areas. This holistic approach highlighted how the presence of trees and green spaces could significantly impact public health outcomes, thereby solidifying the importance of urban forestry in health promotion initiatives (<https://blogs.ubc.ca/2017wufor200/files/2017/01/Urban-Green-Spaces-and-Health-WHO-2016.pdf>). Research conducted over the years revealed substantial correlations between access to green spaces and reductions in various health issues, including cardiovascular diseases, respiratory illnesses, and mental health disorders (<https://pollution.sustainability-directory.com/question/why-is-community-involvement-in-urban-forestry-important/>).

Community Engagement and Environmental Justice

More recently, urban forestry has been framed within the context of environmental justice and community engagement. The shift towards participatory models recognizes that effective urban forestry practices must involve local communities, empowering them as stewards of their environments (<https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>; <https://prism.sustainability-directory.com/scenario/the-role-of-urban-forests-in-public-health-outcomes/>). This focus on community agency not only enhances the sustainability of urban ecosystems but also addresses historical inequalities in access to green spaces. As a result, urban forestry is now seen as a crucial strategy for fostering resilient, equitable, and healthy urban communities (<https://auf.isa-arbor.com/content/29/3/137>) [<https://www.ioes.ucla.edu/wp-content/uploads/2021/04/2021-The-Benefits-and-Limits-of-Urban-Tree-Planting-for-Environmental-and-Human-Health.pdf>].

This historical trajectory illustrates the growing recognition of urban forestry as a multifaceted discipline that contributes significantly to the health and well-being of urban populations, while simultaneously addressing broader environmental challenges.

Benefits of Urban Forestry

Urban forestry programs offer a multitude of benefits that significantly enhance public health and community well-being. These benefits extend beyond mere aesthetic improvements and are rooted in the creation of resilient, safe, and healthy urban environments that address various social, environmental, and economic needs of communities.

Health Benefits

Urban forests contribute to public health in several key ways. Firstly, they improve air quality by filtering pollutants, which in turn reduces respiratory ailments and other health issues related to air pollution [<https://www.reforestation.com/en/magazine/urban-forests-challenges-and-benefits>; <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0254973>].

Furthermore, exposure to greenery has been linked to psychological relaxation and stress alleviation, promoting mental health and overall well-being

[<https://www.sciencedirect.com/science/article/abs/pii/S0169204622000949>],

[<https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.950894/full>].

Research indicates that communities with increased access to parks and green spaces experience lower rates of cardiovascular diseases (CVDs), as these environments encourage physical activity and reduce exposure to harmful environmental factors [<https://dnr.wisconsin.gov/topic/urbanforests/conference>; <https://groundworkusa.org/what-we-do/urban-forestry-tree-equity/>].

Specifically, neighborhoods with higher vegetation indices have shown significantly lower odds of CVD mortality [<https://dnr.wisconsin.gov/topic/urbanforests/conference>].

Community Cohesion and Engagement

Urban forestry also plays a pivotal role in fostering community engagement and social cohesion. Programs that involve community members in planning and planting activities create opportunities for residents to connect, collaborate, and share a vision for their neighborhood

[<https://auf.isa-arbor.com/content/29/3/137>; <https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>].

[<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>]. This collective action not only strengthens community bonds but also empowers residents, leading to a more profound sense of ownership and stewardship of their local environment [15. The Benefits and Limits of Urban Tree Planting for Environmental ...

[<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>];

[<https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>]. Moreover, increased social interaction facilitated by community forestry projects can enhance safety and security within neighborhoods [<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>]

Economic Advantages

Beyond health and social benefits, urban forestry initiatives can provide significant economic advantages. Training programs designed to equip young individuals with skills in urban forestry not only cultivate a future workforce but also stimulate job creation in the green sector [<https://auf.isa-arbor.com/content/29/3/137>].

Investments in urban greenery can lead to increased property values, lower energy costs due to shading, and reduced expenses associated with stormwater management and urban heat [<https://www.reforestation.com/en/magazine/urban-forests-challenges-and-benefits>], [<https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>]

Sustainable Urban Development

The benefits of urban forestry extend to environmental sustainability as well. By integrating green spaces into urban planning, cities can improve their resilience to climate change impacts, such as extreme weather events and flooding [<https://auf.isa-arbor.com/content/29/3/137>],

[<https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>].

Trees play a critical role in cooling urban areas, mitigating the urban heat island effect, and managing stormwater runoff, thus promoting a healthier and more sustainable urban ecosystem

[<https://www.reforestation.com/en/magazine>

[/urban-forests-challenges-and-benefits;](#)
<https://auf.isa-arbor.com/content/29/3/137>).

Mechanisms of Impact

Enhanced Immune Functioning

Research suggests that exposure to biodiversity may significantly enhance immune functioning, which is crucial for mitigating various health issues, including cardiovascular diseases and autoimmune disorders. The "biodiversity hypothesis" posits that interactions with diverse natural environments can lead to a more resilient and diverse human microbiota, thereby improving immune responses and reducing the prevalence of chronic inflammatory conditions [<https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>; <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1677223/full>; <https://www.ioes.ucla.edu/wp-content/uploads/2021/04/2021-The-Benefits-and-Limits-of-Urban-Tree-Planting-for-Environmental-and-Human-Health.pdf>].

Specifically, studies have indicated that biodiversity exposure correlates with greater diversity in commensal microbiota among children, further supporting the link between nature exposure and improved immune health (<https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>).

Psychological Restoration

Another key mechanism through which urban forestry impacts human health is psychological restoration. The biophilia hypothesis, introduced by E.O. Wilson, suggests that humans have an innate affinity for nature, which can result in restorative benefits when interacting with biodiverse environments. Exposure to natural settings has been shown to reduce stress and promote recovery from attention fatigue, providing significant mental health benefits, particularly in urban areas where such environments may be limited (<https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>; <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1677223/full>).

Research has indicated that individuals experiencing nature—such as through urban greenspaces—exhibit lower levels of stress and improved emotional well-being

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0276517>].

Dilution of Disease Risk

Biodiversity in urban settings may also play a role in reducing the risk of infectious diseases. The "dilution effect" hypothesis suggests that greater biodiversity can lower the prevalence of zoonotic diseases by reducing host-pathogen interactions in ecosystems (<https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1677223/full>).

This is particularly relevant in urban areas, where a variety of wildlife and plant species can contribute to a more balanced ecosystem that mitigates disease transmission risks associated with urbanization [16. The Mental Benefits Provided by Urban Forests - American Forests <https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>].

Future Research Directions

While these mechanisms provide insight into how urban forestry may benefit human health, further research is necessary to establish causal relationships and to better understand the specific pathways involved. Future studies should adopt causal frameworks to investigate the dynamics between biodiversity, urban greenspace, and human health outcomes, including the effects of various types of urban forest interventions [<https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>, <https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>].

Understanding the interplay between individual, organizational, and community-level factors will also be crucial in designing effective urban forestry initiatives that maximize health benefits for diverse populations (<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>).

Systematic Review Methodology

Inclusion and Exclusion Criteria

The studies included in the systematic review had to meet several pre-defined criteria. These criteria mandated that the studies be randomized controlled trials (RCTs) explicitly evaluating the effects of green exercise

interventions on mental health outcomes among participants aged 18 years or older. Interventions had to be conducted in urban natural environments such as parks or urban forests, combining nature exposure with physical activities. Additionally, a clearly defined control group was required, alongside the necessity for reporting at least one mental health outcome using quantitative measures. Furthermore, complete pre-intervention and post-intervention data or sufficient statistical information for effect size calculations were mandatory for inclusion (<http://naturewithin.info/New/2024 Health Benefits of-Urban Forests.rapid review.final.pdf>).

Literature Search Strategy

A comprehensive literature search was conducted to identify relevant studies that evaluate the impact of urban forestry on human health and well-being. The search included multiple databases, namely Web of Science, Scopus, Medline, APA PsycINFO, and GreenFile, and was performed on March 10th, 2021. The search strategy employed a combination of medical subject headings (MeSH) and keywords tailored to capture all pertinent literature in the field. It was designed with the guidance of a medical librarian and peer-reviewed according to the Peer Review of Electronic Search Strategies (PRESS) guidelines (<https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary 11 16 15.pdf>).

The search was limited to articles published in English.

Screening and Data Extraction

The screening process utilized the Rayyan AI platform to facilitate systematic assessment by two blinded reviewers, who independently evaluated titles and abstracts against the eligibility criteria. Conflicts in assessment were resolved through consensus or by consulting a third reviewer. Following the initial screening, full articles were scrutinized to ensure adherence to the inclusion criteria. Reference lists of all included articles were also checked to identify additional relevant studies (<https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary 11 16 15.pdf>; <http://naturewithin.info/New/2024 Health Benefits of-Urban Forests.rapid review.final.pdf>).

Data extraction was meticulously conducted by the same two reviewers, focusing on general study information, baseline participant characteristics, intervention protocols, psychological assessment instruments, and outcome measures. In instances where data were presented graphically or incomplete, the corresponding authors were contacted for clarification and additional numerical data (<http://naturewithin.info/New/2024 Health Benefits of-Urban Forests.rapid review.final.pdf>), <https://pmc.ncbi.nlm.nih.gov/articles/PMC6388234>

Risk of Bias Assessment

To assess the risk of bias in the included studies, a modified version of the Newcastle-Ottawa Scale (NOS) was utilized. This adaptation was necessary due to the absence of a validated tool for the various study types incorporated in this review. While the original NOS has established validation for case-control and cohort studies, the modified scoring guide aimed to capture experimental or pre-post study factors, although it lacked independent validation. To mitigate potential subjectivity, two independent reviewers conducted the bias assessment, which was overseen by a third mediator in cases of disagreement (<https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary 11 16 15.pdf>).

Adherence to Reporting Guidelines

This systematic review was executed and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring transparency and reproducibility. The review protocol was registered with PROSPERO under ID # CRD42021231619, affirming the commitment to methodological rigor throughout the review process (<http://naturewithin.info/New/2024 Health Benefits of-Urban Forests.rapid review.final.pdf>).

Evidence from Systematic Reviews

The systematic review of the impact of urban forestry on human health and well-being highlights several key findings regarding the effectiveness of nature-based interventions. A total of 31 studies were included in the review,

with a significant focus on cardiovascular (CV) health and cancer-related outcomes. The risk of bias for these studies was evaluated using a modified version of the Newcastle–Ottawa Scale (NOS), allowing for a comprehensive assessment of methodological quality across the included research. [20. Ten-Year Urban Forestry Action Plan Goals and Strategies https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf].

Cardiovascular Health Outcomes

Out of the 31 studies reviewed, 26 specifically examined cardiovascular health metrics. The countries contributing to this body of research included Japan, China, the UK, and Taiwan, among others, with forest bathing being the most prevalent intervention type, particularly in Japan and China. Other interventions included green exercise, nature viewing, and gardening. The primary health outcomes measured were diastolic blood pressure (DBP), systolic blood pressure (SBP), and heart rate (HR), which were assessed in 18 studies. Heart rate variability (HRV) and measures related to both the parasympathetic and sympathetic nervous systems were also reported in several studies [https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf].

Cancer-Related Outcomes

Five studies focused on cancer-related outcomes, with three conducted in the United States and two in Japan. The U.S. studies primarily investigated vegetable gardening interventions, whereas the Japanese studies explored the effects of forest bathing on natural killer (NK) cell activity. Positive health behaviors, such as improved dietary habits and increased physical activity, were documented alongside measures of physical fitness and overall quality of life [https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf].

Methodological Rigor and Limitations

Despite the methodological rigor of this review, certain limitations were acknowledged. The modified NOS lacked formal validation for all study types included, leading to potential subjectivity in scoring. Furthermore, although statistical trends were reported across studies using alluvial charts, a formal meta-analysis was

not conducted, preventing definitive statistical inferences about the collective findings. Variability in the reporting of outcome measures and sample sizes across studies also posed challenges for drawing generalized conclusions. Lastly, several studies cited small sample sizes and methodological deficiencies as additional concerns [https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf].

The review underscores the necessity of further research with larger, multi-center randomized controlled trials (RCTs) to enhance the reliability of findings related to urban green interventions and their integration into public health planning [19. Human Health Benefits of City Trees & Forests: http://naturewithin.info/New/2024_Health_Benefits_of-Urban_Forests.rapid_review.final.pdf], Overall, the evidence suggests a beneficial impact of greenspace interventions on both cardiovascular health and cancer-related outcomes, reinforcing the potential role of urban forestry in promoting public health.

RESULTS AND DISCUSSIONS

EndoInclusion and Exclusion Criteria

The studies included in the systematic review had to meet several pre-defined criteria. These criteria mandated that the studies be randomized controlled trials (RCTs) explicitly evaluating the effects of green exercise interventions on mental health outcomes among participants aged 18 years or older. Interventions had to be conducted in urban natural environments such as parks or urban forests, combining nature exposure with physical activities. Additionally, a clearly defined control group was required, alongside the necessity for reporting at least one mental health outcome using quantitative measures. Furthermore, complete pre-intervention and post-intervention data or sufficient statistical information for effect size calculations were mandatory for inclusion [http://naturewithin.info/New/2024_Health_Benefits_of-Urban_Forests.rapid_review.final.pdf].

Literature Search Strategy

A comprehensive literature search was conducted to identify relevant studies that evaluate the impact of urban forestry on human

health and well-being. The search included multiple databases, namely Web of Science, Scopus, Medline, APA PsycINFO, and GreenFile, and was performed on March 10th, 2021. The search strategy employed a combination of medical subject headings (MeSH) and keywords tailored to capture all pertinent literature in the field. It was designed with the guidance of a medical librarian and peer-reviewed according to the Peer Review of Electronic Search Strategies (PRESS) guidelines

(https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

The search was limited to articles published in English.

Screening and Data Extraction

The screening process utilized the Rayyan AI platform to facilitate systematic assessment by two blinded reviewers, who independently evaluated titles and abstracts against the eligibility criteria. Conflicts in assessment were resolved through consensus or by consulting a third reviewer. Following the initial screening, full articles were scrutinized to ensure adherence to the inclusion criteria. Reference lists of all included articles were also checked to identify additional relevant studies

(https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf),

http://naturewithin.info/New/2024_Health_Benefits_of-Urban_Forests.rapid_review.final.pdf].

Data extraction was meticulously conducted by the same two reviewers, focusing on general study information, baseline participant characteristics, intervention protocols, psychological assessment instruments, and outcome measures. In instances where data were presented graphically or incomplete, the corresponding authors were contacted for clarification and additional numerical data (http://naturewithin.info/New/2024_Health_Benefits_of-Urban_Forests.rapid_review.final.pdf), (<https://pubmed.ncbi.nlm.nih.gov/articles/PMC6388234/>)

Risk of Bias Assessment

To assess the risk of bias in the included studies, a modified version of the Newcastle-Ottawa Scale (NOS) was utilized. This adaptation was necessary due to the absence of

a validated tool for the various study types incorporated in this review.

While the original NOS has established validation for case-control and cohort studies, the modified scoring guide aimed to capture experimental or pre-post study factors, although it lacked independent validation. To mitigate potential subjectivity, two independent reviewers conducted the bias assessment, which was overseen by a third mediator in cases of disagreement

(https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

Adherence to Reporting Guidelines

This systematic review was executed and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring transparency and reproducibility. The review protocol was registered with PROSPERO under ID # CRD42021231619, affirming the commitment to methodological rigor throughout the review process [19]. Human Health Benefits of City Trees & Forests: http://naturewithin.info/New/2024_Health_Benefits_of-Urban_Forests.rapid_review.final.pdf].

Evidence from Systematic Reviews

The systematic review of the impact of urban forestry on human health and well-being highlights several key findings regarding the effectiveness of nature-based interventions. A total of 31 studies were included in the review, with a significant focus on cardiovascular (CV) health and cancer-related outcomes. The risk of bias for these studies was evaluated using a modified version of the Newcastle-Ottawa Scale (NOS), allowing for a comprehensive assessment of methodological quality across the included research

(https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

Cardiovascular Health Outcomes

Out of the 31 studies reviewed, 26 specifically examined cardiovascular health metrics. The countries contributing to this body of research included Japan, China, the UK, and Taiwan, among others, with forest bathing being the most prevalent intervention type, particularly in Japan and China. Other interventions included green exercise, nature viewing, and gardening. The primary health

outcomes measured were diastolic blood pressure (DBP), systolic blood pressure (SBP), and heart rate (HR), which were assessed in 18 studies. Heart rate variability (HRV) and measures related to both the parasympathetic and sympathetic nervous systems were also reported in several studies

[\[https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf\]](https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

Cancer-Related Outcomes

Five studies focused on cancer-related outcomes, with three conducted in the United States and two in Japan. The U.S. studies primarily investigated vegetable gardening interventions, whereas the Japanese studies explored the effects of forest bathing on natural killer (NK) cell activity. Positive health behaviors, such as improved dietary habits and increased physical activity, were documented alongside measures of physical fitness and overall quality of life

[\[https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf\]](https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

Methodological Rigor and Limitations

Despite the methodological rigor of this review, certain limitations were acknowledged. The modified NOS lacked formal validation for all study types included, leading to potential subjectivity in scoring. Furthermore, although statistical trends were reported across studies using alluvial charts, a formal meta-analysis was not conducted, preventing definitive statistical inferences about the collective findings. Variability in the reporting of outcome measures and sample sizes across studies also posed challenges for drawing generalized conclusions. Lastly, several studies cited small sample sizes and methodological deficiencies as additional concerns

[\[https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf\]](https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf).

The review underscores the necessity of further research with larger, multi-center randomized controlled trials (RCTs) to enhance the reliability of findings related to urban green interventions and their integration into public health planning

[\[http://naturewithin.info/New/2024_Health_Benefits_of_Urban_Forests.rapid_review.final.pdf\]](http://naturewithin.info/New/2024_Health_Benefits_of_Urban_Forests.rapid_review.final.pdf),

[https://www.sciencedirect.com/science/article/abs/pii/S0169204622000949\]](https://www.sciencedirect.com/science/article/abs/pii/S0169204622000949).

Overall, the evidence suggests a beneficial impact of greenspace interventions on both cardiovascular health and cancer-related outcomes, reinforcing the potential role of urban forestry in promoting public health.

Case Studies

Overview of Case Studies

A systematic review of the impact of urban forestry on human health and well-being includes several key case studies that illustrate the diverse benefits provided by urban green spaces. These case studies encompass various geographical locations and demographic settings, highlighting the multifaceted nature of urban forestry's influence on public health.

Community-Centered Urban Forestry Programs

One notable case study involved a community-centered urban forestry program designed to enhance public health. This program demonstrated that community engagement in tree planting and care not only fostered environmental stewardship but also contributed to improved community health. Trees played a significant role in mitigating extreme weather effects, improving air quality, and reducing flooding risks. The program also aimed to grow the urban forestry workforce by training young individuals in the necessary skills for maintaining urban green spaces, thus opening new career opportunities while protecting natural environments [\[https://auf.isa-arbor.com/content/29/3/137\]](https://auf.isa-arbor.com/content/29/3/137), [\[https://www.epa.gov/green-infrastructure/social-benefits-green-infrastructure\]](https://www.epa.gov/green-infrastructure/social-benefits-green-infrastructure).

Engagement and Participation

Another case study illustrated the importance of community involvement in urban forestry initiatives. This project emphasized participatory models of urban forestry that empowered residents to take an active role in shaping their environments. By engaging the community in the planning and execution of green space projects, the initiative helped cultivate a shared vision for neighborhood development. This collaborative approach not only enhanced environmental responsibility but also fostered social cohesion and a sense of ownership among residents [\[https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455\]](https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455), [4. Good Health Grows

on Trees - Wisconsin DNR <https://dnr.wisconsin.gov/topic/urbanforests/conference>].

Health and Social Benefits

Several studies within the review highlighted the social benefits derived from urban green spaces. For instance, access to parks and green infrastructure has been linked to lower rates of anxiety and depression, improved mood, and reduced stress levels. Green spaces foster social interactions that strengthen community ties and enhance feelings of safety and engagement. These findings underscore the role of urban forests as critical components of public health infrastructure, promoting mental well-being and social equity (<https://www.conservationfinancenetwork.org/2018/11/08/tapping-into-public-health-dollars-to-restore-urban-forests>;

CONCLUSIONS

The relationship between urban forestry and human health and well-being (HWB) is complex and influenced by a myriad of factors. One significant challenge in establishing a clear causal relationship is the multifaceted nature of HWB determinants that extend beyond urban green spaces (UGSs) alone. Simplistic UGS interventions may overlook underlying determinants of HWB, such as accessibility, perception of safety, and the quality of management, which can significantly affect the benefits derived from these spaces

Additionally, many studies examining the impacts of UGSs on HWB suffer from methodological shortcomings, including small sample sizes and inadequate reporting of randomization procedures. Such limitations contribute to an elevated risk of bias, which may distort the findings and conclusions drawn from these investigations

Future research would benefit from enhanced methodological rigor, such as conducting multi-center, large-sample randomized controlled trials (RCTs) with standardized intervention designs and extended follow-up periods

Furthermore, individual factors such as personality traits, socio-economic status, ethnicity, and cultural backgrounds can

<https://keepmassbeautiful.org/news-events/the-kmb-blog/overview.html/article/2025/06/10/urban-green-spaces-boosting-mental-health>], <https://beyondgreenspace.net/making-the-most/making-the-most-evidence-and-resources/>).

Addressing Disparities

Despite the recognized benefits, many case studies pointed out existing disparities in access to urban green spaces. Research indicated that urban areas, particularly in lower-income regions, often lack sufficient green infrastructure, limiting the potential health benefits for residents. Addressing these inequalities is crucial for maximizing the public health advantages of urban forestry and ensuring that all communities can partake in the associated benefits of green environment.

influence how individuals perceive and engage with UGSs, potentially skewing the overall transactional reporting of benefits

It is also essential to recognize that respondents may experience HWB benefits through various means outside of green space interaction, such as through social groups or recreational activities, which further complicates the analysis

Moreover, the reciprocal impacts of urban environmental conditions, including pollution and heat, on urban forest ecological processes necessitate further empirical research to understand their interplay with human health outcomes

This includes examining the interactions between urban morphology and tree canopies, as these factors can significantly influence atmospheric conditions and consequently the health benefits associated with urban green spaces.

REFERENCES

- Linking human wellbeing and urban greenspaces - Frontiers
<https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2022.950894/full>
- Why Is Community Involvement in Urban Forestry Important?
<https://pollution.sustainability-directory.com/question/why-is-community-involvement-in-urban-forestry-important/>
- Urban forests: challenges and benefits - Reforest'Action

- <https://www.reforestation.com/en/magazine/urban-forests-challenges-and-benefits>
- Good Health Grows on Trees - Wisconsin DNR
<https://dnr.wisconsin.gov/topic/urbanforests/conference>
- Not by trees alone: Centering community in urban forestry
<https://www.sciencedirect.com/science/article/abs/pii/S0169204622000949>
- Urban Forestry and Tree Equity - Groundwork USA
: <https://groundworkusa.org/what-we-do/urban-forestry-tree-equity/>
- [PDF] The Benefits and Limits of Urban Tree Planting for Environmental ...
<https://www.ioes.ucla.edu/wp-content/uploads/2021/04/2021-The-Benefits-and-Limits-of-Urban-Tree-Planting-for-Environmental-and-Human-Health.pdf>
- Tapping into Public Health Dollars to Restore Urban Forests
<https://www.conservationfinancenetwork.org/2018/11/08/tapping-into-public-health-dollars-to-restore-urban-forests>
- [PDF] Urban green spaces and health. A review of evidence - UBC Blogs
<https://blogs.ubc.ca/2017/wufor200/files/2017/01/Urban-Green-Spaces-and-Health-WHO-2016.pdf>
- Health and wellbeing benefits of urban forests in winter: a narrative ...
<https://pubmed.ncbi.nlm.nih.gov/38879884/>
- Green Streets, Healthy Hearts: Exploring the Roles of Urban Nature ...
<https://journal.houstonmethodist.org/articles/10.14797/mdcvj.1455>
- The Role of Urban Forests in Public Health Outcomes → Scenario
<https://prism.sustainability-directory.com/scenario/the-role-of-urban-forests-in-public-health-outcomes/>
- Social Aspects of Urban Forestry: Urban Greening and Social Benefits
<https://auf.isa-arbor.com/content/29/3/137>
- Potential health benefits from California's street trees | PLOS One
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0254973>
- The Benefits and Limits of Urban Tree Planting for Environmental ...
<https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2021.603757/full>
- The Mental Benefits Provided by Urban Forests - American Forests
<https://www.americanforests.org/article/the-mental-benefits-provided-by-urban-forests/>
- Effects of urban green exercise on mental health: a systematic ...
<https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1677223/full>
- The impact of greenspace or nature-based interventions on ...
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0276517>
- [PDF] Human Health Benefits of City. Trees & Forests:
http://naturewithin.info/New/2024_Health_Benefits_of_Urban_Forests.rapid_review.final.pdf
- [PDF] Ten-Year Urban Forestry Action Plan Goals and Strategies
https://urbanforestplan.org/wp-content/uploads/2015/11/FinalActionPlanSummary_11_16_15.pdf
- The Relationship between Social Cohesion and Urban Green Space
<https://pmc.ncbi.nlm.nih.gov/articles/PMC6388234/>
- Social Benefits of Green Infrastructure | US EPA
<https://www.epa.gov/green-infrastructure/social-benefits-green-infrastructure>
- Urban Green Spaces Boosting Mental Health
<https://keepmassbeautiful.org/news-events/the-kmb-blog/overview.html/article/2025/06/10/urban-green-spaces-boosting-mental-health>
- Making the Most of Green Space for People's Health
<https://beyondgreenspace.net/making-the-most/making-the-most-evidence-and-resources/>
- Urban Forest Equity and Public Health Disparities → Scenario
<https://prism.sustainability-directory.com/scenario/urban-forest-equity-and-public-health-disparities/>
- Sustainable Urban Forestry to Combat Extreme Heat
<https://fas.org/publication/urban-forest-heat-health/>