

Trees benefit human health

Trees save lives.

Trees give our communities beauty, wildlife habitat, and shade. Our research shows that the benefits of trees are even more profound: they save human lives.

Using 30 years of data from the Portland nonprofit [Friends of Trees](#), we ran a natural experiment to assess how tree planting in urban neighborhoods affects human mortality.

We discovered that residents in neighborhoods with more newly planted trees experienced lower rates of cardiovascular and nonaccidental mortality. The reduction in mortality was more strongly associated with older trees, 11 to 15 years after planting, meaning that the impact of trees on human mortality grows stronger as trees mature.

Cost vs benefit of trees.

In 2023, US healthcare [expenditures](#) totaled \$4.9 trillion, or \$14,570 per person.

Further, given our findings that trees save lives, we estimated that planting a tree in each of Portland's 140 census tracts would generate \$14.2 million in annual benefits (based on the value of a [statistical life](#)). In contrast, the annual cost of maintaining 140 trees would be \$2,716–\$13,720. This represents a return on investment of 1,700:1.

Failing to adequately account for the public-health benefits of trees means that we may be significantly under investing in urban forestry.

“I’m interested in the intersection between people and the natural environment. In particular, my research focuses on the health benefits of trees.”

--Geof Donovan, PhD

Asthma.

[Donovan et al. 2018. Nature Plants.](#)

Newborn babies.

[Donovan et al. 2011. Health and Place.](#)

Childhood leukemia.

[Donovan et al. 2021. Sci. of the Total Environment.](#)

Allergies.

[Gernes et al. 2019. Sci. of the Total Environment.](#)

ADHD.

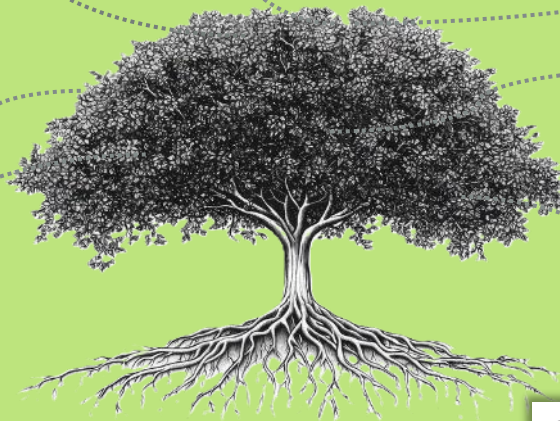
[Donovan et al. 2019. Lancet Planetary Health.](#)

Heart and lung health.

[Donovan et al. 2013. Am. J. Preventative Medicine.](#)

Surgery recovery.

[Donovan et al. 2019. BMJ Open.](#)



Why exposure to biodiverse nature matters

In the late 1980s, researchers discovered that children from larger families were less likely to develop hay fever. This led to the “hygiene hypothesis”—the idea that kids need to be exposed to germs to develop healthy immune systems.

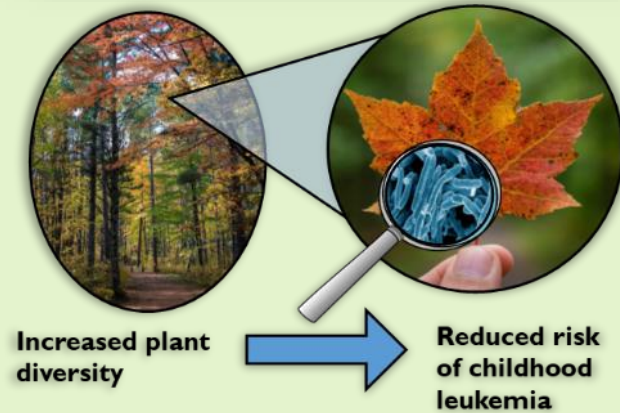
Since then, studies have shown that a broad range of proxies for microbial exposure—such as attending day-care, breastfeeding, having pets, and growing up on a farm—have proven to be protective of certain immune diseases.

Our research has refined the evidence supporting the hygiene hypothesis and taken it a step further by examining the importance of biodiversity. We have found that exposure to more diverse plants is protective of asthma, allergies, and childhood leukemia.

Plant leaves support an astounding $\sim 10^{26}$ bacterial cells. Our finding that exposure to more diverse plants is protective of some immune disorders suggests that the composition of exposure to nature may be as important as the intensity of exposure.

Other mechanisms certainly influence how trees and nature affect public health, such as improved air quality, reduced stress, increased exercise, and improved social connections.

However, our work suggests that loss of plant diversity, and associated microbial communities, may have a negative impact on human immune development, which may, in turn, be contributing to a global increase in immune diseases, especially in high-income countries.



There's more

A healthy urban forest is an asset for the entire community. In addition to positively affecting human health, trees can improve social cohesion and reduce crime, decrease energy use, increase property values (thereby raising city revenue), and play a role in social equity.



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