City Trees & Public Health
diverse benefits, diverse beneficiaries

Jennifer McKeen, Master of Public Health
Simon Fraser University

Kathleen Wolf, Ph.D., Research Social Scientist
University of Washington & USDA Forest Service

International Urban Forestry Congress
1 October 2018
WHO Health Definition

A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (1946)
Social Determinants
Urban Nature and Health

This Photo by Unknown Author is licensed under CC BY-NC-ND
City Trees and Human Health: A Systematic Review

**Purpose:** carefully collect and synthesize the peer-reviewed evidence concerning city trees and human health

**Sponsors:**

[Logo of US Forest Service] [Logo of Health Canada] [Logo of Santé Canada] [Logo of Natural Resources Canada]
Project Team

- Kathleen Wolf, Ph.D., University of Washington
- Sharon Lam, MSc, University of Toronto
- Jennifer McKeen, MPH, Simon Fraser University
- Gregory Richardson, MUP, Health Canada
- Matilda Van Den Bosch, M.D, University of British Columbia
- Adrina Bardekkian, Ph.D., Tree Canada
Methods

Keyword search (n=1644)

Abstract review (n=436)

Quality assessment (n=198)

Final article set (n=182)

Synthesize and present findings
Final Article Collection

- 182 articles
- diverse methods, populations, measures, and study locations
- conducted by multiple disciplines

study examples and synthesis . . . .
Urban Forests and Newborns

the natural environment may affect pregnancy outcomes . . .

10% increase in tree-canopy cover within 50m of a house

= lower number of low weight births (1.42 per 1000 births)

Donovan et al., Health & Place 2011; Hystad et al., Env Health Perspectives 2014
Trees & Physical Activity

• school children in cities grades 6 to 8
• relationship of tree cover to outside-of-school physical activity
• 5% increase in treed area cover = 5% increase in free-time physical activity

Sacramento Study :: LIDAR x CHIS data
7,900 adults, 250 m buffer, covariates


more tree cover = better overall health = better social cohesion
EAB Tree Loss & Public Health

1990 to 2007, 1,296 counties in 15 states infected areas vs. no bugs
15,000 more deaths from cardiovascular disease
6,000 more deaths from lower respiratory disease
controlled for demographic, human mortality, and forest health data at the county level

Toledo, Ohio in 2006, pre EAB

2009, EAB in neighborhood

photo credits: Dan Herms, Ohio State U
Improving Depression

20 adults with major depression walk in a park setting and a built setting

- 50-minute walks one week apart
- before-after testing:
  - Mood: Positive and Negative Affect (PANAS)
  - Cognition: Backward Digit Span (BDS)

Berman et al. 2012. *Journal of Affective Disorders*

cognitive and affective improvements after walking in a nature setting
City Trees & Human Health

newborn & infant health
increased physical activity for kids
overall adult health
social cohesion
respiratory & cardiovascular health
reduced depression
Greenspace & Health Pathways

Literature Review – City Trees & Human Health

USDA Forest Service, U of WA, Health Canada, Natural Resources Canada, Tree Fund

182 peer-reviewed articles

DRAFT not for distribution

figure credit: Sharon Lam
Limitations of Evidence

- heterogeneity of study methods, few experiments
- heterogeneity of tree or forest interventions
- lack of replication
- did not include qualitative studies
- thus, not able to conclusively state outcomes
Implications of the Review

• city trees are essential for health-supportive environments
• effects of trees vary by receptor, not always beneficial (allergy symptoms due to tree pollen)
• benefits mediated by many factors, including the health status of trees and forests
• integrated and proactive design and management
• maximize health benefits and minimize potential adverse impact
• collaboration between health and environmental professionals, planning guidelines
• health equity, tree distribution
Shinrin yoku (forest bathing)

- extensive research
- restorative experiences
- workers retirees
- networked system, 52 bases in Japan
The medicine of being in the forest
We are the leading global voice for forest bathing and forest therapy

Santa Rosa, California
Canopy Cover & Stress

images of canopy cover varied 0-60%

Trees, Income & Health

▲ income  ▲ health care  ▲ health

11 more trees in a city block
decreased cardio-metabolic conditions =
increase in annual personal income
of $20,000, or
moving to a neighborhood
with $20,000 higher median income

Kardan, et al. 2015. Scientific Reports 5, 11610
Metro Nature & Human Health

Nearby nature includes a variety of spaces and places

Urban Forest Canopy

Biophilic Design

Parks and Gardens

Green Stormwater Infrastructure
Green Cities: Good Health
www.greenhealth.washington.edu

Sponsors:
USDA Forest Service,
(U&CF Program + Pacific NW Research)
University of Washington
NGO partners

Thanks!
to U of WA students:
Katrina Flora
Mary Ann Rozance
Sarah Krueger

Research Reviews & Summaries
Local Economics

Trees in cities are not grown and managed for products that can be bought and sold on markets, but they do provide many intangible services and functions! This article serves two purposes. First, it introduces valuation methods that are used to convert intangible benefits to dollar sums. Then, it shows how nonmarket valuations can support local decision-making.

Fast Facts

- The presence of larger trees in yards and as street trees can add from 3% to 15% to home values throughout neighborhoods.

- Averaging the market effect of street trees on all house values across Portland, Oregon yields a total value of $1.35 billion, potentially increasing annual property tax revenues $15.3 million.

- A study found 7% higher rental rates for commercial offices having high quality landscapes.

- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.

- Shoppers indicate that they will travel greater distance and a longer time to visit a district having high quality trees, and spend more time there once they arrive.
Green Cities: Good Health
database of >4,500 peer reviewed publications
Science Review

nearby nature & health evidence

> 40 years
> 4,500 publications
Closing

• trees in cities, health protective environments
• tree research + metro nature research
• 3 domains of benefit:
  • reducing harm
  • restoring capacity
  • building capacity
• collaborative UF planning & management
Human Dimensions of Urban Forestry and Urban Greening

What's New?
Nature and Consumer Environments
Research about how the urban forest influences business district visitors.

Trees and Transportation
Studies on the value of having quality landscapes in urban roadsides.

Civic Ecology
Studies of human behaviors and benefits when people are active in the environment.

Policy and Planning
Integrating urban greening science with community change.

Green Cities: Good Health
human health & well-being research

Urban Forestry and Human Benefits
More resources, studies and links...

Projects Director
Kathleen L. Wolf, Ph.D.