Where Matters II
Walkability and Greenspace Relationships with Health and Climate Change
Executive Summary and Policy Brief

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The Global Warming Gamble

Policy Levers to Reduce Transportation - Related CO2 emissions

REDUCING GHG EMISSIONS

TWO SIDES - SAME COIN

CLIMATE CHANGE

PUBLIC HEALTH
Where Matters II provides a blueprint to track how communities are changing over time; and tracking how these changes impact public health and climate change. Tracking physical changes to the built environment over time and linking it with travel and health outcome data provides planners and decision-makers with a tool that links the health of a population and the environment with community design.
Frank, L. D., Iroz-Elardo, N., MacLeod, K. E., Hong, A. The pathways from built environment to health: Connecting behavior and exposure-based impacts. 2019. *Journal of Transport and Health*. 

**Diagram:**
- **Environment/Travel:** Transportation Infrastructure, Land Use/Walkability, Pedestrian Environment, Greenspace.
- **Behavior/Exposures:** Dietary Intake, Physical Activity, Social Interaction, Air Pollution, Traffic Safety & Crime, Noise.
- **Biological Response:** BMI, Systemic Inflammation, Stress.
- **Chronic Disease:** Physical (Hypertension, Cardiovascular Disease, Diabetes, Cancer, Breast, Colon/Rectal, Injury/Fatality), Mental (Dementia, Depression).
- **Healthcare Utilization & Cost**
Health and Climate Change Impacts – Integration

DETAILED TRIP LEVEL EMISSIONS ESTIMATES *
TRANSLINK’S 2017 HOUSEHOLD TRAVEL SURVEY DATA
BC GENERATIONS DATA ON HEALTH OUTCOMES**
ESTIMATED HEALTH IMPACTS

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BUILT ENVIRONMENT ELEMENTS & SCALE

MACRO

MICRO

Pedestrian Environment

- Sidewalk, Road Buffering
- Pedestrian Crossings
- Trees, Lighting, Seating

Transportation

Accessibility

Complete Communities

• Sidewalk, Road Buffering
• Pedestrian Crossings
• Trees, Lighting, Seating
Walkability and Diabetes

People living in a moderately walkable area are 27% less likely to have diabetes and people in a walkable area are 39% less likely to have diabetes compared to those living in a car dependent area.

People living in a moderately walkable area are 24% more likely to have a strong sense of community belonging and people in a walkable area are 47% more likely compared to those living in a car dependent area.
DOCUMENTING CAUSAL HEALTH AND CLIMATE CHANGE IMPACTS: A NATURAL EXPERIMENT IN VANCOUVER
After (Counterflow Lanes)
Documenting GHG & Health Impacts

• Those within 300 Meters of the greenway reduced their transport GHG emissions by 21%
  • Those further away drove and generated more GHG emissions due to emergence of car sharing
    • Transportation Research Part D: Ngo, Hong, and Frank, 2018

• Those within 300 Meters of the greenway were twice as likely to meet recommended physical activity levels Those further were less likely to meet this target
  • Preventive Medicine: Frank, Ngo, Hong, 2019

• Those within 300 Meters of the greenway showed a 3 fold (251%) increase in # of reported cycling trips
  • International Journal of Transportation Policy: Frank, Ngo, Hong, 2021
The proportion of trips by car declined from 92 to 44 percent and walking increased from 5 to 35 percent and transit rose from 3 to 17 percent from the least to the most walkable areas of the region.
Mean per capita vehicle kilometers traveled declined from 23 to 9 kilometres per day from the least to the most walkable areas of the region.

A decline from 37 to 19 minutes of time in cars and a reduction from 23 to 9 kilometres traveled from the least to the most walkable areas.

Walk and bike time rose from 2 to 14 minutes per day from the least to the most walkable areas.
Travel-related GHG emissions declined nearly threefold from 17 to 6 kilograms per person per day from the least to most walkable areas.

Per capita daily travel-related amounts of Volatile Organic Compounds (VOCs), Oxides of Nitrogen (NOx), Small Particulate Matter (PM2.5), and Carbon Monoxide (CO) were estimated.

Those living in walkable areas generated between half to a third as much of these pollutants as those in the most car-dependent areas of the region CO declined from 96 to 39 milligrams,

NOx declined from 11 to 4, VOC declined from 6 to 3, and PM 2.5 declined from 5 to 2 milligrams per day. These detailed emissions estimates account for vehicle type and fuel, congestion level, vehicle occupancy, and other key factors.
16 applications in 14 different Regions
Long Range Transportation Plans
Environmental Justice focus
Scenario planning
Health & transportation
Health & freight

Applying the National Public Health Assessment Model
Case Study Locations

- Chicago
- Madison
- Rochester
- Houston
- Stockton
- Las Vegas
- Los Angeles
- San Diego
- Sacramento
- Seattle
- Toronto
- Grand Rapids
- Kansas City
- Surrey
- Seattle

$8.41 Total
- $1.97 Construction and Strategy
- $5.96 Health
- $0.38 Mobility
- $0.05 Travel Savings

Health (Fewer Expenditures + Increased Productivity)
N-PHAM Application Process

**Geospatial Inputs**

- **35 Social/Cultural Metrics** (Demographics - Census)
  - Age
  - Race
  - Income
  - Vehicles
  - Family type
  - Employment

- **22 Built/Natural Environment Metrics**
  - Density
  - Accessibility
  - Greenspace
  - Transit
  - Bike/ped

**Geospatial Outputs**

- Body Mass Index
- Physical Activity
- % Overweight
- % Obese
- % Type 2 Diabetes
- % Hypertension
- % Coronary heart disease
- Depression
- Annualized cost of illness

19 of 38
San Diego Region: Palomar Gateway

All adult health metrics improved

- 68% increase minutes of daily transportation walking
- 15.4% reduction in high blood pressure
- 9.6% reduction in type II diabetes

Economic Benefits of Active Transportation Infrastructure and Transit Investments

- Land Value Capture
- Capital Construction
- Maintenance
- Equipment & Services
- Tourism
- Healthcare
- Less Employee Absenteeism
Per $1 Spent on Active Transportation Infrastructure 2016-2040

- Construction and Strategy: $1.97
- Household Travel Savings: $0.05
- Mobility: $0.38
- Health (Fewer Expenditures + Increased Productivity): $5.96
- Total: $8.41

$12.8 Billion Spent Will Generate $113 Billion Over Life of the Plan

RESULTS FROM THIS WORK HELPED TO PROTECT $13 BILLION EARMARKED FOR ACTIVE TRANSPORTATION

USED SAME COST-BENEFIT TOOL CREATED TO JUSTIFY ROADWAY EXPENDITURES BASED ON RETURN ON INVESTMENT AND THE MONETIZATION OF DELAY DUE TO CONGESTION

AECOM APPLIED “REMI” MODEL AS SUB-CONTRACTOR TO UD4H
CLIENT: SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS
Comparable Walkability Over Time

- Building on 25+ years of Experience
- Validated by 100s studies
- Detail postal code / parcel level information for lower mainland

2006 ➔ 2011 ➔ 2016 ➔ 2021

- Joined with Census Information

*Provides Dynamic Detailed Performance Measures to Support Local and Regional Planning Purposes*
Tracking Lower Mainland Communities Over Time

Figure 3: Longitudinal changes (2011-2016) by each component of walkability
• PLACES THAT CHANGED THE MOST ...

Figure 4: Longitudinal changes (2011–2016) in residential density for four key areas in the region
CONCLUSIONS

• Findings support GHG reduction and health promotion policies at the provincial and regional levels.

• Transportation and public health constitute two of the biggest provincial responsibilities and perhaps the largest expenditures.
  • These two issues are interrelated, yet institutionally separated. Both benefit from walkability and are adversely impacted by car dependence.

• Results support Metro Vancouver’s Regional Growth Strategy and TransLink’s Transport 2050 Regional Transportation Strategy.

• Results further underpin the Ministry of Transportation and Infrastructure’s CleanBC Roadmap to 2030.
  • Findings support recently enacted Provincial Bills 44, 46, and 47, which include a wide range of actions to increase density across most of BC municipalities primarily in association with transit.
Applying the Research

**Transit Investment and TOD Business Case:** Policies to promote fixed guideway transit investment integrated with high density walkable development based on predicted reductions in chronic disease and associated health care cost savings.

**Green Space:** Investments in parks, green space, and open space programs to foster increased access to recreational environments based on predicted physical and mental (sense of community and social capital) benefits and health care cost savings.

**Active Transportation Planning:** Application of results demonstrating health and economic benefits of investing in active transportation to help justify increased funding for pedestrian and bike infrastructure and to help with defining needs and prioritizing investments.

**Health Equity:** Investing in underserved communities where transit, active transportation, greenspace, and policies to promote local access to shops and services are most needed to reduce the chronic disease burden born by the most disadvantaged.

**Land Use Scenario Planning:** Regulatory and fiscal policies to support increased access to shops and services and overall land use mix and densification and creation of contrasting future growth scenarios linked with health outcomes and costs.
Tree Canopy Cover, Impervious Surface, and Tree Regulations

DATASET AND TOOLKIT UPDATE

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Regional Planning Committee – April 5, 2024
65795912
Why measure ‘tree canopy cover’ and ‘impervious surface’?
Areas of lower tree canopy cover:

- Urbanized, denser and newly developed areas
- Commercial and industrial lands
- Some jurisdictions greener than others
Tree Canopy Cover Change (2014-2020) – Within UCB

- Anmore: -0.2%
- Burnaby: -2.9%
- Coquitlam: -4.0%
- Delta: -1.4%
- Electoral Area A: 1.4%
- Langley (City): 0.2%
- Langley (Township): 0.9%
- Lions Bay: 6.3%
- Maple Ridge: 0.7%
- New Westminster (City): 0.3%
- New Westminster (District): 2%
- Pitt Meadows: 2%
- Port Coquitlam: 4%
- Port Moody: 6%
- Richmond: 8%
- Surrey: 32 of 38
- Tsawwassen: 32 of 38
- First Nation: 0.7%
- Vancouver: 0.3%
- West Vancouver: 0%
- White Rock: 2%

Regional UCB change: -1%
Impervious Surface Change (2014-2020) – Within UCB

-4.3% 5.3% 4.2% 5.1% 3.6% 5.4% 7.1% 3.5% 7.7% 2.0% 2.0% 8.8% 4.9% 2.8% 3.0% 27.7% 1.0% 0.9% -5.8% -1.5% -10% -5% 0% 5% 10% 15% 20% 25% 30%
Tree canopy cover is projected to decrease from 31% to 29% due to continued development within the UCB.

+1,990 ha of tree planting required to offset projected loss.

+8,000 ha of tree planting required to reach Metro 2050’s UCB tree canopy cover target of 40%.
DATA SUMMARY

• Tree canopy cover in the Urban Containment Boundary (UCB)
  o *Decreased by 1%* between 2014 and 2020 (32% to 31%)
  o In 2020 - 38% on Residential lands, 21% on single detached

• Impervious surface in the UCB
  o *Increased by 4%* between 2014 and 2020 (50% to 54%)
  o In 2020 - 39% on Residential lands, 19% on single detached

• Tree Canopy Cover Future Projections for the UCB
  o Expected to *decrease from 31% to 29%*
  o 9,990 ha of tree planting in the UCB needed to offset this loss and reach *Metro 2050’s* UCB 40% tree canopy cover target
• **Toolkit Purpose:**
  - Guidance on regulatory tools that influence the preservation and growth of trees and tree canopy

• **Structure:**
  - Higher-level plans
  - Tools regulating land use
  - Tools regulating trees
New Information On:

- Land use trends and tree canopy cover
- Considerations for canopy cover targets
- Land use bylaws and development permit areas
- Development, subdivision, and servicing bylaws
- Worksheets to assess regulatory framework and identify opportunities for improvement
Thank you