

# Where Matters



## Health & Economic Impacts of Where We Live

### Project Advisory Panel:

Mr. David Hendrickson,  
Real Estate Foundation of British Columbia  
Mr. Sam Khany, City of Vancouver  
Mr. Lyle Walker, TransLink  
Ms. Erin Rennie, Metro Vancouver

### Report Development:

Mr. Victor Ngo, Research Scientist  
Mr. Stuart Hamre, Graphic Designer

### Prepared By:



**HEALTH & COMMUNITY DESIGN LAB**  
School of Population and Public Health

May 6, 2019

### Research Team:

Dr. Lawrence Frank, UBC, Study Lead  
Dr. Jat Sandhu, Vancouver Coastal Health  
Mr. Binay Adhikari, Doctoral Candidate  
Dr. Andy Hong, Postdoctoral Scholar  
Dr. Anandvir Saini, Research Assistant  
Ms. Ellen Demlow, Vancouver Coastal Health  
Ms. Yumian Hu, Vancouver Coastal Health



THE UNIVERSITY OF BRITISH COLUMBIA  
School of Population and Public Health  
Faculty of Medicine



FONDATION  
J. ARMAND  
BOMBARDIER



metrovancover  
SERVICES AND SOLUTIONS FOR A LIVABLE REGION



THE UNIVERSITY OF BRITISH COLUMBIA  
Applied Science



# Walkability and Green Space are Preventive Medicine

There is a public health crisis happening right now. Total health expenditure in Canada was estimated to be up to \$253.5 billion (\$6,839 per person) for 2018. This represents 11% of Canada's gross domestic product according to the Canadian Institute for Health Information. For example, obesity, high blood pressure, and diabetes place tremendous pressure on our healthcare system (see Figure 1).

There is an increasing consensus that the postal code of the neighbourhood where we live is as important as our genetic code. Studies

have shown that land-use decisions and transportation investments to enhance neighborhood walkability and access to green space can significantly affect how you travel and your physical activity, and exposure to air pollution, traffic safety and crime, and noise.

Very few studies have examined how transportation investment, neighbourhood walkability and access to green space are associated with less chronic disease and lower health care cost (see Figure 2). To date, existing evidence used to inform major transportation investment deci-

sions have rarely accounted for the potential health impacts and related costs of these factors.

The **Where Matters Study** aims to incorporate health into local and regional policy-making by examining the multiple pathways linking the way our communities are planned and designed with people's travel and physical activity patterns, chronic disease risk and health care cost.

**Chronic Disease Burden**  
Proportion of Population Chronic Disease 2013

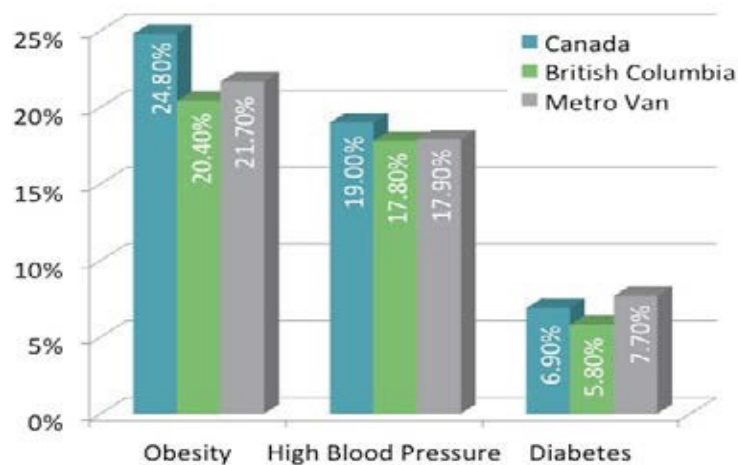


Figure 1. Canadian health context using My Health, My Community survey for Metro Vancouver, and CCHS for BC and Canada.

**Causal Pathway Linking Environment, Health, and Cost**

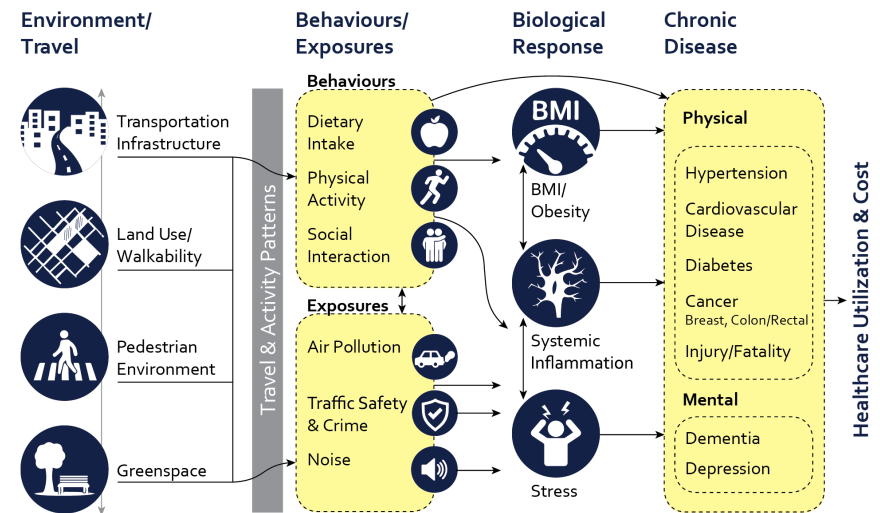


Figure 2. Frank, L.D., Iroz-Elardo, N., MacLeod, K.E., & Hong, A. (2019). Pathways from built environment to health: A conceptual framework linking behavior and exposure-based impacts. *Journal of Transport & Health*, 12, 319-335.



# The Where Matters Study Design

The **Where Matters Study** is a unique partnership between the UBC Health and Community Design Lab and multiple government agencies and health authorities, including Vancouver Coastal Health, Fraser Health, Metro Vancouver, TransLink, and the City of Vancouver. The study had three aims:

1. To investigate the relationship between built and natural environment and health
2. To investigate how the relationships between built and natural environment and health vary across income and age groups
3. To investigate the extent to which walkable environments can reduce health care costs

The study used two existing and unique health datasets, the My Health, My Community Survey survey (representing 33,000 individuals), and the BC Generations Project survey (rep-

resenting 18,000 individuals) that provided highly detailed information about people's health & wellbeing and anonymous health records.

These datasets were then combined with a detailed built and natural environment database that measures neighbourhood walkability. Using this information, we studied the relationship between where people lived and how walkable their neighbourhood was to six health outcomes: (1) physical activity; (2) obesity; (3) diabetes; (4) heart disease; (5) stress; and (6) sense of community.

See the full technical report for more details. The Where Matter Study also built upon an existing study funded by the Canadian Institutes of Health Research (CIHR) to calculate the healthcare cost savings of living in a more walkable neighbourhood.



Vancouver Coastal and Fraser Health Authorities



BC Cancer Agency

## The Monetization of Health Outcomes



# Measuring the Components of Walkability

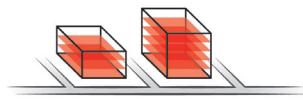
Walkability is a measure of the **physical characteristics of the urban environment** at the local or neighbourhood level that support walking. In Metro Vancouver, walkability has been quantified by the Health and Community Design Lab using the method developed by Dr. Larry Frank and validated by numerous studies in North America. The walkability of an area is defined using four measures which, combined, create a **Walkability Index**.

Net residential density



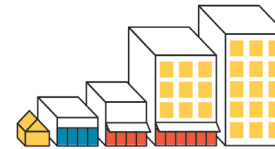
The concentration of dwelling units. Higher values indicate a greater number of dwelling units relative to the residential land area.

Commercial FAR



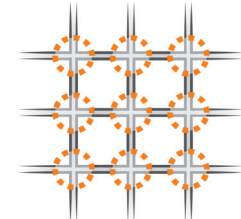
The ratio between the total commercial floor area of a building to the land area of the property it is built on. Higher values indicate less surface parking and buildings set close to sidewalks and street.

Land use mix



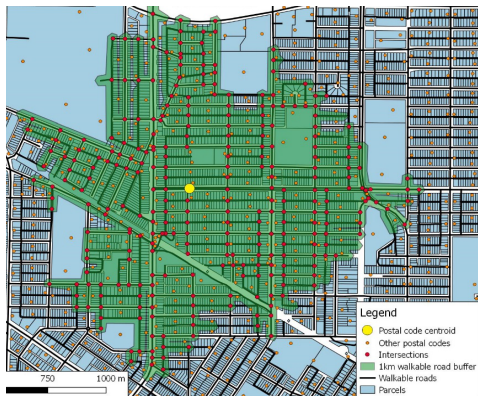
The balance between building floor areas of six land uses (retail, entertainment/recreation, civic/educational, office, single-family residential, and multi-family residential), providing more opportunities for different activities in the same area.

Intersection density



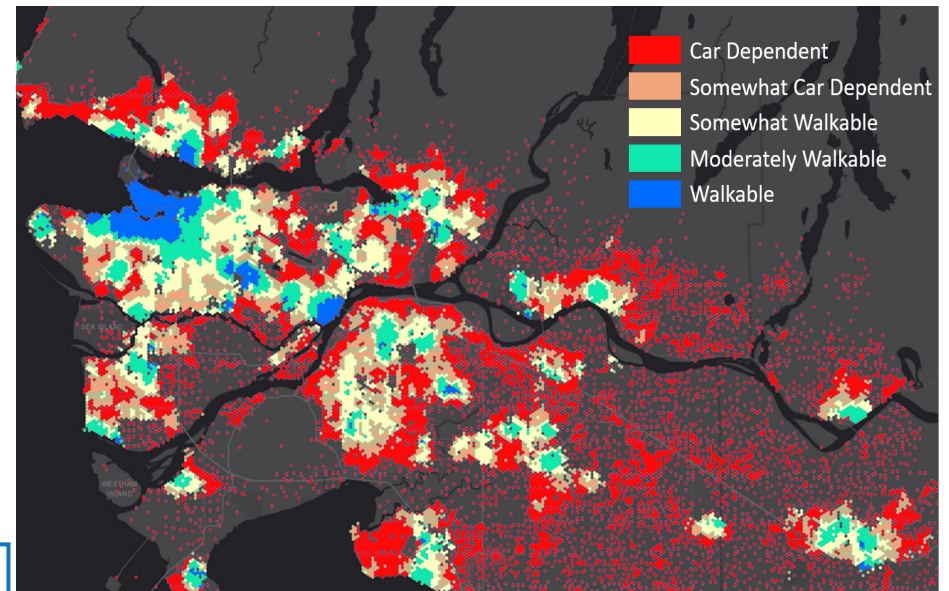
The measure of road network connectivity. Higher values indicate smaller block sizes and a greater number of intersections.

## Behaviour-Sheds



To measure how walkability differed across the region, we used every postal code in Metro Vancouver. To calculate the walkability index, we drew a one kilometre area around each postal code (also known as a street network buffer). The yellow dot is the center of the postal code. The bold dark lines represent the walkable road network segments. The green polygon is the 1 km buffer. We use the green polygon to measure the four components of walkability. This produces a highly detailed map of walkability across the region.

## Five different types of neighbourhoods based on walkability

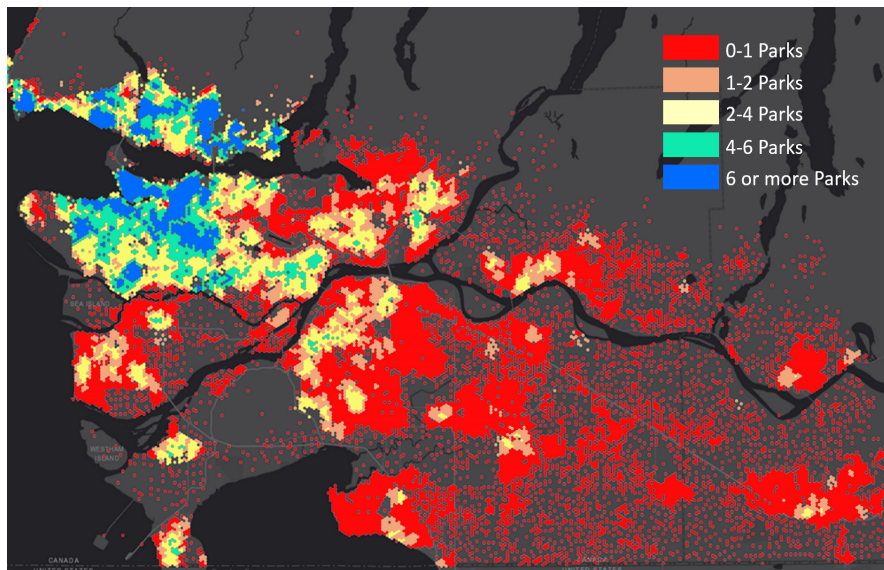


# Additional Components of a Walkable Community

## Access to Parks

Park access is a measure of the number of public parks that can be publicly accessed. To measure the number of parks, we used the street network buffer used to create the walkability index. Blue represents areas with a high number of parks (6 or more) and red represents zero to 1 parks nearby.

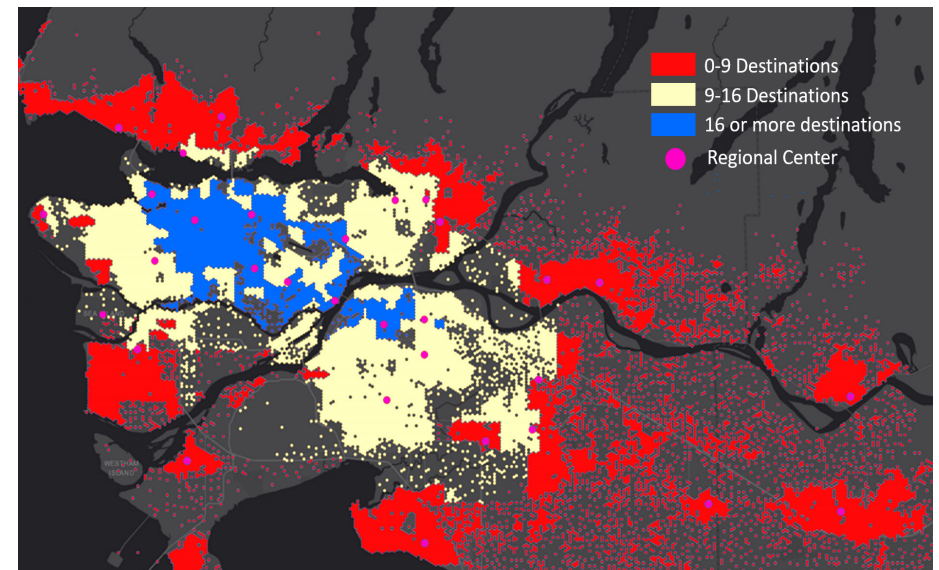
Park Access: Number of Parks Within 1 km Walking Distance



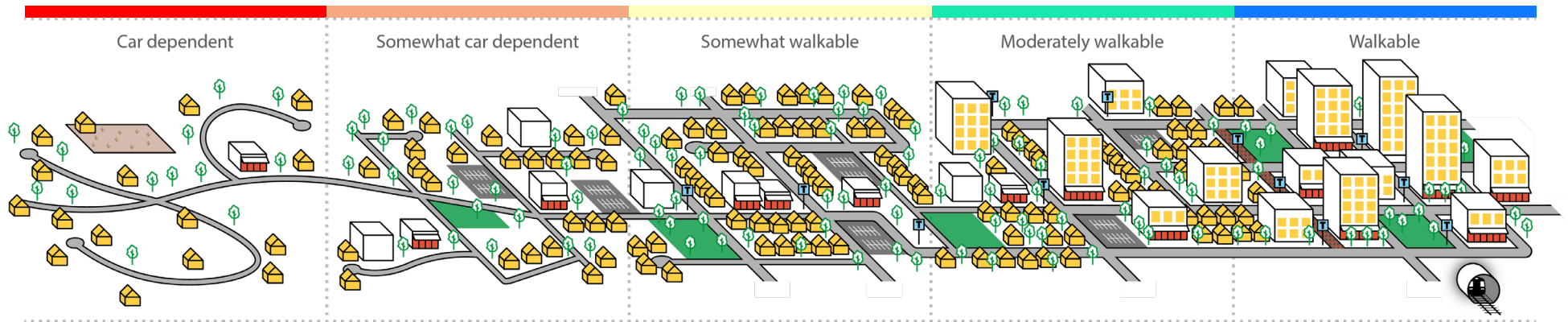
## Regional Accessibility

Regional accessibility is a measure of ease of travel to major regional locations. Regional accessibility was defined as the number of major regional centres that can be reached by a 45-minute transit ride during the morning rush hour. Red represents areas with lower levels of regional accessibility and blue represents high accessibility.

Regional Accessibility: Number of Regional Centres Accessible by Transit in 45 Minutes in Morning Rush Hour.



# Place Types by Walkability



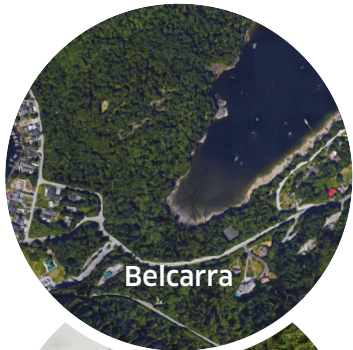
\*5 dwellings per acre

\*10 dwellings per acre

\*15 dwellings per acre

\*25 dwellings per acre

\*60 dwellings per acre



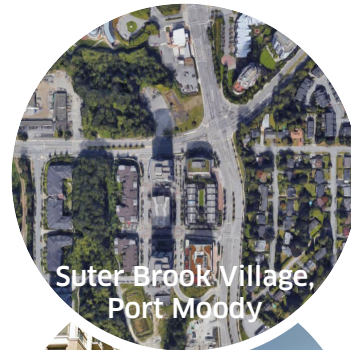
Belcarra



Hammond,  
Maple Ridge



Cloverdale,  
Surrey



Suter Brook Village,  
Port Moody



West End,  
Vancouver



Belcarra Blvd



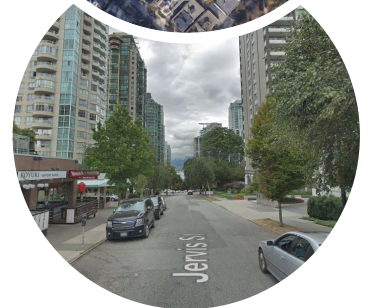
Wares Ave



57 Ave



Brens St



Jervis St

Other examples:  
Eagle Harbour  
(West Vancouver),  
Shaughnessy  
(Vancouver)

Other examples: Capital  
Hill (Burnaby), Seafair  
(Richmond)

Other examples:  
Dundarave (West  
Vancouver), Sunset  
(Vancouver)

Other examples:  
Brighouse (Richmond),  
Suter Brook (Port  
Moody)

Other examples:  
Lower Lonsdale (North  
Vancouver), Downtown  
(New Westminster)

\* Numbers represent median value for each place type.

# Chronic Disease Findings

Understanding how where you live matters for your health

## Walkability

## Park Access



### Physical Activity

People living in a somewhat walkable area are **20% more likely to walk for transportation** and people in a walkable area are **45% more likely** compared to those living in a car dependent area. People in a walkable area are **17% more likely to meet the weekly recommended level of physical activity** compared to those living in a car dependent area.

People living in an area with many parks (6 or more) are **20% more likely to walk for leisure or recreation** and **33% more likely to meet the weekly recommended level of physical activity** compared to those living in an area with no parks.



### Obesity

People living in a walkable area are **42% less likely to be obese** compared to those living in a car dependent area.

People living in an area with many parks (6 or more) are **43% less likely to be obese** compared to those living in an area with no parks.



### 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 an area with many parks (6 or more) are **37% less likely to have diabetes** compared to those living in an area with no parks.



### Heart Disease

People living in a moderately walkable area are **14% less likely to have heart disease** compared to those living in a car dependent area.

People living in an area with many parks (6 or more) are **39% less likely to have heart disease** compared to those living in an area with no parks.



### Stress

People living in a somewhat car dependent area are **19% less likely to have stressful days** and people in a walkable area are **23% less likely to have stressful days** compared to those living in a car dependent area.

People living in an area with many parks (6 or more) are **19% less likely to have stressful days** compared to those living in an area with no parks.



### Sense of Community

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.

People living in an area with many parks (6 or more) are **23% more likely to have a strong sense of community belonging** compared to those living in an area with no parks.



# Understanding Economic Benefits for Chronic Disease

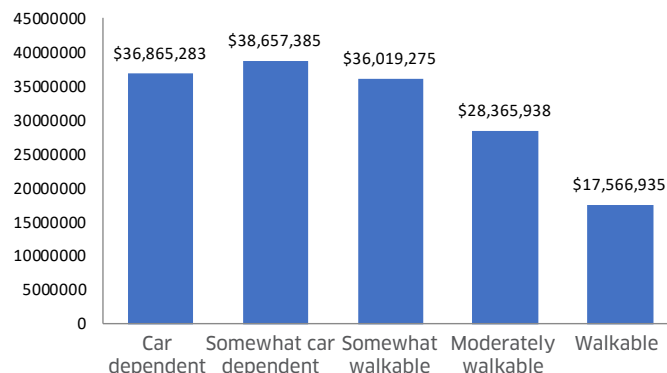
Our findings show that the type of neighbourhood you live in matters for your health. This means the type of investments we make in transportation infrastructure, parks, and land use actions will impact how much money we spend on health care. To show this relationship, we calculated annual direct health care cost by linking the My Health My Community data with the Economic Burden of Illness in Canada and the Canadian Community Disease Surveillance System estimates (see link below) for diabetes, hypertension and heart disease. Our findings suggest the type of neighborhood you live in matters for your health.



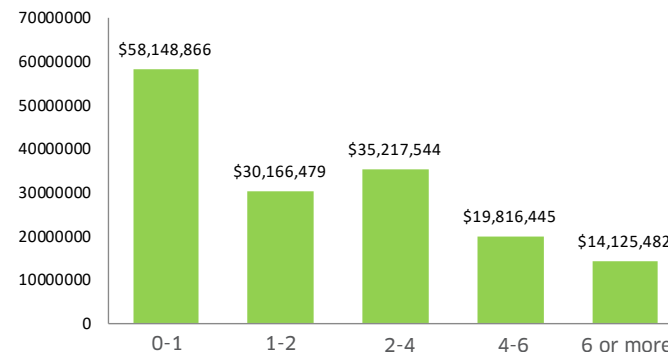
## Diabetes

The direct healthcare cost of people living in a moderately walkable area is **23% less** than people in a car dependent area. People living with 1-2 parks nearby spend **48% less** and people with 6 or more parks nearby spend **75% less** than people with 0-1 parks.

### Walkability

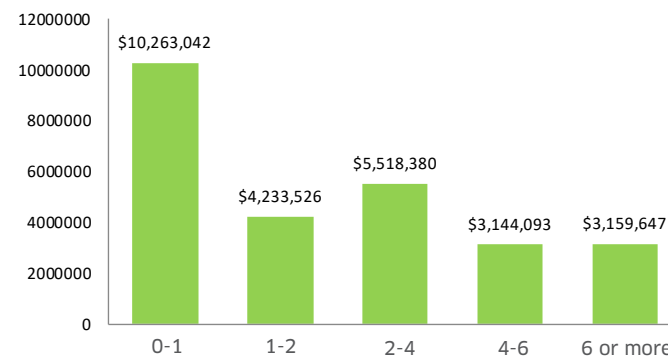
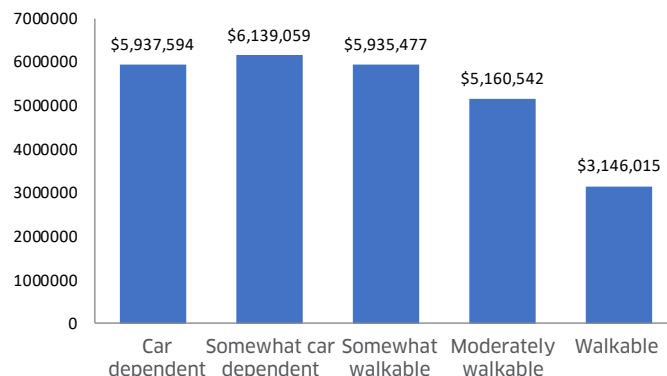


### Park Access (Number of Parks)



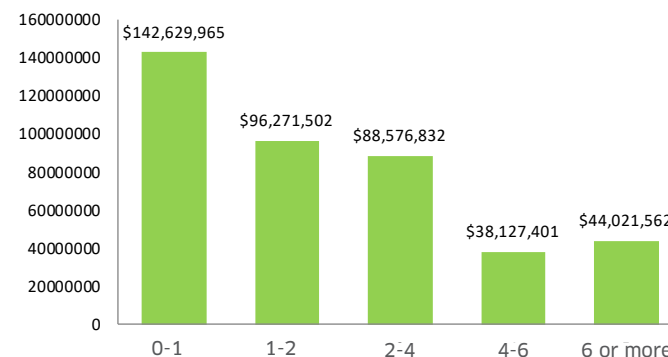
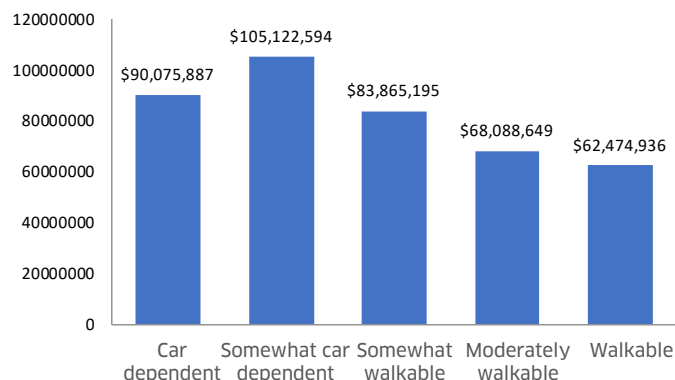
## Hypertension

The direct healthcare cost of people living in a walkable area is **47% less** than people in a car dependent area. People living with 1-2 parks nearby spend **59% less** and people with 6 or more parks nearby spend **69% less** than people with 0-1 parks.



## Heart Disease

The direct healthcare cost of people living in a walkable area is **31% less** than people in a car dependent area. People living with 1-2 parks nearby spend **33% less** and people with 6 or more parks nearby spend **69% less** than people with 0-1 parks.

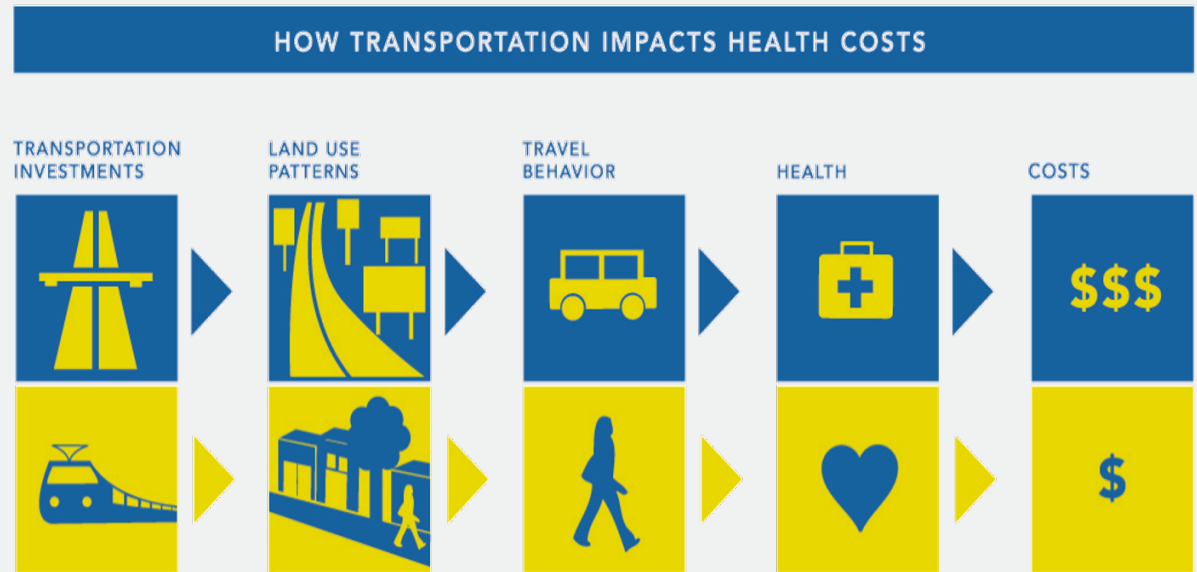




# So What? Policy Implications and Fiscal Impacts

Our findings reveal that the type of neighbourhood you live in matters for your health. For this reason, it is important to recognize that the type of investments we make in our **transportation infrastructure**, and the resulting land use patterns of our communities, will ultimately impact the money we individually and collectively as a society spend on healthcare.

In terms of walkability, people living in an urban centre have lower healthcare spending compared to those living in an exurban area for both diabetes and high blood pressure. In terms of park access, people living in an area with a high number of parks (6 or more) within a 1 kilometer distance have the lowest health care spending compared to those with no parks nearby.



Source: Frank et al. 2010, The Hidden Health Costs of Transportation, American Public Health Association.

## Applying the Research

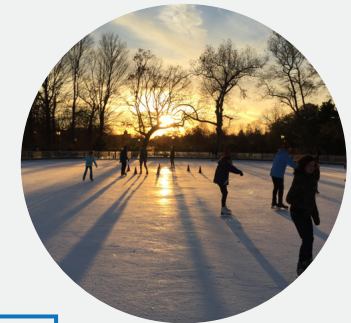
**Transit investment and TOD Business Case:** Policies to promote fixed guideway transit investment integrated with high density walkable development based on predicted reductions in chronic disease and associated health care cost savings.

**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.

**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.

**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.



*“WHAT GETS MEASURED GETS DONE...”*

