Integrating Health into Scenario Planning for Transportation & Land Use Applications

Healthy Built Environment Webinar Series | May 12, 2021

Eric H. Fox, MScP
Senior Planner, UD4H

Lawrence Frank, PhD
Professor, UCSD, President, UD4H

Christine Corrales, MURP
Senior Planner, SJCOG

National Collaborating Centre for Environmental Health
Centre de collaboration nationale en santé environnementale

San Joaquin Council of Governments

URBAN DESIGN 4 HEALTH

Presentation Overview

1. Health Integration into Scenario Planning Tools
2. Case Study Applications
   - Healthy Canada by Design Initiative
     - West Don Lands, Toronto
   - Health Equity Study
     - South Stockton Promise Zone, Stockton
3. Discussion

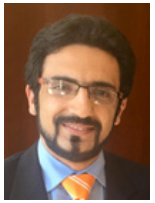
HEALTHY CANADA by design

SAN JOAQUIN COUNCIL OF GOVERNMENTS

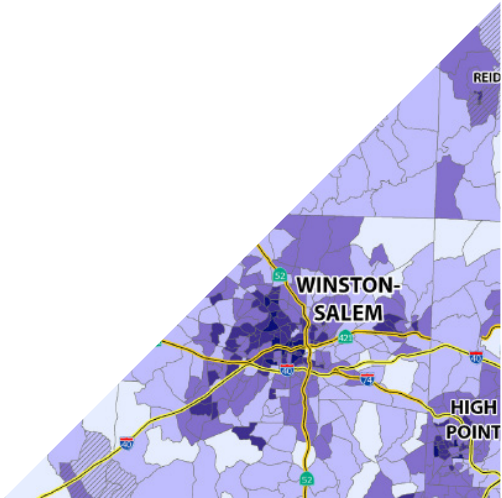
UD4H URBAN DESIGN 4 HEALTH

URBAN DESIGN 4 HEALTH (UD4H) – BACKGROUND



- Develop **evidence-based models** for scenario planning applications
- Assess **Monetization** of health and economic impacts of investment
- Measure **built, natural and social** environments
  - Pedestrian & Cycling Environments
  - Multi-modal Destination Accessibility
  - Park/Recreation and Public Space
- Operations in Canada & the U.S.



Our Partners

Canada

National Authorities

State, Regional, Local

U.S.

Key Services

- Active Transportation Planning
- Prepare Land Use & Transportation Plans
  - Comp Plans & OCPs
- Quantify GHG & Equity/EJ Impacts
- Perform Health Impact Assessments
- Monetize Health Impacts
- Prioritize Transportation Projects
- Acquire Primary Data

Health, PA & Behavior Metrics

- Obesity, Overweight, BMI
- Type 2 Diabetes
- Hypertension
- Coronary Heart Disease
- Depression
- Distress
- COVID-19 Risk Index
- Walk for Transport
- Bike for Transport
- Transit Use
- Personal Vehicle Use
- Cost of Illness

INTEGRATING HEALTH & TRANSPORT IN CANADA

7 Primary Connection Points

Safe Multimodal Systems

Travel Mode Choice and Active Transportation

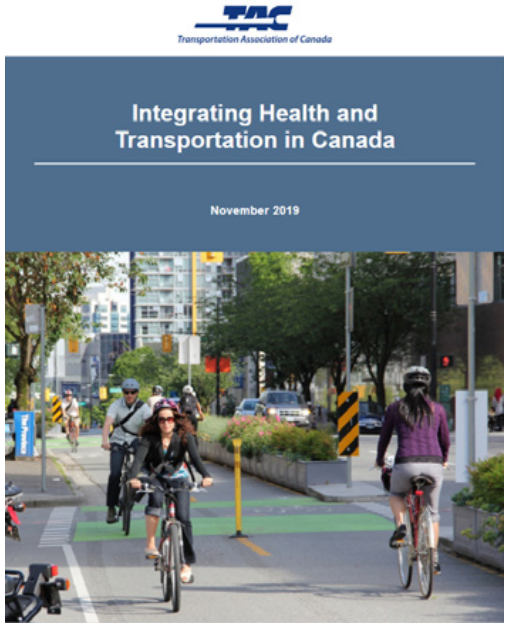
Transportation Access to Health Promoting and Community Resources

Supporting Mental Health

Reducing Exposure to Air Pollution and Noise Related to Transportation

Health Equity

Monetizing Health Outcomes Related to Travel Behaviour



Source: Integrating Health & Transportation in Canada prepared by UD4H for Transportation Association of Canada, 2019.

3 Geographic Scales

Regional Accessibility

Walkable, Complete Neighborhoods

Pedestrian Environment (Micro-scale)

Applications

TRANSIT ORIENTED DEVELOPMENT

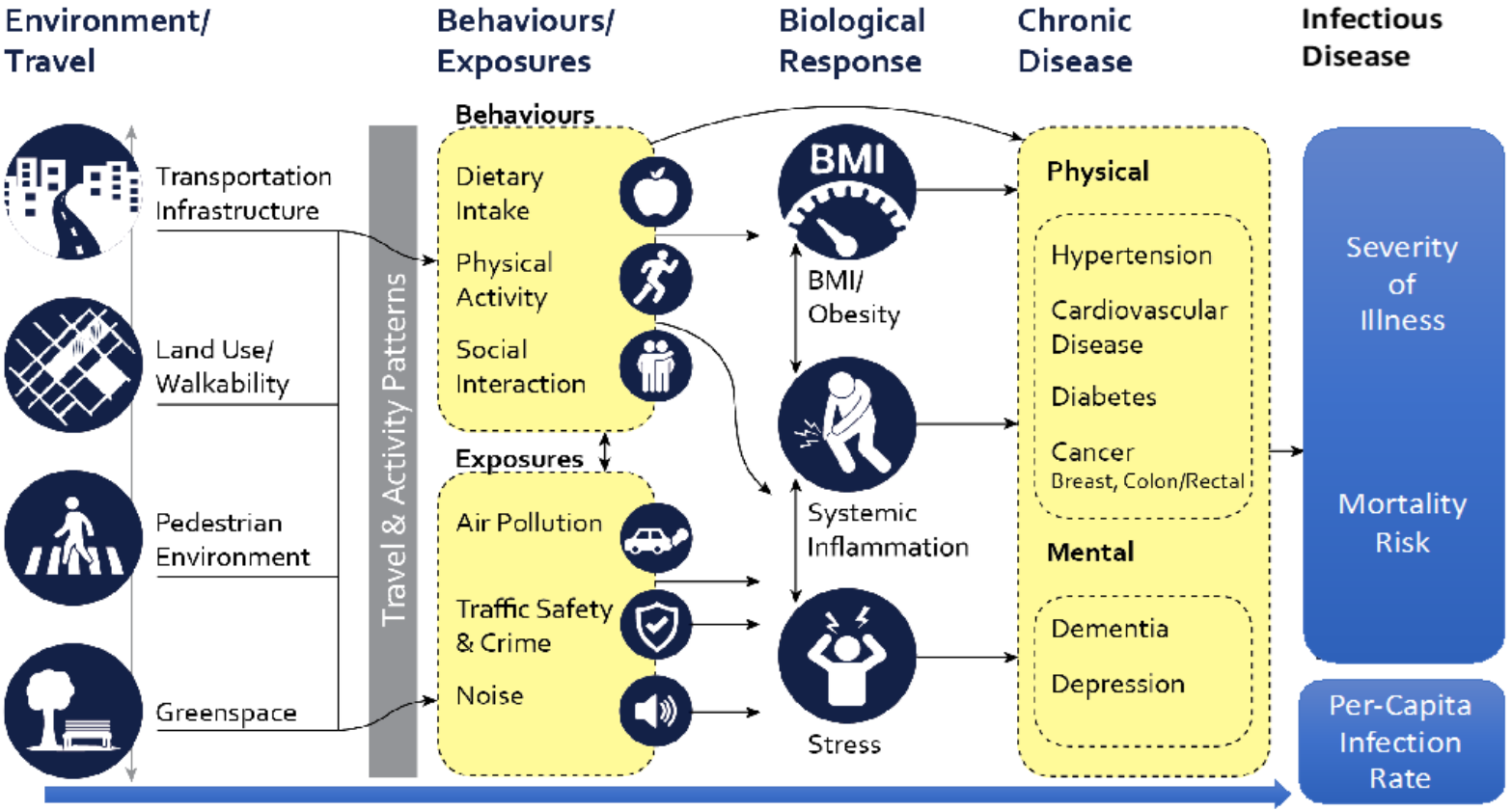
GREEN SPACE

ACTIVE TRANSPORTATION

LAND USE

HEALTH EQUITY

TWO PANDEMICS … *FOR THE PRICE OF ONE*



Adapted from: Frank et al, 2019 (*Journal of Transport and Health*)

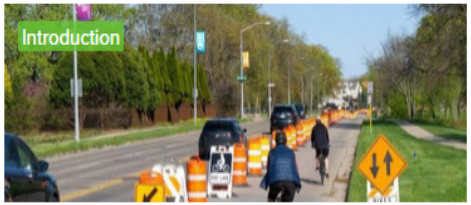
Re-Appropriating Road Space: Taking Back the Streets

Normal Street Promenade
Source: Fox 5 San Diego

Proposed Gaslamp Promenade
Source: SanDiegoDowntownNews.com

NACTO: Summarizing Health Beneficial Municipal Policies and Investments to Promote Active Travel, Social Capital, and

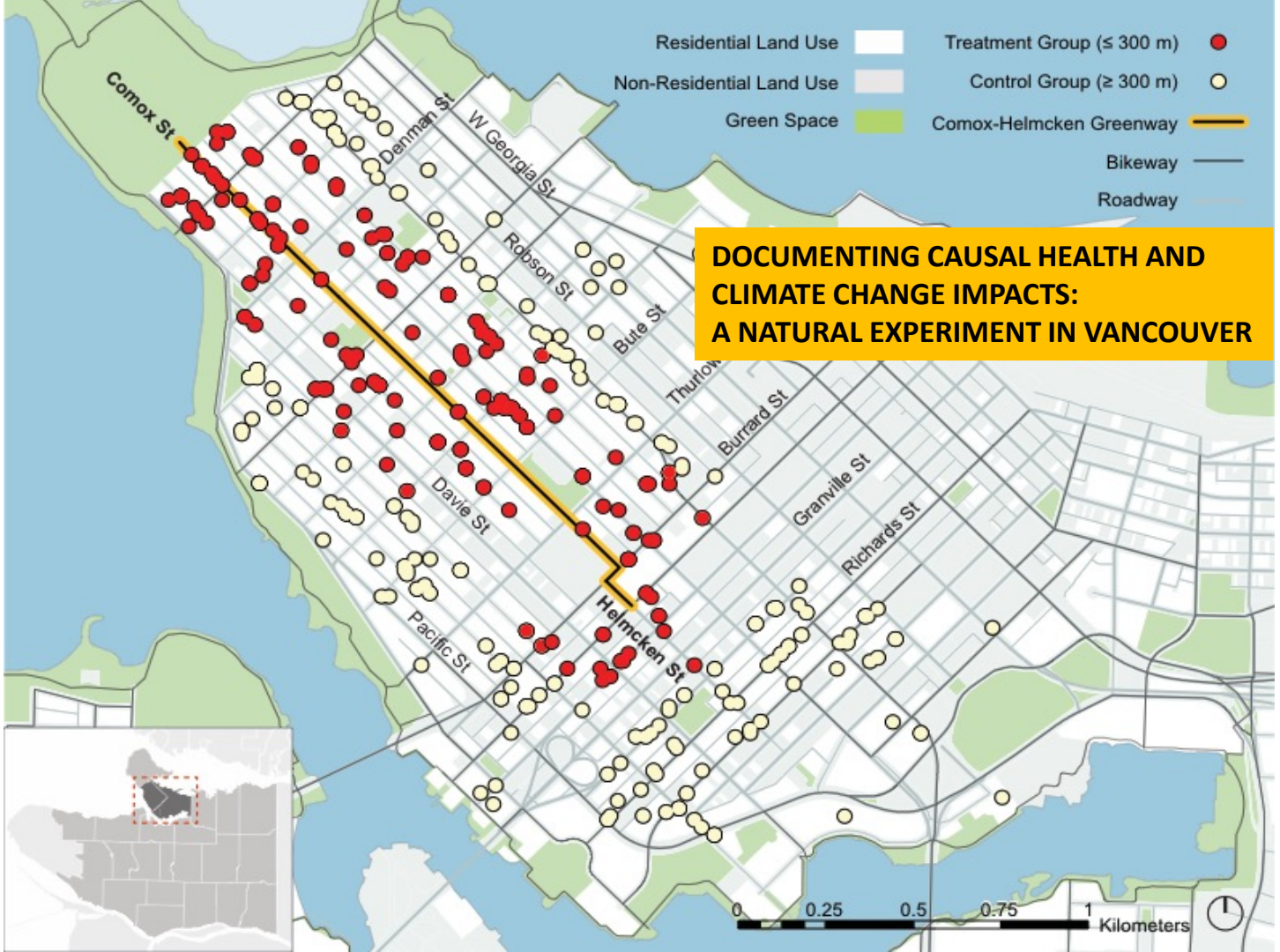
Streets for Pandemic Response & Recovery



https://nacto.org/publication/streets-for-pandemic-response-recovery/

Public Health Response	Neighborhood Streets (local/residential)	Neighborhood Main/High Streets (small retail/office, residential, schools, institutions)	Major Urban Streets (transit, retail/ offices, institutions, schools)	Edge Streets & Boulevards (in/alongside parks, waterfronts, etc.)
Stay-at-home orders in place	• "open streets" (pop-up parks) • slow streets or local access only • speed management (movable barriers, gateway treatments, signs) • WiFi hotspots • open-air cooling zones/sanitation	• sidewalk expansions for queuing, outdoor markets, & access • pop-up bike and roll lanes • temporary pick-up/ drop-off delivery zones	• sidewalk expansions for access & queuing • temporary pick-up/ drop-off zones • shorten signal cycles • put pedestrian signals on recall	• street closures to vehicular traffic, for medical services, recreation, markets, etc.
Pre-vaccine re-opening	• local-access only treatments • lane removal/street closures for schools & religious/cultural service providers	• tactical lane/parking space removal, street closures for outdoor restaurant seating, outdoor markets, etc. • sidewalk expansions for queuing & access • tactical bike lanes • designated pick-up/ drop-off delivery zones • bike & shared micromobility parking corrals • lane removal/street closures for schools & religious/cultural service providers	• bus-only lane, tactical islands/in-lane stops, bus priority signals, expanded bus stops • lane removal/parking space removal for outdoor restaurant seating, outdoor markets • sidewalk expansions for queuing & access • protected bike lanes • speed management	• street closures to vehicular traffic, e.g. for recreation, markets, schools, etc. • expanded bike lanes & bike/shared micromobility parking zones • speed management
Vaccine/post-COVID-19	• speed management (e.g. speed limit changes & geometry) • play streets, slow streets, and local-access-only policies & design	• sidewalk widenings • speed management (e.g. speed limit changes & geometry) • expanded bike lanes & bike/shared micromobility parking zones	• bus-only lanes with offboard fare collection, bus islands, and amenities • high frequency bus service • expanded bike lanes & bike/shared micromobility parking zones • sidewalk widenings • speed management	• open space expansions • expanded bike lanes & bike/shared micromobility parking zones • speed management

UD4H URBAN DESIGN 4 HEALTH


Residential Land Use
Non-Residential Land Use
Green Space
Treatment Group (≤ 300 m)
Control Group (≥ 300 m)
Comox-Helmcken Greenway
Bikeway
Roadway
DOCUMENTING CAUSAL HEALTH AND CLIMATE CHANGE IMPACTS:
A NATURAL EXPERIMENT IN VANCOUVER
Comox St
Denman St
W Georgia St
Robson St
Bute St
Burrard St
Granville St
Richards St
Davie St
Pacific St
Helmcken St
0
0.25
0.5
0.75
1
Kilometers

Before

After (Counterflow Lanes)

Documenting GHG & Health Impacts

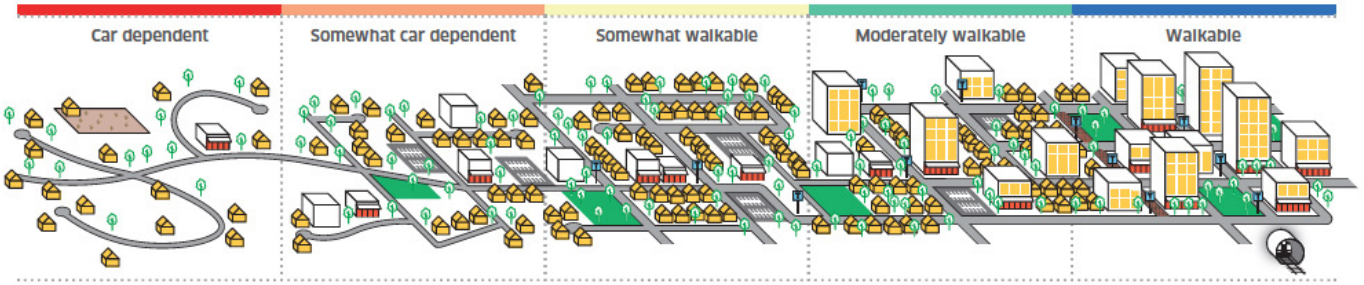
- Those within 300 Meters of the greenway reduced their transport GHG emissions by 21%
    - Transportation Research Part D: Ngo, Hong, and Frank, 2018
- Those within 300 Meters of the greenway where twice as likely to meet recommended physical activity levels
    - Preventive Medicine: Frank, Ngo, Hong, 2019
- Those within 300 Meters of the greenway showed a 5 fold (251 %) increase in # of reported cycling trips
    - International Journal of Transportation Policy: Frank, Ngo, Hong, 2021

WHERE MATTERS STUDY

UBC

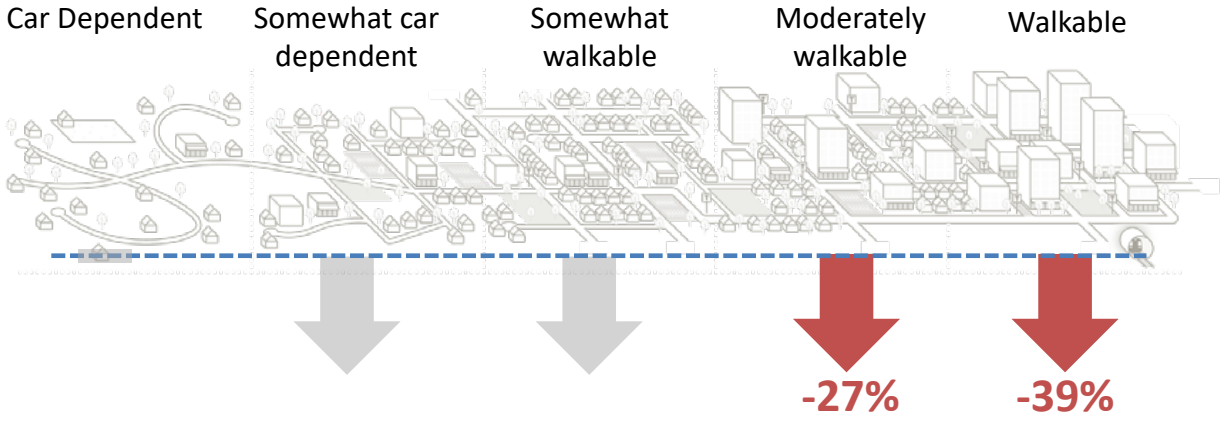
Place Types by Walkability

Lawrence D. Frank UCSD



Exurban	Suburban	Semi-urban	Town Centre	Urban Core
0-5 dwellings per acre	5-10 dwellings per acre	10-15 dwellings per acre	15-25 dwellings per acre	25-60 dwellings per acre
Belcarra	Hammond, Maple Ridge	Cloverdale, Surrey	Suter Brook Village, Port Moody	West End, Vancouver
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)

Walkability and Diabetes

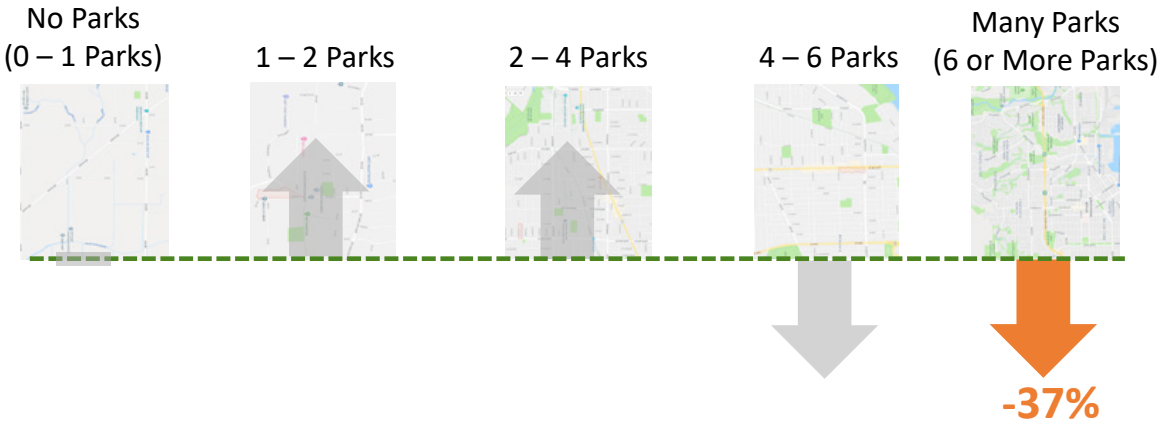


Lawrence D. Frank UCSD

WHERE MATTERS STUDY

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.

Parks Access and Diabetes

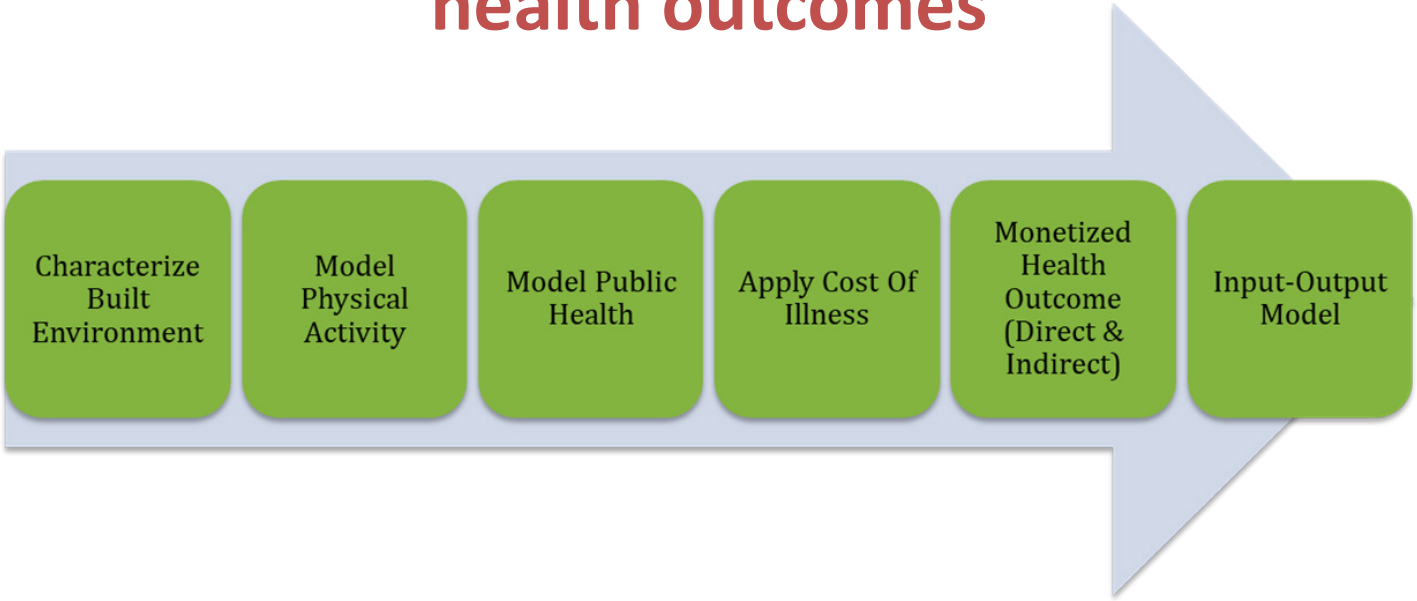


Lawrence D. Frank UCSD

WHERE MATTERS STUDY

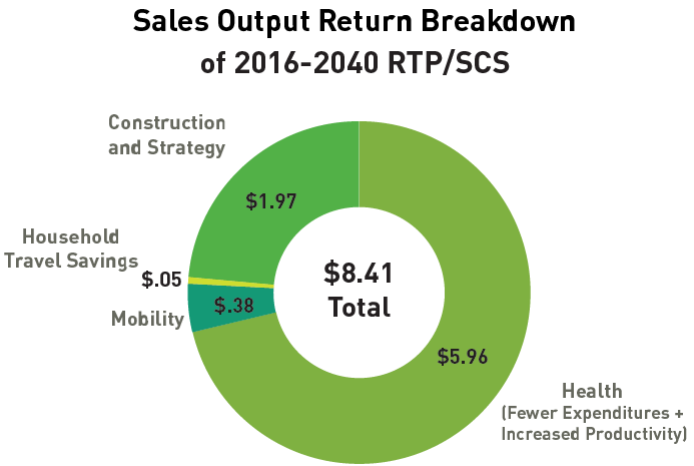
People living in an area with many parks (6 or more) are 37% less likely to have diabetes compared to those living in an area with no parks(0 to 1 parks).

Monetizing direct & indirect health outcomes

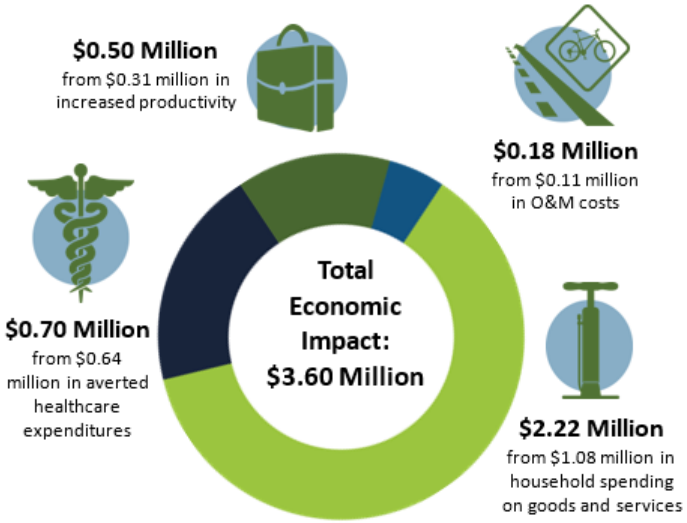


Health & Economic Impact

Health Monetization of Active Transportation (Southern CA)



Utah Active Transportation Study



THE *DIGITAL* DIVIDE

- Adverse economic impacts of COVID-19 are largely born by those without reliable internet access who are low-income and located in rural areas.
    - 23% of households earning less than $50,000 do not have a broadband subscription
    - 42% of people who live in unincorporated parts of San Diego County have fixed broadband, compared with 97% of people in urban areas.
    - Between 20% and 40% of students in many local districts are under-connected or lack home Internet access.
- Source:
    - Antoinette Meier, SANDAG's director of mobility and innovation

NATIONAL POST

NP Comment | Post Picks | Financial Post | Healthing | Driving | The GrowthOp | Videos

News

Suburban sprawl: is it a COVID-19 super-spreader?

When it comes to health, density is not the enemy. The pandemic has important lessons for city planners across Canada

FAST COMPANY

UPDATED 10-22-20 | BUILDING BACK GREENER

If COVID-19 pushes people to the suburbs, how can we make them more environmentally friendly?

As people move out of dense cities and into sprawling suburbs, their carbon footprint could actually increase.

[Images: tarras79/iStock, JuliarStudio/iStock, Poganka06/iStock]

UD4H URBAN DESIGN 4 HEALTH

PROPUBLICA Graphics & Data Newsletters About

Get the Big Story

Racial Justice | Health Care | Immigration | Environment | More... | Series | Video

CORONAVIRUS

In Chicago, Urban Density May Not Be to Blame for the Spread of the Coronavirus

The communities hardest hit by the coronavirus in Chicago are low-density black and Hispanic neighborhoods, including ones where economic decline and population loss have caused more people to live in the same household.

by Haru Coryne, ProPublica Illinois, April 30, 2020, 3 p.m. EDT

Residential real estate: 'COVID premium' persists as North Jersey real estate market stays hot

Office space: The changing work habits caused by COVID-19 could give NJ suburban office space a boost

Demographic shifts: NJ could see increase in people moving from the cities to the suburbs after coronavirus

Latest Issues | SCIENTIFIC AMERICAN | Cart | Sign In

NAVIRUS | THE SCIENCES | MIND | HEALTH | TECH | SUSTAINABILITY | VIDEO | PODCASTS | OPINION | PUBLICA

Sign up for our free newsletters. Sign Up

PUBLIC HEALTH

Population Density Does Not Doom Cities to Pandemic Dangers

Crowding, connections among communities and other factors seem to better explain infection and mortality rates

By Jeremy Hsu on September 16, 2020

COVID-19: Sprawl on Steroids?

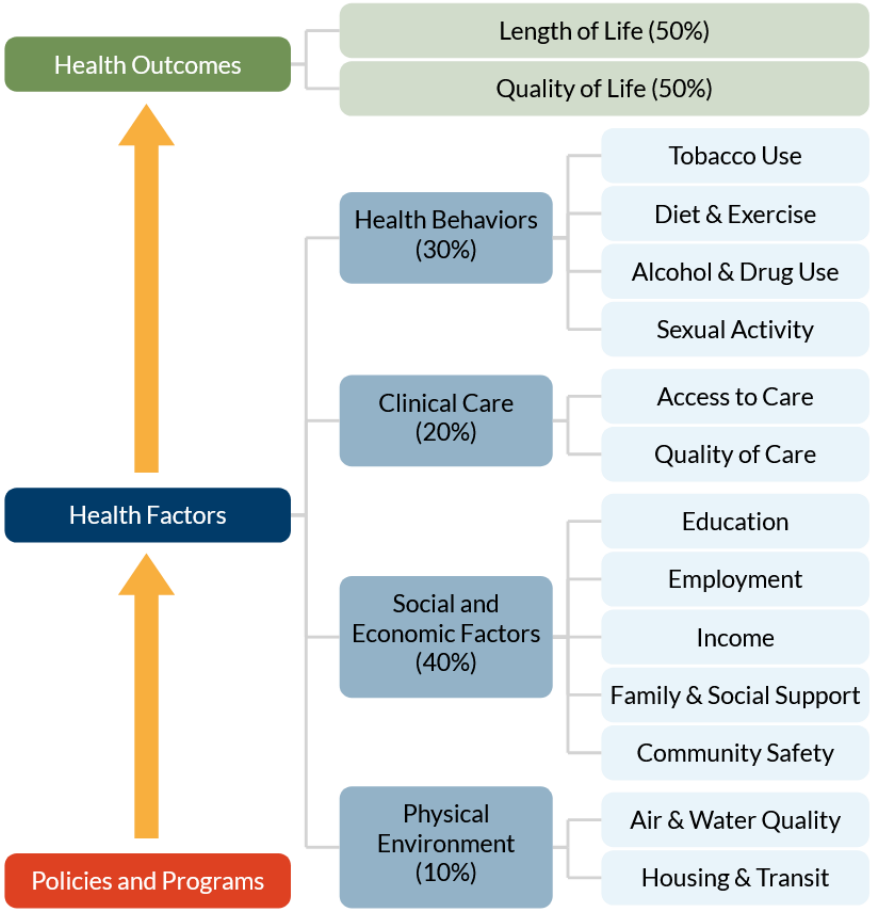
- Single-family home sales in Sonoma and Marin Counties on the outskirts of San Francisco, were up 36% from last year, and in Napa up 28%.
- In New York, there's been a 44% increase in home sales in surrounding suburbs from last year, including 112% in Westchester County.
- Between March and June, 16,000 New Yorkers switched to Connecticut addresses.
- New York and San Francisco, list prices have dropped by 4.2% and 4.9% year over year, respectively.

    - Sources: [https://www.fastcompany.com/90554205/if-covid-19-pushes-people-to-the-suburbs-how-can-we-make-them-more-environmentally-friendly]

Factors Influence on Health Outcomes

Policy & Programs for Health

- Environment and health behaviors impacted by how communities are planned
  - Transportation
  - Land Use
  - Community Design



Source: County Health Rankings, RWJF, 2014;
Univ. of Wisconsin Population Health Institute, 2014;

Scenario Planning Overview

Compare Impacts of Land Use & Transportation Alternatives

- Typical impacts include:
  - Population, Housing, Jobs
  - Financial Costs
  - Transportation Accessibility
  - Resource Management
- More recently health impacts have been integrated
- Results used to inform decision-making
  - Long-Range Regional Transportation Planning
  - Master Planning
  - Infrastructure Investments
  - Development Proposals

Scenario Planning Tools

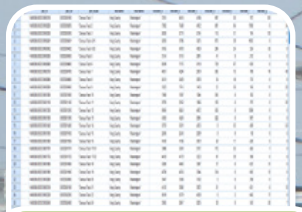
Options for Different Applications

- Range of expertise needed
- Proprietary and no-cost options
- Stand-alone or add-ons to existing popular GIS software (e.g., ESRI)

Development Process for Scenario Planning

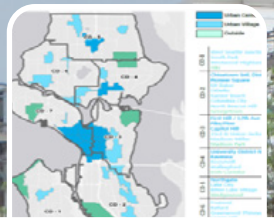
Data Needs

- Identify and acquire data:
  - Outcomes
  - Demographics
  - Land Use
  - Transport



Data Development

- Review, clean, organize
- Create measures
- Review and map variation
- Investigate extreme values



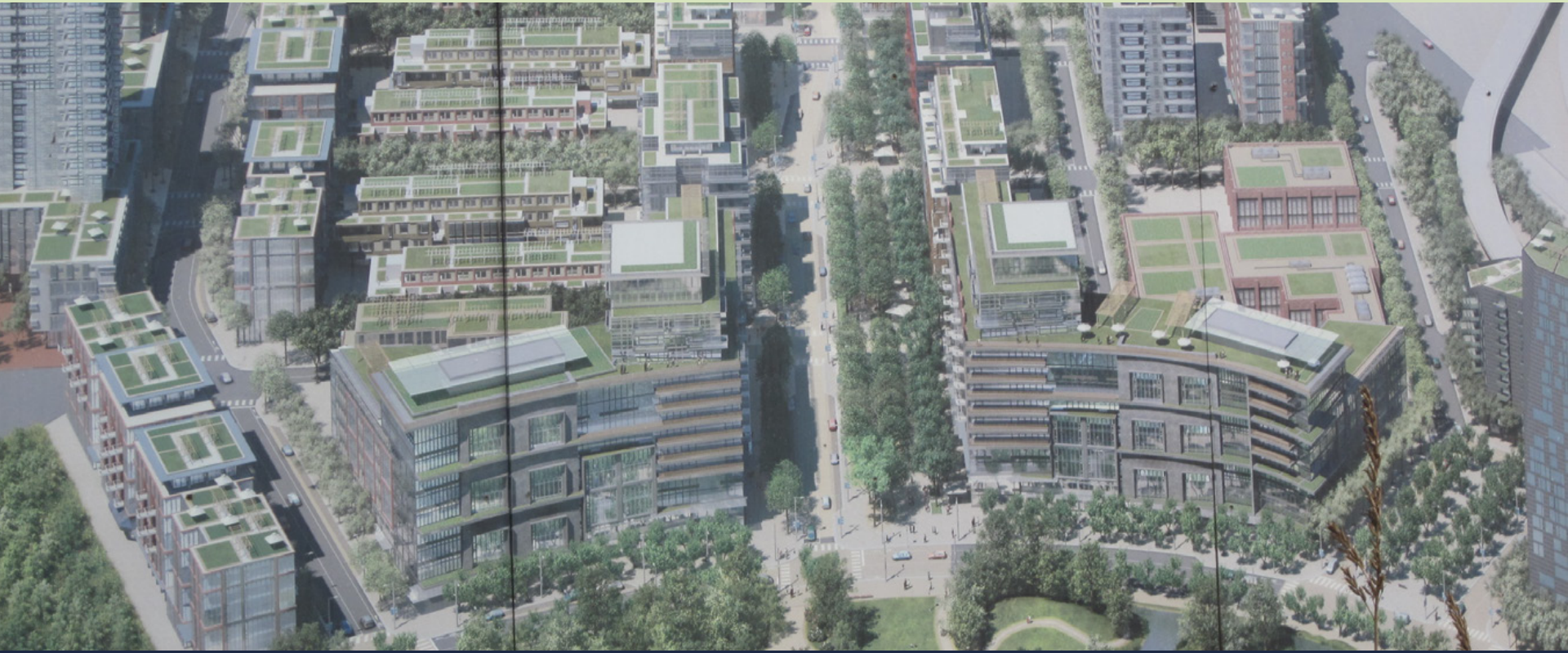
Analyses & Tool Development

- Determine associations
- Statistical modelling
- Create elasticities (magnitude and direction of change)
- Develop user interface

Application

- Select study areas
- Compare outcomes across scenarios
- Calibrate assumptions/ parameters as needed

Case Study Application: West Don Lands



HEALTHY CANADA BY DESIGN INITIATIVE

Pan-Canadian program linking planning with health agencies

- Health-based decision support tools for policy makers and land use/transportation planning
- Supported by Toronto Public Health

HEALTHY CANADA by design

TORONTO Public Health

CLASP
COALITIONS LINKING ACTION & SCIENCE FOR PREVENTION

An initiative of:

CANADIAN PARTNERSHIP AGAINST CANCER
PARTENARIAT CANADIEN CONTRE LE CANCER

HEART & STROKE™ FOUNDATION

UD4H URBAN DESIGN 4 HEALTH

West Don Lands Redevelopment

Case Study Site

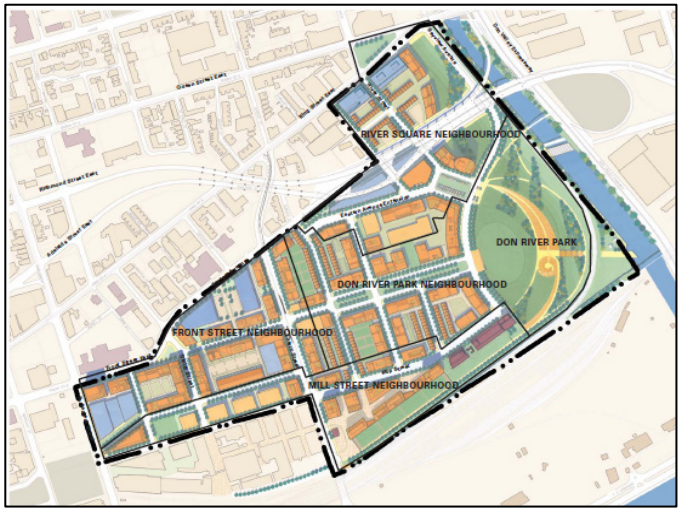
- Former industrial waterfront lands
- Part of revitalization of Toronto Waterfront
- Athletes Village for the 2015 Pan American Games

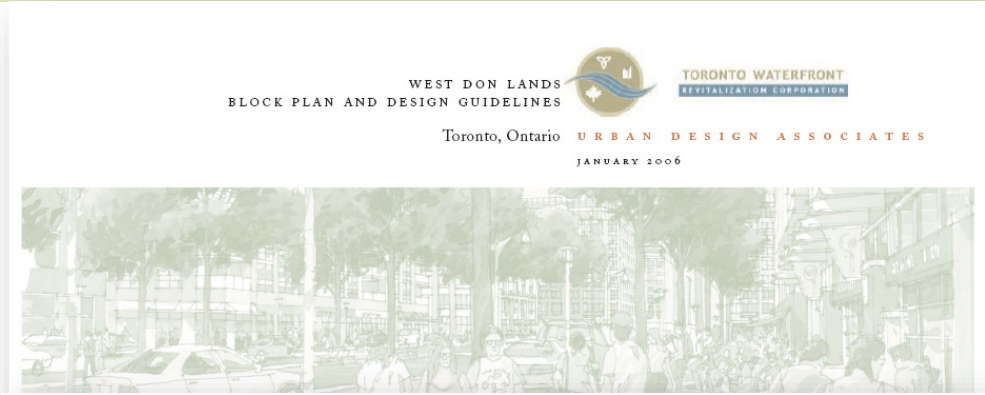
Source: City of Toronto Archives, 1929; Waterfront Toronto, 2015.

Planning for the West Don Lands Redevelopment

Pre-Existing Plans

- 2005 West Don Lands Precinct Plan
- 2006 West Don Lands Block Plan
- 2015 Pan American Village Plan



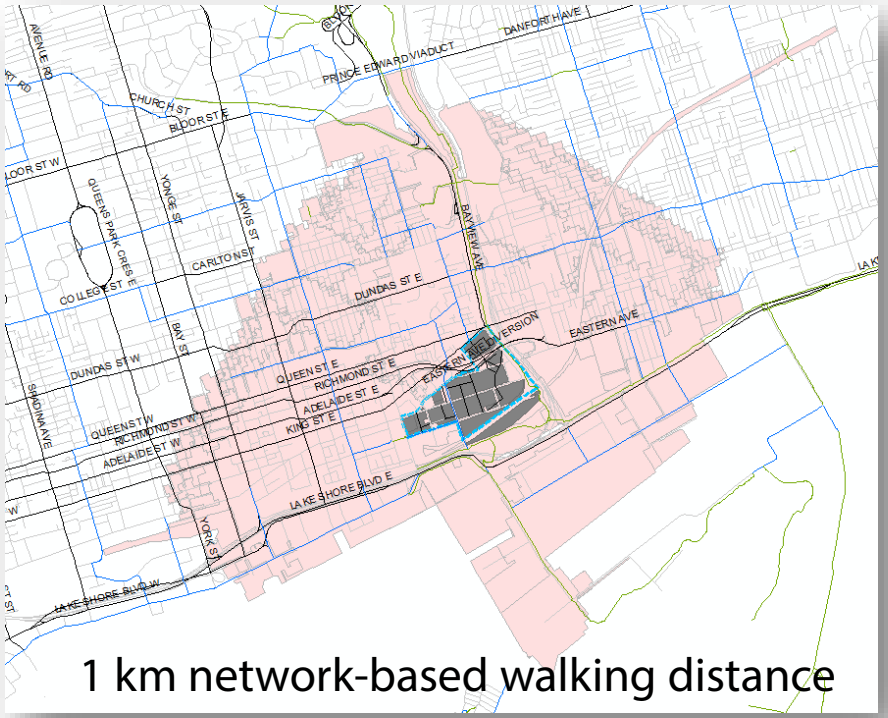


West Don Lands Redevelopment

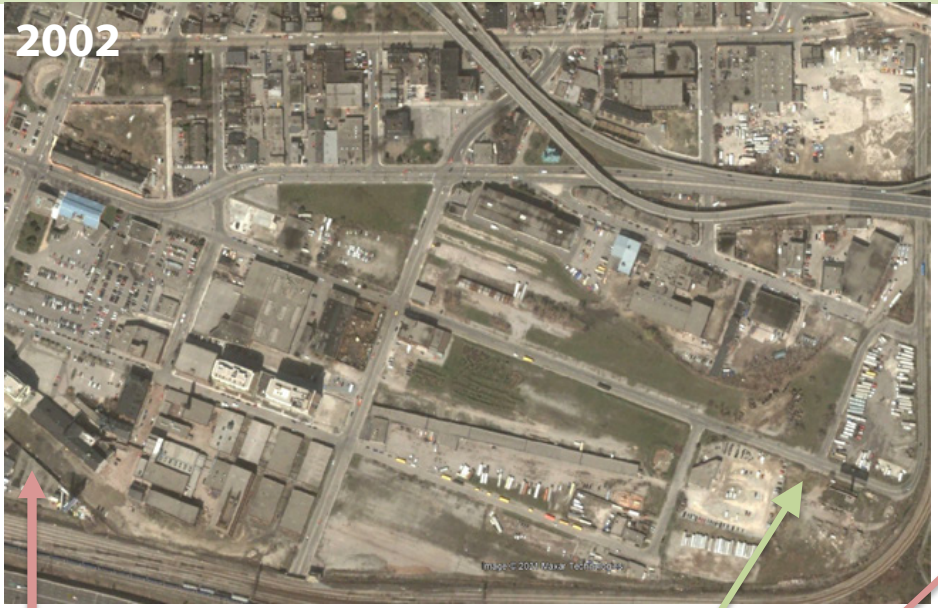
Viable Pilot Site for Application

- Significant built environment changes
  - 30 hectare (80 acre) site
  - Dense/mixed-use development
  - Up to 6,500 housing units
  - 1 million sq. ft. of office/retail
  - New TTC streetcar/bus stops
  - 2 new parks (> 18 acres)
- Scenario Evaluation (~2030)
  - Study Area
  - City-wide
  - Impacted Area

Impacted Area



West Don Lands Redevelopment



- Corktown Common Park
- The Distillery Historic District
  - High Density Residential
    - Mixed-Use Corridor

Source: Google Earth, 2021.

Data Sources: Built Environment

Development Process

- Data preparation
- Loading data
- Define the analysis area
- Build future (change) scenario(s)
- Report existing/future conditions
- Review results and adjust scenarios as necessary

Data Type	Environmental Measures	Data Source
Postal code boundaries with built environment measures	Residential density Land use mix Retail floor area ratio Office floor area ratio Walkability index	MPAC Municipal Property Assessment Corporation
Bicycle facilities Trail network	Metres of bicycle facilities Metres of trails Metres of bicycle facilities and trails	Toronto
Food retail locations	Supermarket density Convenience store density Farmers' market density Restaurant density Take-out restaurant density	Toronto Public Health
Parks	Park area	
Road network	Metres of all walkable roads Number of intersections Intersection density Crow-fly distance to nearest major arterial	Ministry of Education
School locations	Network distance to nearest school School density	
Sidewalk network	Sidewalk coverage	
Transit stops	Network distance to nearest transit stop Transit stop density	

UD4H Urban Design 4 Health

Data Sources: Health/Physical Activity Outcomes

Canadian Community Health

N = 4,077

- Body mass index
- Daily energy expenditure
- Walk trip occurrence, for exercise or to work/school
- High blood pressure
- Bicycle trip occurrence, for exercise/work/school

City of Toronto

transportation tomorrow

N = 22,091

- Mean daily active (walk & bike) trips/person
- Mean daily transit trips/person
- Mean daily auto (driver & passenger) trips/person
- Mean daily trip kilometres/person
- Mean daily grams of CO^2/household (personal transport)

Source: Canadian Community Health Survey, Statistics Canada, 2012; Southern Ontario Transportation Tomorrow Survey, 2012.

Future Scenario Outcomes (2030)[1]

Cumulative Impact

- Future Population
  - Study Area: ~+12,800
  - Impacted Area: ~+26,200

Outcome	Study Area*		Impacted Area**		City**
	Base	Future	Base	Future	Base
average **active trips**/person/day	0.2	**0.4**	0.4	0.4	0.1
average **transit trips**/person/day	0.6	**0.7**	0.7	**0.8**	0.5
average **automobile trips**/person/day	1.0	0.6	0.6	0.6	1.3
average **trip kilometers**/person/day	18.2	15.9	14.6	14.3	22.6
average CO^2 generated (kg/HH/day)	3.4	2.5	2.3	2.3	4.2
walking for exercise monthly freq.	14.4	**14.6**	12.0	12.0	10.7
walk to work/school monthly freq.	7.8	**9.8**	10.8	**11.2**	5.6
bicycle for exercise monthly freq.	1.1	**1.4**	1.2	1.2	0.6
bicycle to work/school monthly freq.	0.8	**1.1**	1.0	**1.1**	0.3
daily **energy expenditure** (kcal/kg/day)	2.7	**3.2**	2.8	**2.9**	2.4
body mass index	24.31	24.14	24.03	23.99	24.6
high blood pressure (likelihood)	9.63%	9.19%	5.5%	5.48%	10%

*Average of postal code values
** Population weighted average of postal code values

[1] Ulmer et al. (2015). Application of an Evidence-based Tool to evaluate health impacts of changes to the built environment. *Canadian Journal of Public Health, 106*(1).

Case Study Application: South Stockton Promise Zone

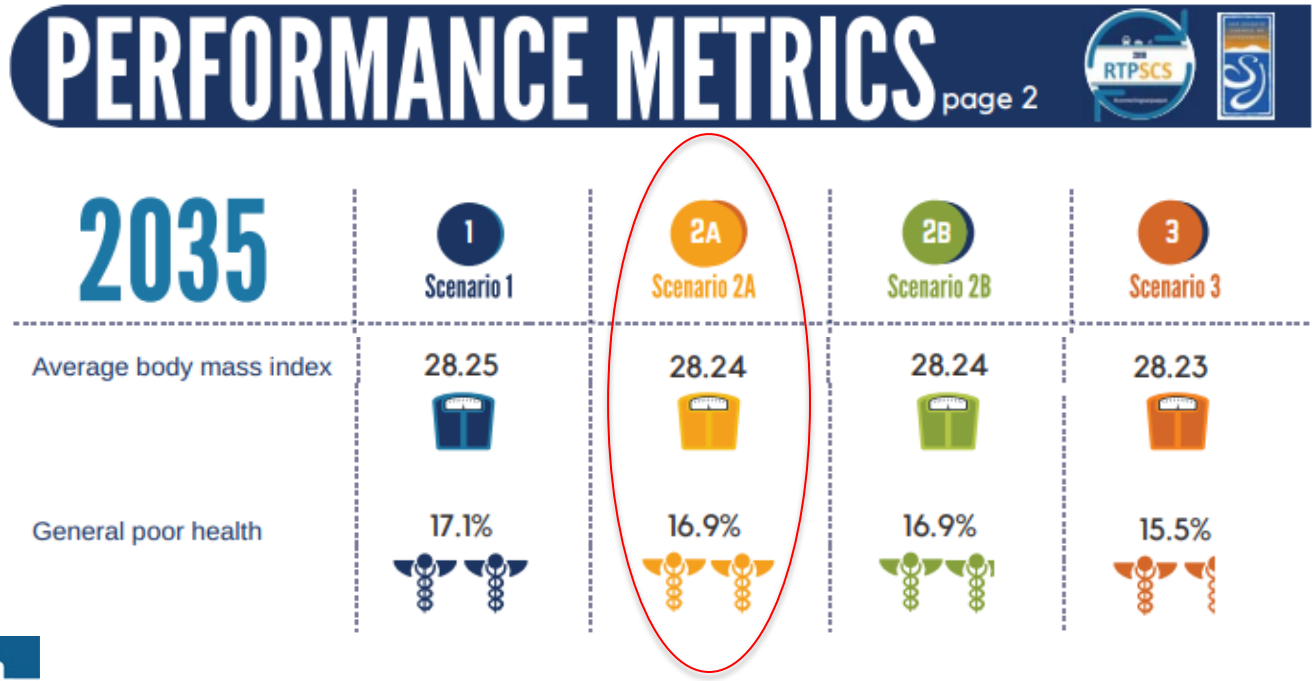
HEALTH EQUITY STUDY

Integrating Health Into Regional Transportation Planning

- San Joaquin Council of Governments (SJCOG) is a metropolitan planning organization and responsible for regional transportation plans and programming of local, state, federal funds
- Required to address environmental justice (EJ) in Regional Transportation Plans (RTPs)
- More attention paid to health indicators

HEALTH EQUITY STUDY

2018 Regional Transportation Plan & Sustainable Communities Strategy



SAN JOAQUIN COUNCIL OF GOVERNMENTS

UD4H URBAN DESIGN 4 HEALTH

HEALTH EQUITY STUDY

South Stockton Promise Zone

- Since 2017, SJCOG has convened SSPZ stakeholders to identify collective action strategies to transform the neighborhood under three priorities:
  - Housing stability
  - Economic vitality
  - Quality of life (e.g. parks, transportation, etc.)

HEALTH EQUITY STUDY

South Stockton Promise Zone

- For the region, the neighborhoods in the SSPZ represent the most disadvantaged communities
  - Compared to the overall City population, SSPZ residents are more likely to experience poverty, be burdened by housing costs
  - There is also a higher concentration of communities of color in the SSPZ
  - Residents are more likely to come from a limited English-speaking household

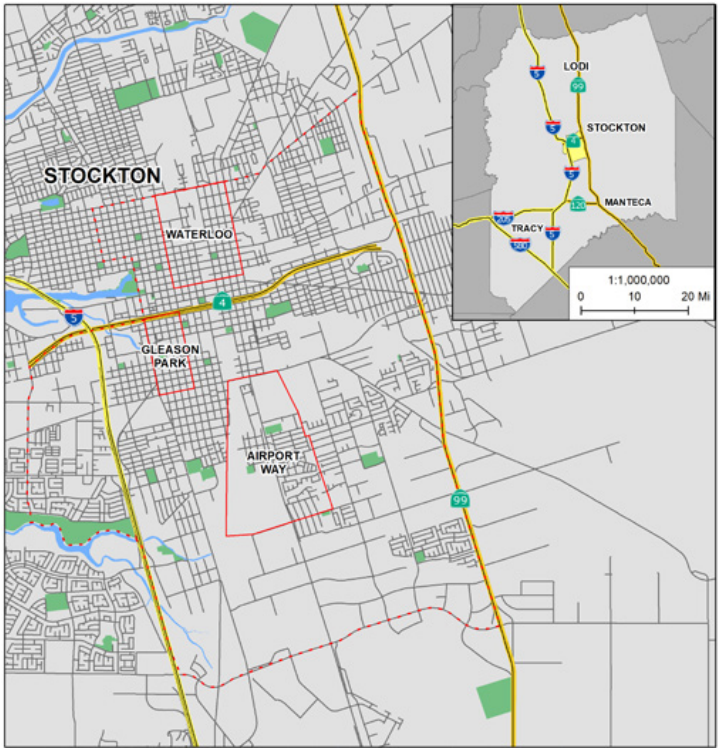
Study Area Assessment

Study Area

- Countywide Assessment
- South Stockton Promise Zone (SSPZ)

Environmental Justice Indicator	San Joaquin County	Stockton City	South Stockton Promise Zone
Concentration of Populations of People of Colour[1]	34.4%	57.4%	96.2%
Concentrated Poverty[2]	22.5%	42.0%	83.0%

Stockton



[1] >= 75% of Census block group population consists of races and ethnicities which are non-Hispanic White.
[2] >= 30% of Census block group population is identified as below the "federal poverty level."
Source: 2015 American Community Survey 5-Yr Estimates, Census Bureau, 2016.

National Public Health Assessment Model (N-PHAM)

- Developed by UD4H in collaboration with U.S. EPA
- Aims:
  - **Nationally applicable**
  - Empower communities, planners & public health officials
  - Quantify **localized health impacts** of alternative investment scenarios
  - Designed specifically to support **long-range transportation planning**
  - Allows for **local** environmental data integration

N-PHAM
National Public Health Assessment Model

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Smart Growth
IMPLEMENTATION ASSISTANCE

ud4h
URBAN DESIGN 4 HEALTH

National Public Health Assessment Model (N-PHAM)

Key Elements

N-PHAM
National Public Health Assessment Model

- Statistical regression models of **built, natural and social environment effects on health**
- Census block group analysis
- Leverages unique datasets
  - Health Outcomes
    - 2015-2017 CHIS (n= 54,481)
  - Travel Behaviour/Physical Activity
    - 2017 NHTS – California Add-On (n=40,887)

CHIS california health interview survey

NHTS National Household Travel Survey
Our Nation's Travel

Source: Schoner, J., Chapman, J., Brookes, A., MacLeod, K., Fox, E., Iroz-Elardo, N. & Frank, L. (2018). Bringing health into transportation and land use scenario planning: Creating a National Public Health Assessment Model (N-PHAM), *Journal of Transportation & Health, 10*, 401-418. DOI: 10.1016/j.jth.2018.04.008

National Public Health Assessment Model (N-PHAM)

Application Delivery

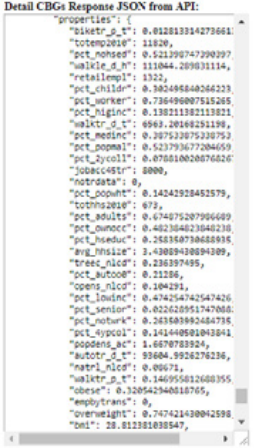
- API
- Web App (RShiny)
- Script-based inputs

UrbanFootprint

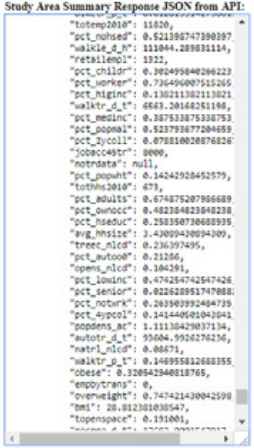
communityviz®

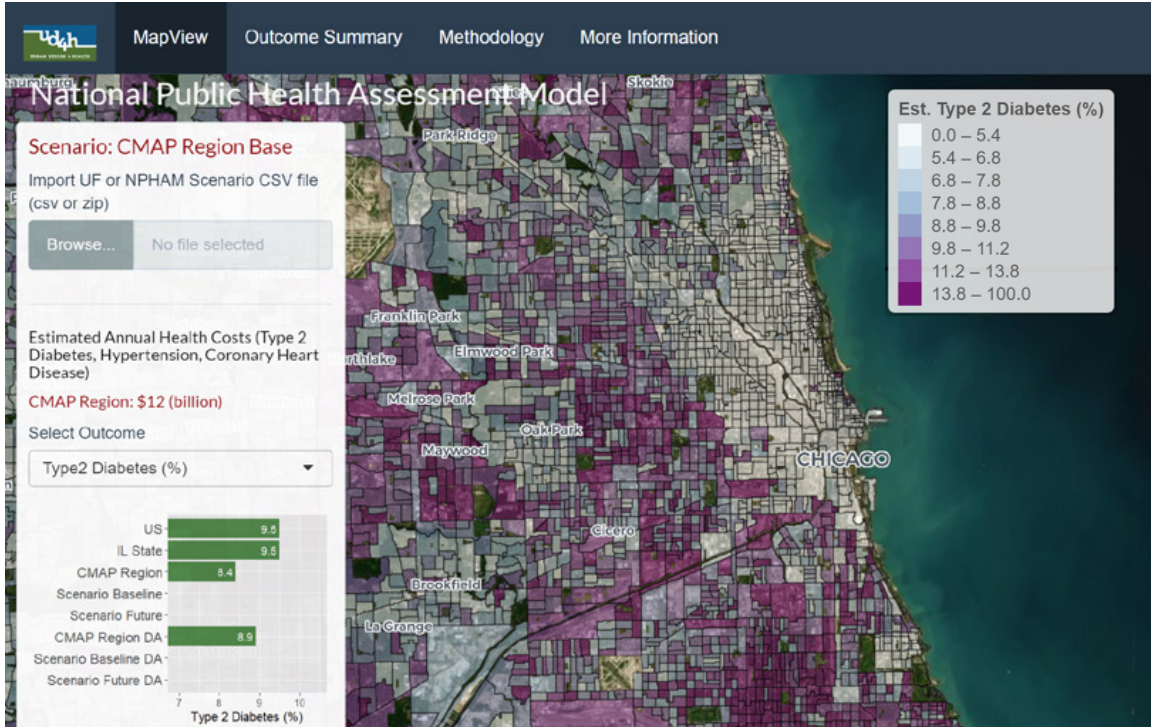
envision tomorrow
a suite of urban and regional planning tools

Detail CBGs Response JSON from API:



Study Area Summary Response JSON from API:





Data Sources: Built Environment

Development Process

- Data preparation
- Loading data
- Define the analysis area
- Build future (change) scenario(s)
- Report existing/future conditions
- Review results and adjust scenarios as necessary

Data Type	Environmental Measures	Data Source
Parcels with built environment measures	Residential density Employment density Employment mix (5-tier)	San Joaquin Council of Governments
Bicycle facilities	Length of bicycle infrastructure Count of bicycle share facilities	
Destination access	8-tier employment entropy Retail employment job density Trip productions and trip attractions equilibrium index	City of Stockton
Green Space	Density of developed parks Percentage of tree canopy coverage	
Road network	Intersection density Pedestrian-orientated intersection density Road network density	Caltrans
Transit	Distance to nearest transit stop (meters) Aggregate frequency of transit service per square mile	San Joaquin RTD

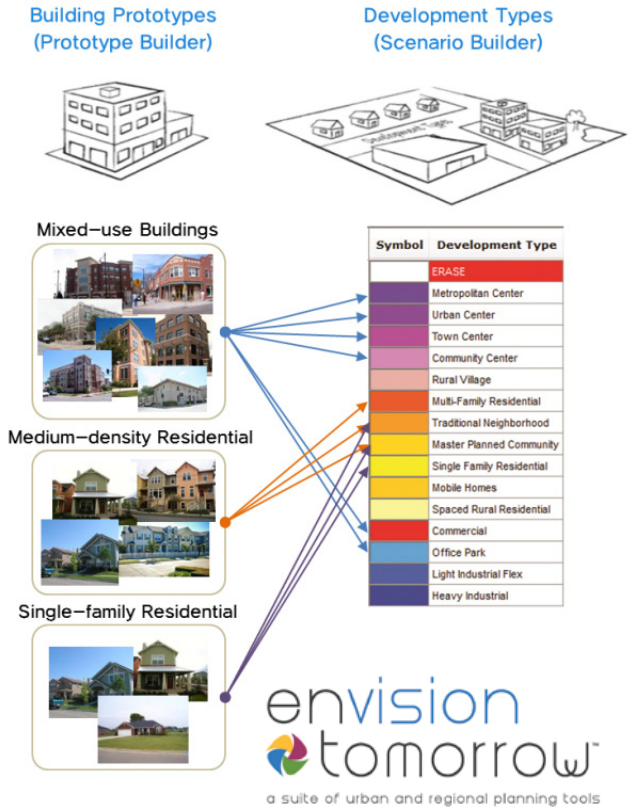
UD4H Urban Design 4 Health

Stockton Scenario Development

Infill Development

- Identify custom development placetypes
- Determine blend of buildings
- Select redevelopment rate

Development Placetype	Building Mixture		Redevelopment Rate
	Residential	Commercial	
Downtown Residential	90%	10%	21%
Downtown	25%	75%	23%
Compact Neighborhood High	100%	0%	6%
Compact Neighborhood Low	100%	0%	5%
Mixed-Use Corridor	30%	70%	15%
Town Neighborhood	75%	25%	8%
Suburban Multifamily	100%	0%	10%
Suburban Residential	100%	0%	3%
Office Park	0%	100%	4%



Source: Envision Tomorrow, Fregonese Associates, 2020.

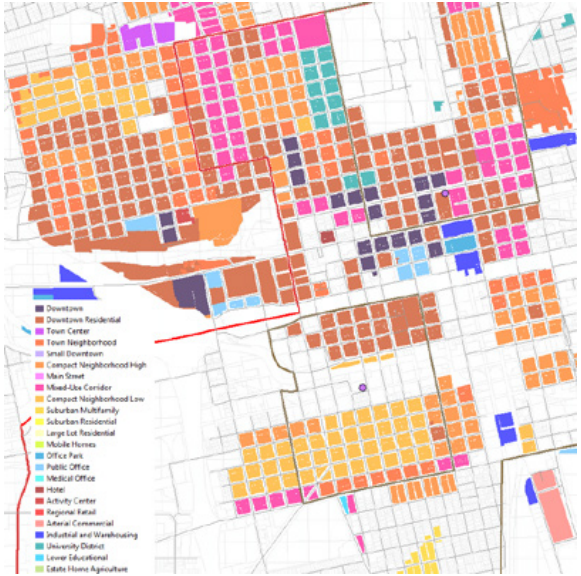
Scenario Development: Units & Jobs

Variable	Baseline (2015)	Percent (%)	Adopted Scenario (2035)				Bold Scenario (2035)			
			Change	Total	Change (%)	Component (%) (Shift %)	Change	Total	Change (%)	Component (%) (Shift %)
Demographics										
Population	75,512	100%	+10,201	88,219	+13.1%	—	+24,282	99,793	+32%	—
Households	21,460	100%	+4,660	27,105	+20.8%	—	+11,829	33,290	+55%	—
MF Units	6,652	27%	+2,947	9,599	44.3%	31% (+4%)	+10,257	16,908	+154%	45% (+18%)
SF Units	16,389	67%	+2,815	19,204	17.2%	62% (-5%)	+810	17,199	+5%	46% (-21%)
Townhouse Units	1,282	5%	+574	1,856	44.8%	6% (+1%)	+1,534	2,816	+120%	8% (+3%)
Other Units[1]	317	1%	0	317	0%	1% (0%)	0	317	0%	1% (0%)
Housing Units	24,639	100%	+6,337	30,976	+19.2%	100%	+12,601	37,241	+51%	100%
Employment										
Retail Jobs	2,603	8%	+1,339	3,942	+51.4%	10% (+2%)	+3,825	6,428	+147%	13% (+5%)
Office Jobs	6,423	20%	+4,331	10,754	+67.4%	29% (+9%)	+13,921	20,345	+217%	40% (+20%)
Industrial Jobs	10,479	32%	+1,468	11,947	+14.0%	27% (-5%)	+173	10,652	+2%	21% (-11%)
Other Jobs[2]	13,347	41%	+533	13,880	+4.0%	33% (-8%)	0	13,347	0%	26% (-15%)
Total Jobs	32,852	100%	+7,671	40,523	+23.4%	100%	+17,919	50,771	+55%	100%

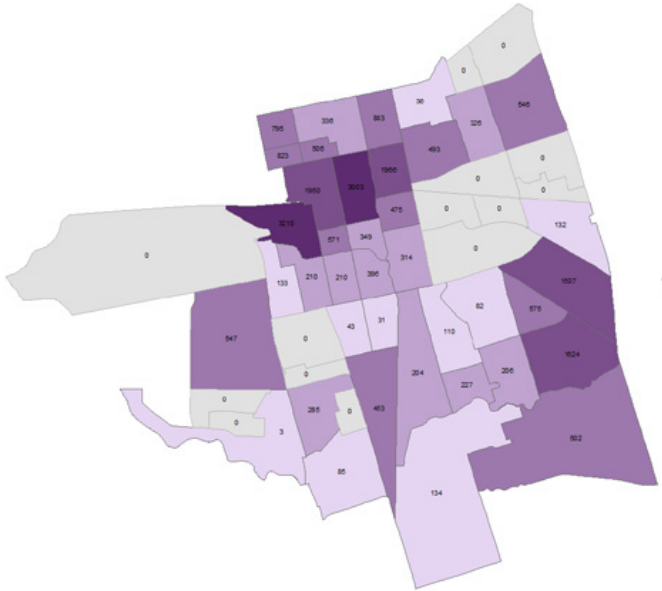
[1] Includes dormitories and university housing; [2] Includes public sector, health sector and other sectors.

Scenario Development: Aggregation

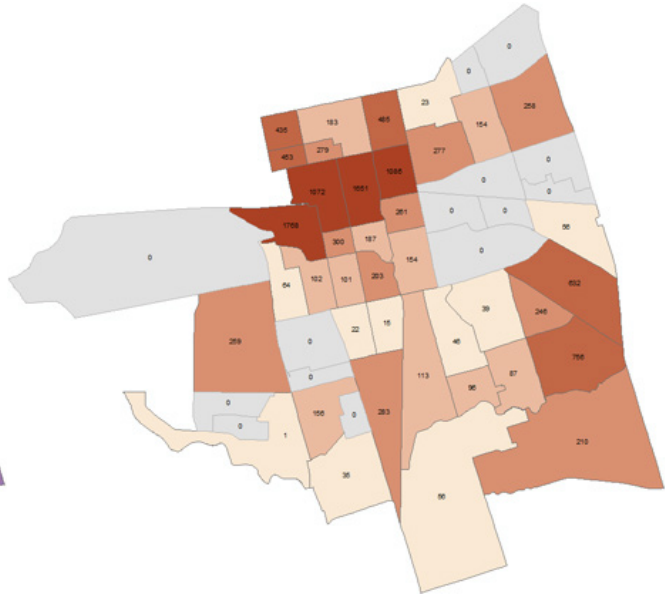
Parcel-Level Scenario → Block Group-Level Scenario



New Population



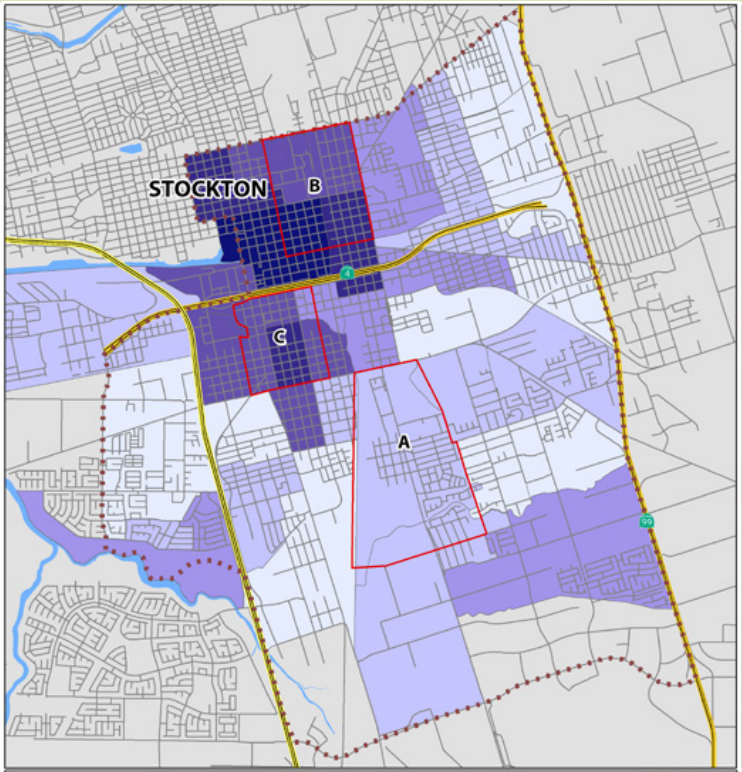
New Units

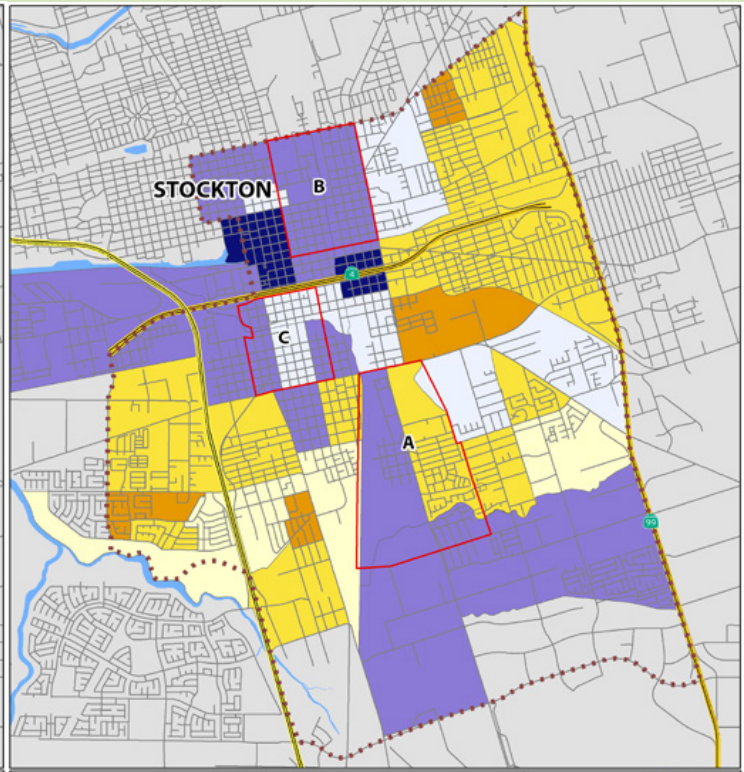


2035 Forecasted Changes in Utilitarian Walking

Most Change

- Downtown Core
- Airport Way Corridor





2035 Forecasted Changes in PA

Utilitarian & Leisure Physical Activity

Physical Activity	Baseline (2015)	Adopted Scenario (2035)			Bold Scenario (2035)		
	Weighted Mean (Weighted SD)		Absolute Change	Percent Change	Weighted Mean (Weighted SD)	Absolute Change	Percent Change
	Baseline	Future			Future		
Walking for transport (daily minutes)	1.56 (0.36)	1.76 (0.53)	+0.20	+12.8%	1.94 (0.71)	+0.38	+24.4%
Walking for transport (participation)	17.0% (6.6%)	20.8% (9.2%)	+3.8%	+22.4%	22.9% (11.1%)	+5.9%	+34.9%
Walking for leisure (weekly minutes)	13.42 (0.74)	13.67 (0.78)	+0.25	+1.9%	13.94 (1.05)	+0.51	+3.8%
Walking for leisure (participation)	57.8% (1.1%)	58.2% (1.2%)	+0.4%	+0.7%	58.5% (1.5%)	+0.7%	+1.2%
Bicycling for transport (daily minutes)	1.04 (0.03)	1.05 (0.04)	+0.01	+1.0%	1.06 (0.05)	+0.03	+2.6%
Bicycling for transport (participation)	0.9% (0.4%)	1.2% (0.6%)	+0.3%	+33.3%	1.4% (0.7%)	+0.4%	+45.2%

Source: Iroz-Elardo, N., Schoner, J., Fox, E., Brookes, A. & Frank, L. (2020). Active Travel & Social Justice: Addressing Disparities & Promoting Health Equity through a Novel Approach to Regional Transportation Planning. *Social Science & Medicine, 261*. DOI: 10.1016/j.socscimed.2020.113211

2035 Forecasted Changes in Health Outcomes

Chronic & Cardiovascular Disease

Health Outcome	Baseline (2015)	Adopted Scenario (2035)			Bold Scenario (2035)		
	Weighted Mean (Weighted SD)		Absolute Change	Percent Change	Weighted Mean (Weighted SD)	Absolute Change	Percent Change
	Baseline	Future			Future		
% Obesity (>30 BMI)	36.0% (3.2%)	34.5% (3.6%)	-1.5%	-4.2%	33.6% (4.1%)	-2.4%	-6.5%
% Overweight or obese status (>25 BMI)	70.9% (3.1%)	69.4% (3.8%)	-1.5%	-2.1%	68.5% (4.4%)	-2.4%	-3.3%
% Coronary heart disease	4.2% (0.8%)	4.0% (0.7%)	-0.2%	-4.8%	4.0% (0.8%)	-0.2%	-5.4%
% High blood pressure	29.7% (4.3%)	28.4% (4.1%)	-1.3%	-4.4%	27.6% (4.4%)	-2.1%	-7.0%
% Type 2 diabetes	11.1% (3.1%)	10.4% (2.8%)	-0.7%	-6.3%	10.1% (2.8%)	-1.0%	-9.4%

Mental & General Health Status

Health Outcome	Baseline (2015)	Adopted Scenario (2035)			Bold Scenario (2035)		
	Weighted Mean (Weighted SD)		Absolute Change	Percent Change	Weighted Mean (Weighted SD)	Absolute Change	Percent Change
	Baseline	Future			Future		
% Fair or poor general health	30.3% (4.9%)	29.8% (4.7%)	-0.5%	-1.7%	29.6% (4.6%)	-0.7%	-2.4%
% Depression	32.8% (2.8%)	32.4% (2.7%)	-0.4%	-1.2%	32.2% (2.7%)	-0.6%	-1.9%
% Psychological distress	6.1% (0.8%)	5.9% (0.7%)	-0.2%	-3.3%	5.8% (0.7%)	-0.4%	-6.2%

Source: Iroz-Elardo, N., Schoner, J., Fox, E., Brookes, A. & Frank, L. (2020). Active Travel & Social Justice: Addressing Disparities & Promoting Health Equity through a Novel Approach to Regional Transportation Planning. *Social Science & Medicine, 261*. DOI: 10.1016/j.socscimed.2020.113211

PUBLICATIONS

- West Don Lands:
  - Ulmer, J.M., Chapman, J.E., Kershaw, S.E., Campbell, M. & **Frank, L.D.** (2015). Application of an Evidence-Based Tool to Evaluate Health Impacts of Changes to the Built Environment. *Canadian Journal of Public Health, 106* (1) (Suppl. 1), eS26-eS32.
  - **Frank, L.D.**, Kershaw, S.E., Chapman, J.E., Campbell, M. & Swinkels, H. (2015). The Unmet Demand for Walkability: Disparities Between Preferences and Actual Choices for Residential Environments in Toronto & Vancouver. *Canadian Journal of Public Health, 106* (1) (Suppl. 1), eS12-eS20.
- South Stockton Promise Zone:
  - Schoner, J., Chapman, J., Brookes, A., MacLeod, K., **Fox, E.**, Iroz-Elardo, N. & **Frank, L.** (2018). Bringing health into transportation and land use scenario planning: Creating a National Public Health Assessment Model (N-PHAM), *Journal of Transportation & Health, 10*, 401-418.
  - Iroz-Elardo, N., Schoner, J., **Fox, E.**, Brookes, A. & **Frank, L.** (2020). Active Travel & Social Justice: Addressing Disparities & Promoting Health Equity through a Novel Approach to Regional Transportation Planning. *Social Science & Medicine, 261*.

Thank You

Eric Fox

Urban Design 4 Health

efox@ud4h.com

Dr. Lawrence Frank

Urban Design 4 Health

ldfrank@ud4h.com

Visit our website:

www.ud4h.com

follow us on twitter

@UD4H_INC

Christine Corrales

San Joaquin Council of Governments

corrales@sjcog.org