America Walks Webinar
April 7, 2022

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Call to Action to Promote Walking & Walkable Communities

- Initiated the **Step it Up!** Campaign
- Urges city officials and developers to:
  - Build walkable communities
  - Invest in infrastructure to promote walking for healthy living

- Key Goals:
  - Goal 2 – Design walkable neighborhoods
  - Goal 5 – Fill Research & Evaluation Gaps Related to Walkability

- UD4H at the forefront for building evidence and tools to support this Call to Action
Pathway and Mechanisms

Frank et al, 2019 Journal of Transport and Health
“The Hidden Health Costs of Transportation” – UD4H 2010
Produced for the American Public Health Association
What Gets Measured Gets Done ... Frank 2019

Components:

- **Data**: Individual, population, and contextual community data
- **Interaction**: Person-level and community health risk models
- **Feedback**: Biometrics, physical activity monitors
- **Outcomes**: Health optimization metrics
- **Forecast**: ability to test community interventions
- **Visualization**: 3D community models, geographic information systems

Quality of Life

- **Societal Impact**
- **Chronic Disease**
- **Biological Response (Genetics)**
- **Behavioral Response**
- **Social / Cultural Environment**
- **Physical Environment**
- **Predisposition: Genetics, Age, Biology, Disability**

Components:

- **Data**: Individual, population, and contextual community data
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Chronic Disease

Biological Response (Genetics)

Behavioral Response

Social / Cultural Environment

Physical Environment

Predisposition: Genetics, Age, Biology, Disability

Terms:

- Term “Walkability” was borne out of the inability to walk
- Before 1940 nearly all urban areas were walkable … by necessity
- First study linking walkability components (density and mix) active travel, transit, and driving was based in Seattle
- Frank and Pivo, 1988 - 1994
- What Gets Measured Gets Done … Frank 2019

Components:

- **Quality**: 3D community models, geographic information systems
3 Geographic Scales

Regional Accessibility

Walkable Complete Neighborhoods

Pedestrian Environment (Micro-scale)

Applications

TRANSIT ORIENTED DEVELOPMENT

GREEN SPACE

ACTIVE TRANSPORTATION

LAND USE

HEALTH EQUITY
Proximity

Disconnected

Connected

Crow-Fly Buffer
Network Buffer
Sample Household

Single Family Residential
Multi Family Residential
Commercial
Office
Industrial
Institutional
Greenspace/Recreational
Parking
Unknown

Connectivity

2 KM

1 KM

A

B

A

B
**Utilitarian Walkability**

Additional Features:

1) Sidewalk completeness
2) Pedestrian Environment (seating, trees, Street crossings, building Height and setbacks, parking location)
3) Factors Impacting “eyes on the street""}

- Commercial Floor Area Ratio
  - Retail Floor Area
  - Office Floor Area

- Street Connectivity
  - Intersection Density
  - Network Density

- Land Use Mix
  - Residential, Commercial, Office, Civic, Entertainment Floor Area

- Net-Residential Density
  - Housing Units
  - Population

Features of the built environment

Transportation Network
• Access to Transportation Options
• Regional Accessibility

Land Use
• Mixing of land use types
• Access to destinations, goods, services

Design
• Pedestrian/Bicycle environment
• Sidewalk, street amenities
• Building and urban design
Utilitarian Walkability Index

Purpose: composite measure combining multiple land use and transportation features

Standard components:
• Density (residential/commercial)
• Diversity
• Connectivity

Supplementary components:
• Sidewalk coverage
• Access to public transit
Geospatial methods to capture environmental factors

**Fixed neighborhood polygon**
- Everyone in neighborhood is assigned same set of environmental factors
- Computationally simple

**15 Minute Person/parcel access buffer**
- Unique set of environmental factors
- Distance-decay
- Computationally complex

**Daily activity space**
- Includes temporal and activity factors
- Data complex
- Unique set of environmental factors
- Distance-decay
- Computationally complex
• Catchment area (buffer) combines transit access + walking
• Access by transit mode (metro = longer distance, bus = shorter distance)
• Measures of non-contiguous access

Source: Fox et al., 2015
Walkable Network

Freeway (non-walkable)  Underpass (walkable)  Ramp (non-walkable)
Regional Accessibility – Where Matters

- Measure individual access to destinations
- Average of distance/travel time for entire region
- Regional Centrality Index
  - Standardized measure of how individual areas compare with the region

Enhanced Travel Time – Walk Time & Transit Time
Research Leading to WalkScore - Twice

• Walkability Research and Map of Seattle in Published Seattle Times - Late 90’s
  – Based on HealthScape Study Conducted for King County
  – Eric Pryne Reporter Wrote Story
• Then Was Contacted by Matt Lerner Who Saw Map in Paper and was with Microsoft – Led to earlier “Crow Fly” Version of WalkScore (2000)
  – Formed FrontSeat Which Developed WalkScore
• Partnered with FrontSeat around 2012 and did research leading to StreetSmart Network Based WalkScore
  – Funded By Robert Wood Johnson Foundation
  – Published Final Paper Documenting this Research in 2021 (below)
• Destinations Matter But Also Need Code-Based Tool for Policy Development
• This work helped to established the algorithms in WalkScore

Walkability and Physical Activity

Transport Walking (at least 30 min/day)

People living in a somewhat walkable area are 20% more likely to walk 30 minutes or more for transportation and people in a walkable area are 45% more likely compared to those living in a car dependent area.

Walkability and 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 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 14% less likely to have heart disease compared to those living in a car dependent area.

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.

Lawrence Frank, PI
WHERE MATTERS
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.

Lawrence Frank, PI
WHERE MATTERS
WALKABILITY AND SOCIAL JUSTICE

• WALKABLE FOR WHOM?

• CO-FACTORS THAT COME WITH WALKABILITY
  – Differ By Demographic Group
    • Wealthier Have Greenspace, Shops, Entertainment, Other Destinations
    • Poor Have Air Pollution, Noise, Crime, Injury Risk

• Health Outcomes Differ As a Result
  – Walkability Itself is NOT Associated with Better Health Outcomes for the Underserved
    • Due to other Co-factors
Environmental Exposure Risk Index – Tree Canopy

- Tree Canopy Coverage
  - % of block group with tree canopy coverage
  - Data Source: USGS
  - Supportive for health:

Map of Seattle showing various levels of tree canopy coverage.
ENVIRONMENTAL EXPOSURE RISK INDEX – LOUD NOISE

• Proximity to Loud Noise
  – % of block group with ambient loud noise (>= 70 dBA) from transportation sources:
    • Road Network, Airports
  – Data Source: U.S. DOT
  – Supportive for health: 

- SEATTLE
ENVIRONMENTAL EXPOSURE RISK INDEX – INJURY RISK

  - Ped/Bike Fatal Traffic Crashes per 100k people
  - Data Source: FARS, U.S. FHWA
  - Supportive for health:

SEATTLE

![Map of Seattle with risk index legend]

- Very High
- High
- Medium High
- Medium Low
- Low
- Very Low
Proximity to Freight Facilities

- % of block group within 0.25 mile of freight facilities:
  - Rail yards
  - Ports
  - Intermodal facilities
- Data Source: U.S. EPA
- Supportive for health:
ENVIROMENTAL EXPOSURE RISK INDEX

- Composite measure:
  - Tree Canopy Coverage
  - Proximity to Loud Noise
  - Traffic Crash Injury Safety
  - Air Pollution
    - Ozone Concentration
    - PM$_{2.5}$ Concentration
  - Proximity to Emissions/Noise
    - Rail Yards
    - Port Facilities
    - Intermodal Freight Facilities
The population living in the USA’s block groups with the worst* environmental exposure risk:

- **14.9%** People of Color (**more than double**) compared to only **5.8%** White/Caucasian
- **12%** Low Income (**nearly 1.5 times higher**) compared to only **8.1%** High Income

* blockgroups with the greatest environmental exposure risk
Is “walkability” healthy and accessible for all?
Variations in the environmental correlates of walkability across sociodemographic groups in the U.S.

Lindsay M. Braun, University of Illinois at Urbana-Champaign
Eric H. Fox, Urban Design 4 Health, Inc.
Lawrence D. Frank, Professor - UCSD

ACSP Annual Conference
October 23, 2021
COMPLETE STREETS: A SUPPORTIVE PEDESTRIAN ENVIRONMENT
Comox Corridor Greenway Vancouver, BC
After (Counterflow Lanes)
Many Monetized Benefits of Active Travel

- Capital Construction
- Maintenance
- Equipment & Services
- Tourism
- Healthcare
- Less Employee Absenteeism
$1 spent returns over $8 in economic growth

$13 billion in active transportation investments will turn into $113 billion in Sales Output.

First study in the world to show monetized benefits of healthy land use.

Developed by UD4H in collaboration with U.S. EPA:

- Nationally applicable
- Empower communities, planners & public health officials
- Quantify **localized health impacts** of alternative investment scenarios
- Supports **current** conditions & **future** forecasting
- Allows for **local** environmental data integration
35 Social/Cultural Metrics
(Demographics - Census)
- Age
- Race
- Income
- Vehicles
- Family type
- Employment

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

- Avg. body mass index
- % overweight
- % obese
- % Type 2 Diabetes
- % Hypertension
- % Coronary heart disease
- Active travel participation and duration
- Annualized cost of illness
**Public Health Assessment Model**

**Model Inputs** *(small area estimates):*

- **35 Social / Demographic Metrics**
  - Age
  - Race
  - Income
  - Vehicles
  - Family type
  - Employment

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

**Current Model Outputs** *(small area estimates):*

- % overweight
- % obese
- % Type 2 Diabetes
- % Hypertension
- % Coronary heart disease
- % Depression
- % Distress
- Transport –related physical activity
- Annualized cost of illness
N-PHAM: Baseline Built/natural environment data

Density Index
- Population (people/area)
- Employment (jobs/area)
- Roads (length/area)
- Intersection (count/area)

Land Use Accessibility Index
- Land use diversity
- Retail employment density
- Trip equilibrium index

Greenspace Index
- Total area of all developed parks
- Total area of forested land
- Total area of natural land cover
- % area of tree canopy

Transit Accessibility Index
- % CBG employment within 400 meters of fixed guideway transit
- % CBG employment within 800 meters of fixed guideway transit
- Count of fixed guideway transit stations
- Density of fixed guideway transit stations
- Service frequency of transit per hour within 400 meters

Bike/Ped Index
- Existence of bike infrastructure in CBG (Y,N)
- Existence of bike share facilities in CBG (Y,N)
- Physically safe from bike/ped crashes in CBG (Y,N)
- Physically safe from violent crime in CBG (Y,N)
Los Angeles: Health Impacts of Long Range Transportation Plan

Houston: Health Impact Assessment of major infrastructure project

Rochester, NY: Integration of health metrics into scenario planning tools and methods

Las Vegas: Health Impact Assessment of Transportation Investment

Chicago: Evaluation of neighborhood health along a freight corridor (Amazon expansion)
• 9 applications in 7 different US cities
• 3 LRTPs
• 2 EJ focus (1 active)
• 4 Scenario planning
• 2 Health and transportation (active)
• 1 Health and freight (active)
Load future scenarios from native PHAM file or scenario planning software

Displays cost-of-illness for diabetes, hypertension, heart disease)

Thematic mapping of all outcomes

Comparison of selected outcome prevalence rates for US, state, region, baseline, scenario, and EJ areas
Urban Design 4 Health
Estimated Type 2 Diabetes Prevalence

Model Inputs:
- Built/natural Environment
  - Density
  - Accessibility
  - Greenspace
  - Transit
  - Bike/ped
- Demographics:
  - Age
  - Race
  - Income
  - Vehicles
  - Family type
  - Employment

Model Outputs:
- Body Mass Index overweight, obese
- Type 2 Diabetes
- Hypertension
- Coronary heart disease
- Depression
- Distress
- Covid-19 Risk Index
- Transport –related physical activity
- Annualized cost of illness

Estimated Annual Health Costs (Type 2 Diabetes, Hypertension, Coronary Heart Disease)
CMAP Region: $12 (billion)
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