SALURBA

Systems thinking in the Salud Urbana en América Latina study

LAC-URBAN HEALTH

Urban Health Network for Latin America and the Caribbean

wellcome

THE SALURBAL PROJECT

- ***Salud Urbana en América Latina*** – Urban Health in Latin America.
- An initiative of the Urban Health Network for Latin America and the Caribbean (**LAC-Urban Health**).
- Implemented by **Drexel University** and 14 partners primarily based in Latin America.
- Funded through **Wellcome Trust's** "Our Planet, Our Health" global initiative.

OUR VISION

- Create evidence base needed to make **Latin American cities** (and other cities) **healthier**, more **equitable**, and **environmentally sustainable.**
- **Engage policy makers and the public** in a new dialogue about urban health and urban sustainability and implications for societal action.
- Create a platform and network that will ensure continued **learning and translation.**

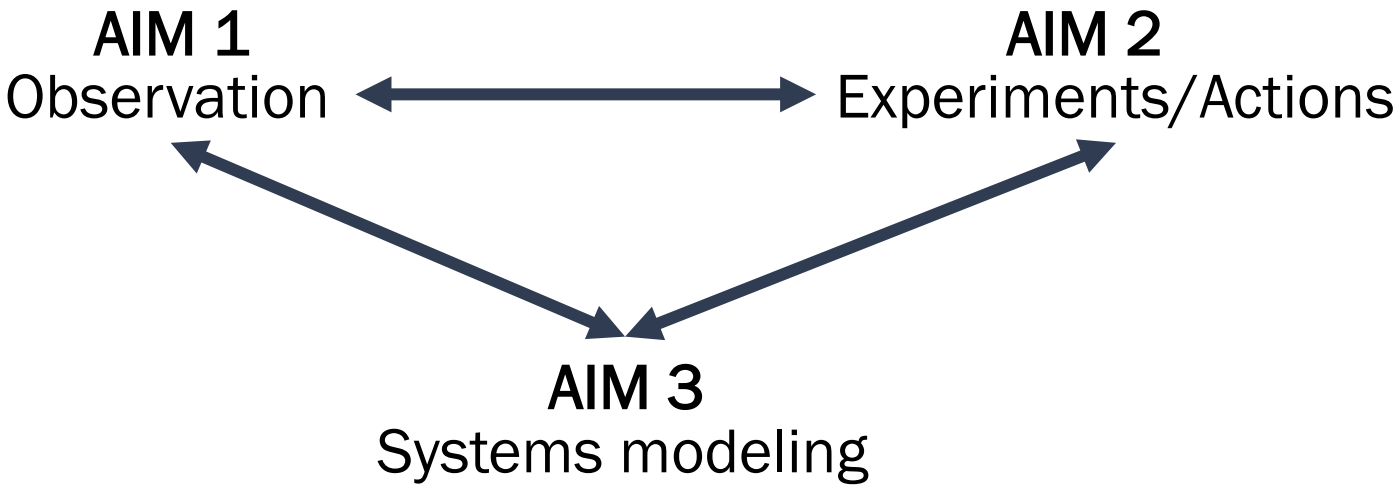
PROJECT AIMS

AIM 1	Identify city and neighborhood drivers of health and health inequalities among and within cities
AIM 2	Evaluate health, environmental and equity impact of policies and interventions
AIM 3	Employ systems-thinking and simulation models to evaluate urban-health-environment links and plausible policy impacts
AIM 4	Engage the scientific community, the public and policy makers to disseminate and translate findings

Lessons from Latin America about what makes cities healthier, equitable and environmentally sustainable

SALURBAL AIMS 1, 2, AND 3

EVIDENCE FOR URBAN HEALTH



TWO THEMATIC AREAS FOR SYSTEMS APPROACHES

- Feedbacks
- Dependencies
- Health-environment link

- Global & regional policy relevance
- Team experience

AIM 4: POLICY MAKER ENGAGEMENT

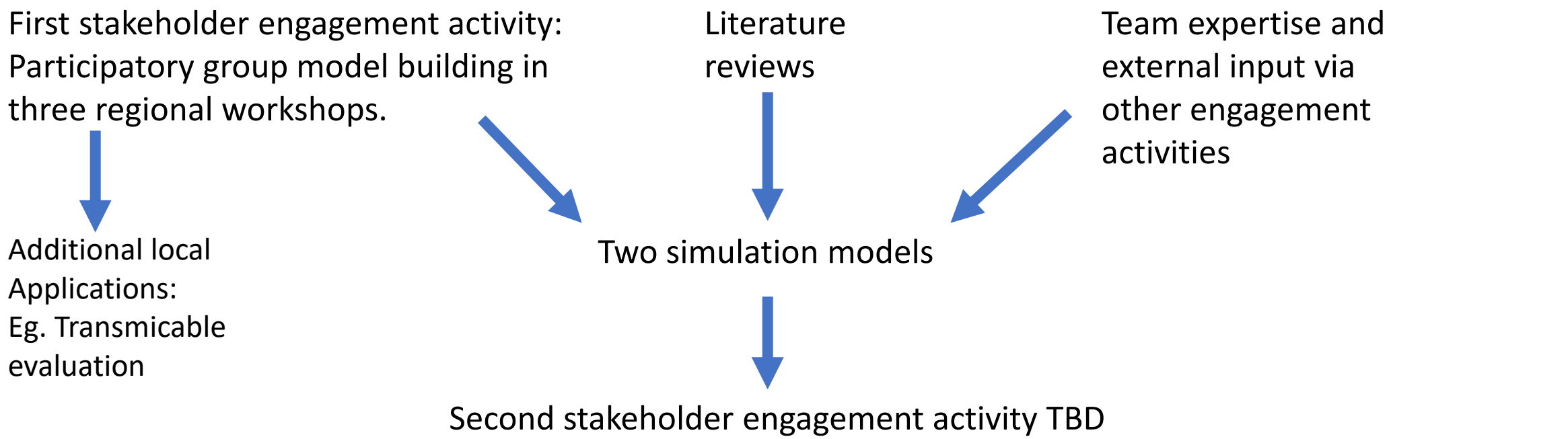
Ensure policy relevance of our research to high-priority policy issues regionally and globally through mapping, surveillance, and engaging stakeholders in research and evaluation processes.

Disseminate our findings broadly to the scientific community, the public, and policy actors.

Promote new ways of thinking among policy actors and other stakeholders about drivers of urban health and the types of policies and interventions that could improve health and sustainability in cities.

Advocate for and support the **translation of research findings into policies and interventions**.

Policy maker engagement in the systems aim



Overview of today

- Participatory group model building in SALURBAL-Brent Langellier

- Two policy- oriented agent based models: transport and food- Brent Langellier

- Local policy-maker engagement using participatory group model building –Felipe Montes

SALURBAL Systems Thinking Aim

- To employ systems thinking and formal systems simulation models to (1) better understand the **dynamic relations** between the urban environment, health and environmental sustainability; and (2) **identify the plausible impacts** of selected policies **under varying conditions** and **dynamic relations**

Urban systems are complex

- Policymakers generally recognize that cities are complex systems
- Aspects of complexity relevant for policy
  - Feedback loops – bi-directional relationships with two or more variables
  - Interdependence – outcomes of one person are often not independent of outcomes in others
  - Change over time – effect of a policy may depend on the state of a system
- Need common tools and terminology for describing complex systems and understanding their influence

Policy stakeholder engagement – group model building

- Three workshops with 62 stakeholders
- Healthy eating and mobility/transport in Latin
  American cities
- Objectives:
  - Engage policy stakeholders in SALURBAL
  - Introduce systems thinking
  - Describe structure and function of complex systems
  - Explore multi-sector influences
  - Identify policy solutions

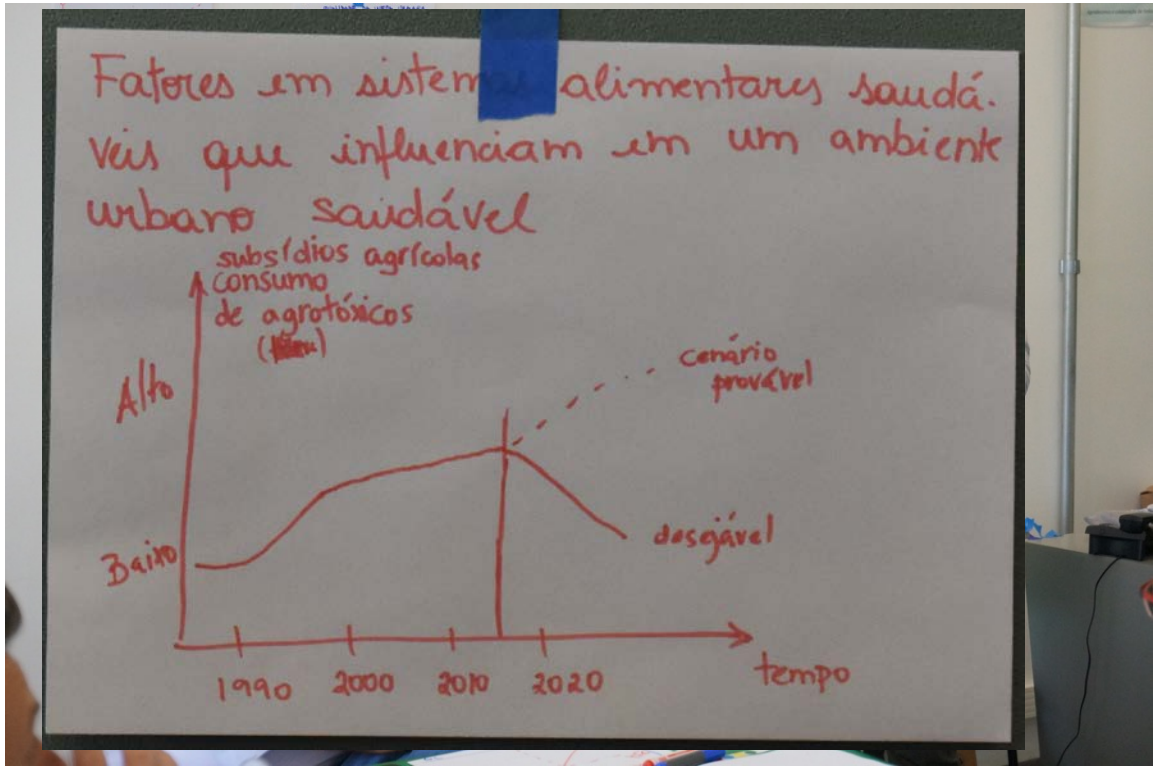
Sample Workshop Agenda
Activity
Hopes & Fears
Graphs Over Time
Dots
Causal Loop Diagramming
Presentations
Model synthesis
Action Ideas
Dots

Three workshops implemented: Lima, São Paulo and Antigua

Scripted Activities – Graphs Over Time

Purpose: Engages participants in framing a problem, initiating mapping, generating variables, and ranking priority of variables as preparation for creating causal loop diagrams.

Sample prompt: Think of a factor that influences healthy eating in cities. Draw a trajectory that shows how you hope that factor changes over time and how you fear it will change over time.

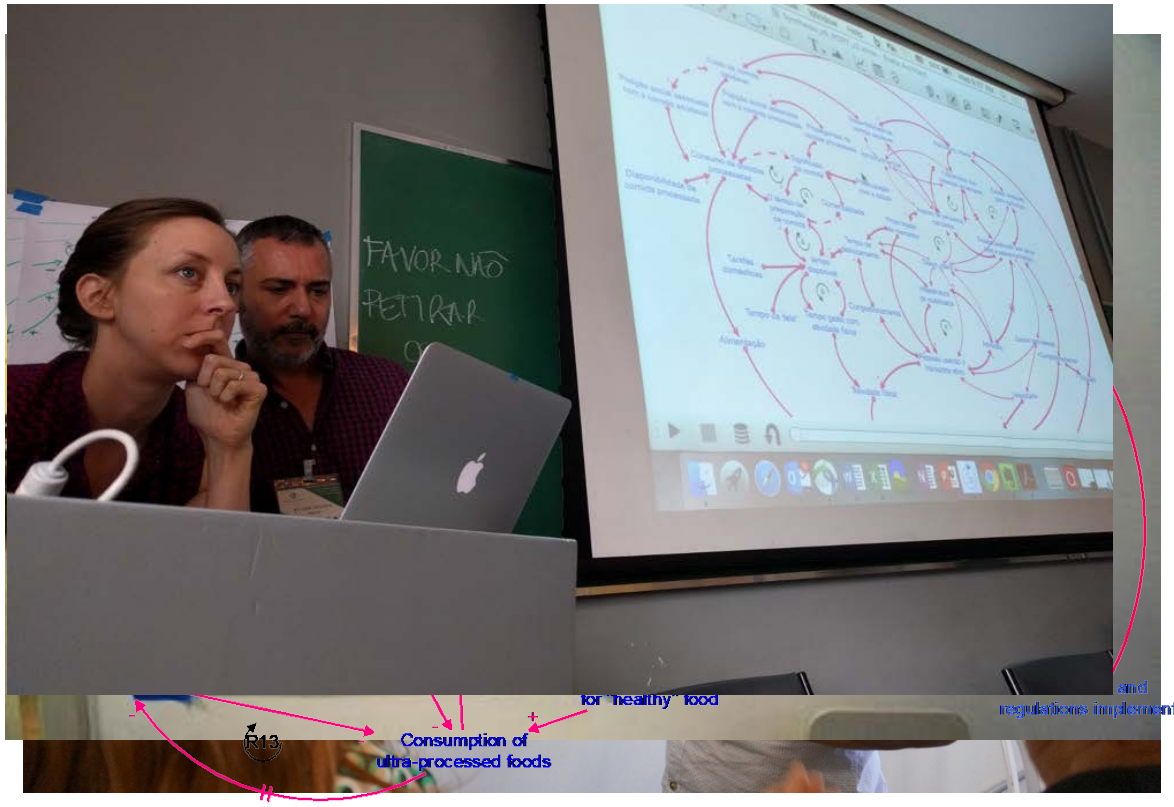


Scripted Activities – Causal Loop Diagrams

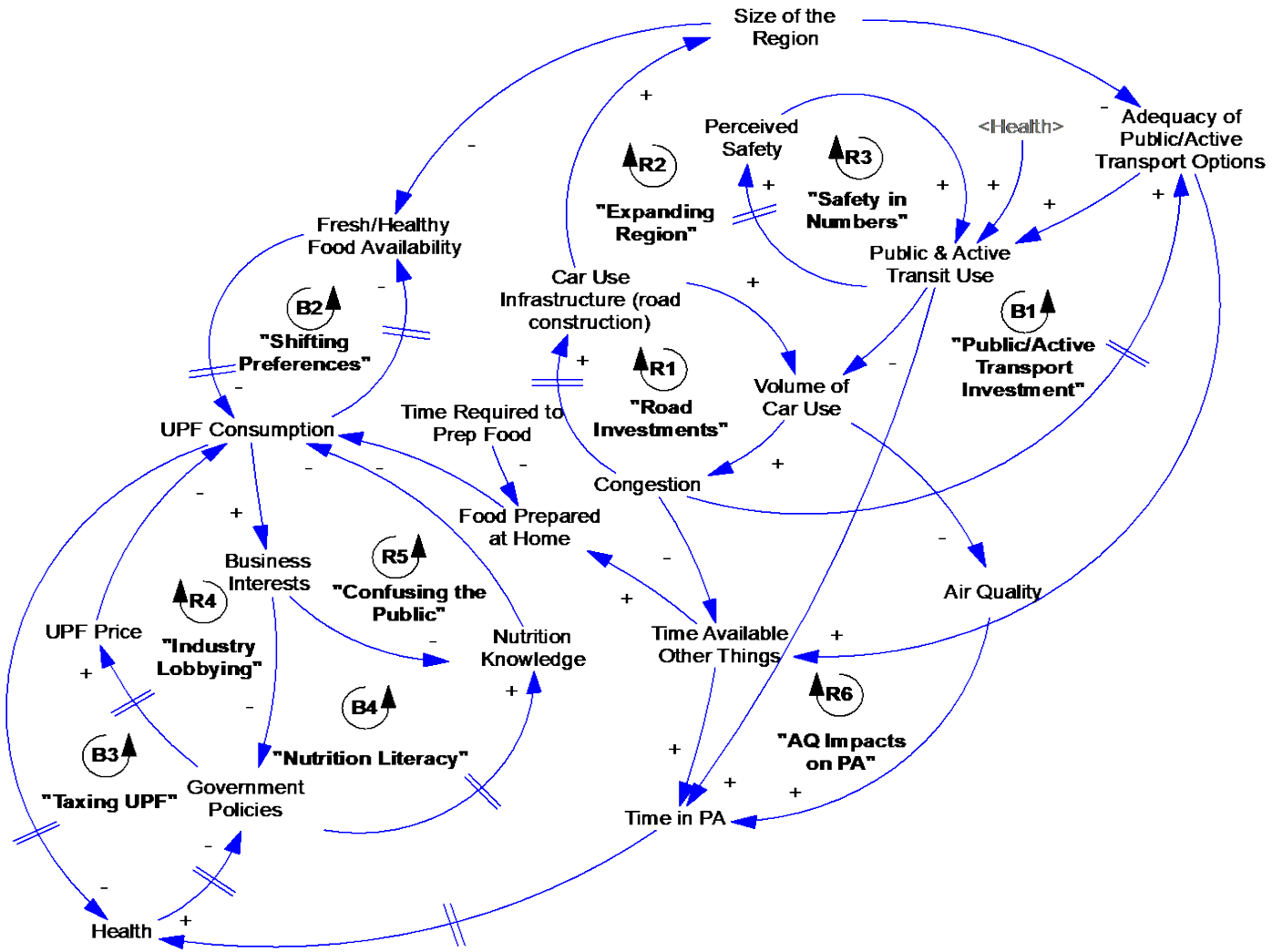
Purpose: Create and synthesize causal loop diagrams

1. Small groups
2. Present back to larger group
3. Synthesis & critique

Prompt: “Build a causal loop diagram that explains a hypothesis of the food system/transportation system factors that influence a healthy urban environment.”

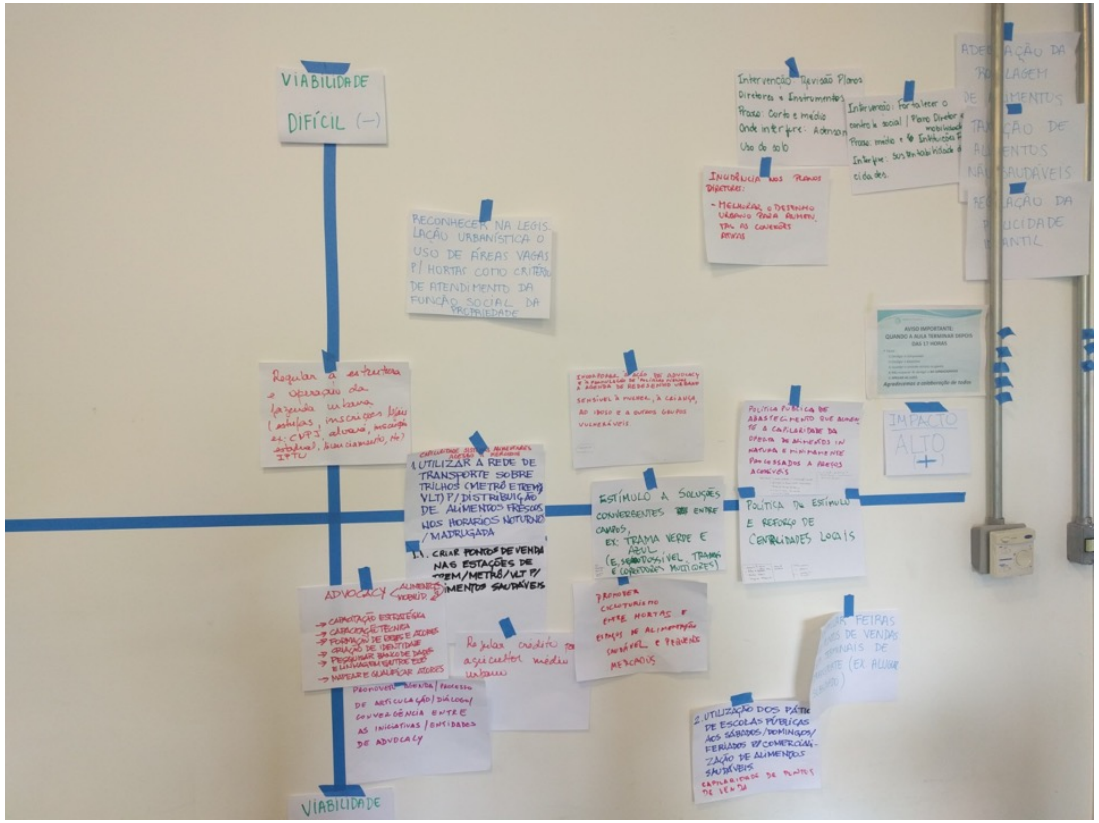


Synthesis model



Scripted Activities – Action Ideas

Purpose: To generate action ideas -- policies and other changes to the system -- to improve health outcomes, rank them by ease/impact, and prioritize them for action.



Action ideas

Hard to Do, Low Impact	Hard to Do, High Impact
• Creation of operation regulations for urban farms	• Incorporating advocacy into public policy agendas for urban redesign • Revising city master plans and design instruments • Using integrated infrastructure to distribute fresh foods • Urban legislation recognizing use of vacant areas for urban gardens • Supply-side public policies to increase capillarity of healthy food distribution • Strengthen social control (revising master plans for sustainable cities) • Urban design incentives • Convergent solutions across fields
Easy to Do, Low Impact	**Easy to Do, High Impact**
• Ultra-processed food regulations	• Promoting cycling tours between vegetable gardens, small markets, and healthy eating places • Microcredit and credit assistance for medium-sized farms • Organizing weekend markets at public schools to sell healthy foods • Markets and selling points on transportation lines • Advocacy for food and transport • Advocacy that articulates goals to bring together different initiatives and areas

Agent-based models of urban policy

- Ultra-processed food purchasing policy
- Urban transport and mobility policy

Ultra processed food purchasing

Questions –

1. How can food labeling, advertising, and taxes be most effectively combined to reduce purchasing of ultra-processed food in Latin American cities?
2. Do policy effects vary across different population segments (high versus low income and educational attainment)?

Ultra processed food purchasing

Design

- Adult females living in urban areas in Latin America that are the primary food purchasers in their households
- Population demographics and UPF purchasing based on data from Mexico City
- Agents are organized in a social network – ties are more likely among agents with similar age, income, education

Ultra processed food purchasing

- UPF purchasing updates in response to:
  - Price, labeling, and advertising policies
  - Social norms and social influence
- Policy effects based on:
  - Own price elasticities from LA countries – price changes relative to income
  - Advertising – advertising elasticity
  - Labeling – based on Chilean policy evaluation

Ultra processed food purchasing

Utility of model

- Tax and labeling policies under consideration in several countries
- Policies effects likely to vary in different contexts, levels, and combinations
- Industry will respond with advertisements
- Development of modeling infrastructure
  - Change parameters (environment, tax levels) as new policies are considered
  - Urban food policy lab
  - Build on this model (e.g., food choices)

Urban transport and mobility policy

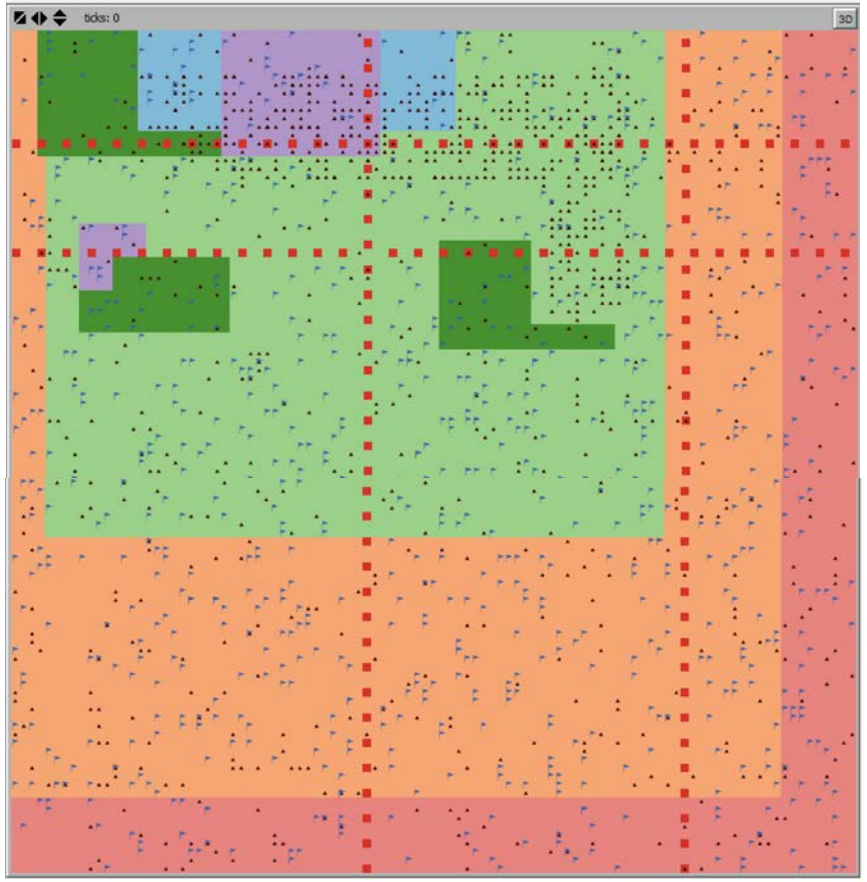
Purpose

- Commuter decision-making and behavior in a Bogota-inspired city
- Five commute modes: car, motorbike, bus, bus rapid transit (BRT), bicycle, walking
- Explore the impact of public transportation-oriented policies, taxation, and interventions that aim to improve personal safety from crime, on mode share, physical activity and air pollution

Urban transport and mobility policy

Design

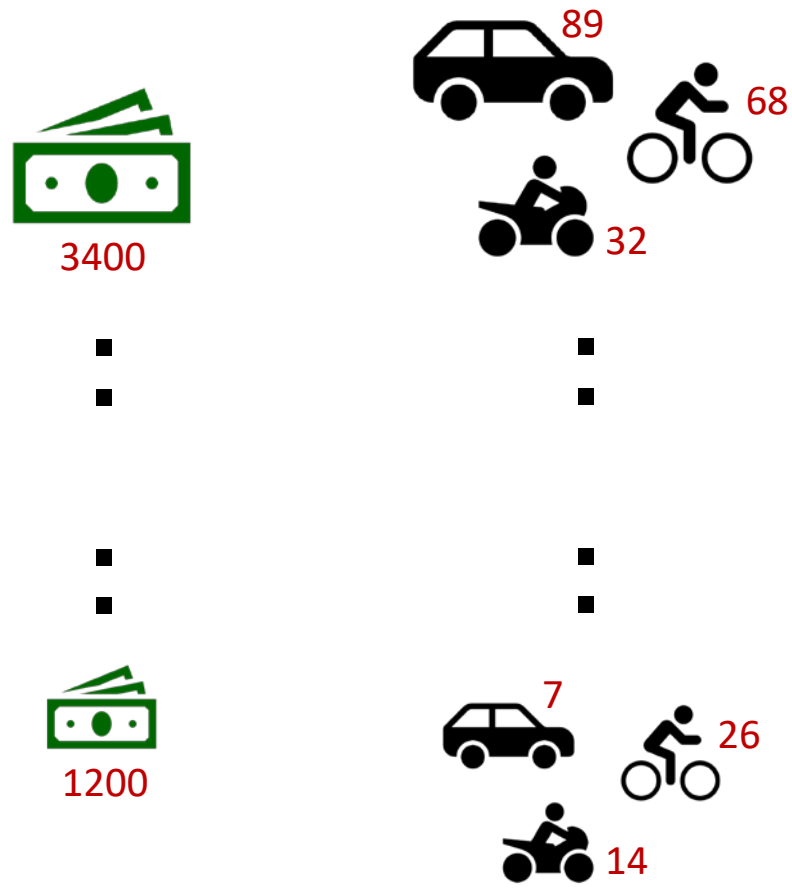
- Spatially explicit model – virtual city with realistic socioeconomic segregation
- Agents make a daily commute between their home and workplace



Urban transport and mobility policy

Design

- Car, motorcycle, and bicycle ownership vary by income
- Bus and BRT stops are distributed throughout the city based
- Each mode assigned a safety value based on available crime data
- Population and environment informed by Bogota data



2016 eCAF Survey

Urban transport and mobility policy

Rules

- Daily commute to work decision
  - Eliminate modes they don’t have access to
  - Evaluate the perceived safety of each mode and avoid modes considered too unsafe
  - Evaluate the utility of each mode and choose the mode with the highest utility
- Choose the mode with the highest utility
  - Relative cost – e.g., fares, fuel, parking
  - Estimated travel time
    - Own past travel time using mode
    - Friends’ past travel time

Urban transport and mobility policy

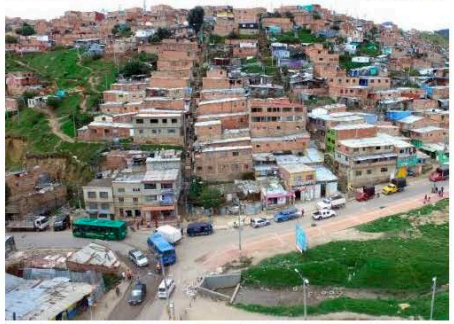
Utility of model

- Mode choice model that includes active transport, safety, and social equity
- Can be linked to other outcomes (e.g., PM 2.5, energy expenditure)
- Explore policies related to transport (e.g., stop density, fare cost), crime, social equity

Case study
TRUST: *Transformaciones Urbanas y Salud: El caso de TransMiCable en* Bogotá

TransMiCable

Cable car intervention
Bogota, Colombia



- Inaugurated on December 2018
- Length 3.43 Km and 163 cabins
- 21,000 passengers per day
- In the first year: 7.501.250 passangers in 163 cabins in the 4 stations

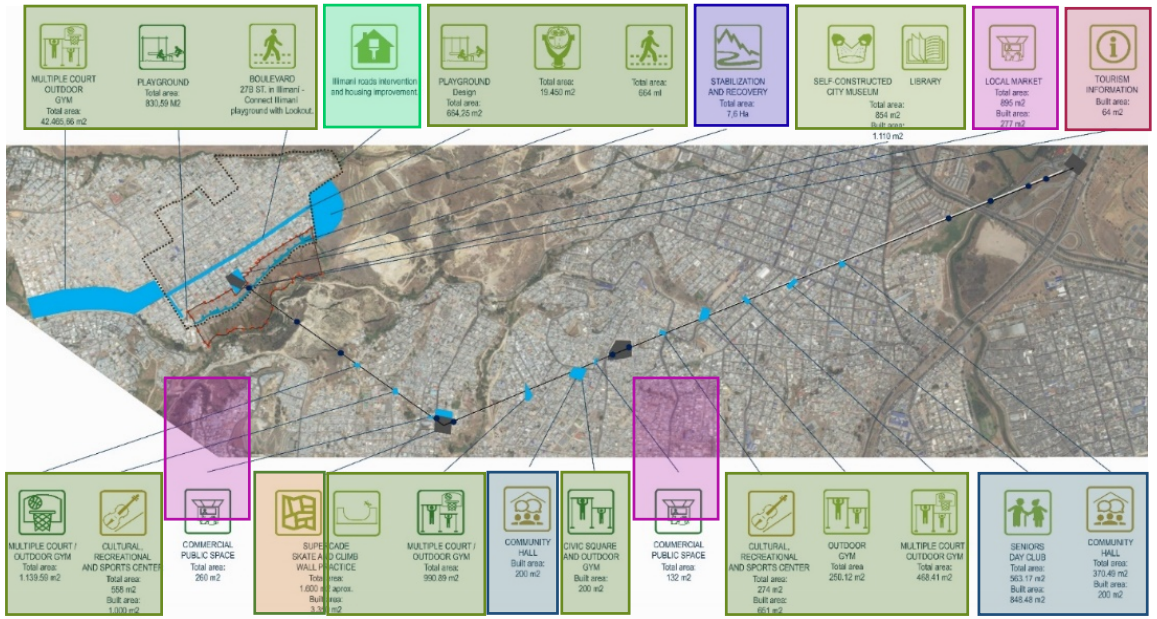
Sarmiento OL, Higuera-Mendieta D, Wilches-Mogollon MA, Guzman LA, Rodríguez DA, Morales R, Méndez D, Bedoya C, Linares-Vásquez M, Arévalo MI, Martínez-Herrera E, Montes F, Meisel JD, Useche AF, García E, Triana CA, Medaglia AL, Hessel P, Arellana J, Moncada C, King AC and Diez Roux AV (2020) Urban Transformations and Health: Methods for TrUST—a Natural Experiment Evaluating the Impacts of a Mass Transit Cable Car in Bogotá, Colombia. *Front. Public Health* 8:64. doi: 10.3389/fpubh.2020.00064

Social urbanism: 16 urban projects

FACILITIES FOR RECREATION AND CULTURAL ACTIVITIES

PHYSICAL IMPROVEMENTS TO HOMES

REDUCTION OF GEOMORPHOLOGICAL HAZARDS



TOURISM OFFICE

LOCAL MARKET VENUES

CITIZEN SERVICE OFFICE

COMMUNITY CENTERS

OBJECTIVES

To assess the effect of TransMiCable's implementation on:

- The **environmental and social determinants of health** (micro-environment pollution, physical environment perceptions, access to recreational and cultural facilities, transport accessibility, employment, social capital, and leisure time)
- **Physical activity** (leisure and transport physical activity)
- **Health outcomes** (health-related quality of life, respiratory diseases, and homicides)

To use citizen science methods to **identify, prioritize, and communicate** the most salient negative and positive features impacting health and quality of life in TransMiCable's area,

To facilitate a **consensus and advocacy-building change process** among community members, policymakers, and academic researchers.

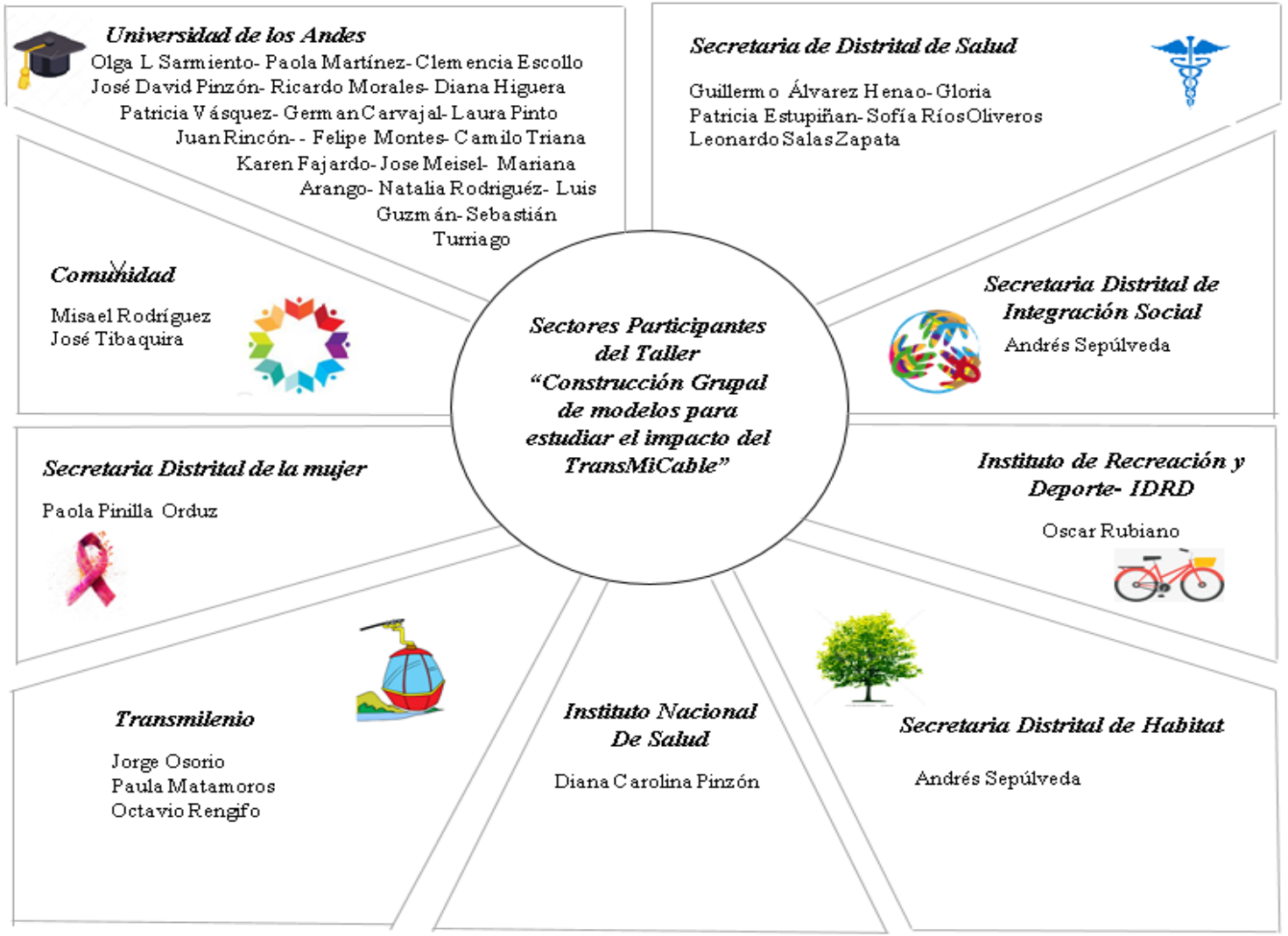
Co-creation of a conceptual framework - 31 stakeholders

- Bring **diverse stakeholders** into the evaluation of TransMicable as part of the SALURBAL project
- Gain experience in **application of systems approaches in the health evaluation** of the implementation of TransMicable
- To develop **causal loop diagrams to complement the conceptual model** and to identify and **explore policy alternatives** within the TransMicable evaluation
- **Participants will provide input** that will help identify and prioritize research questions and practice implications to be pursued by the TransMicable project using systems modeling in the future

Group Model Building

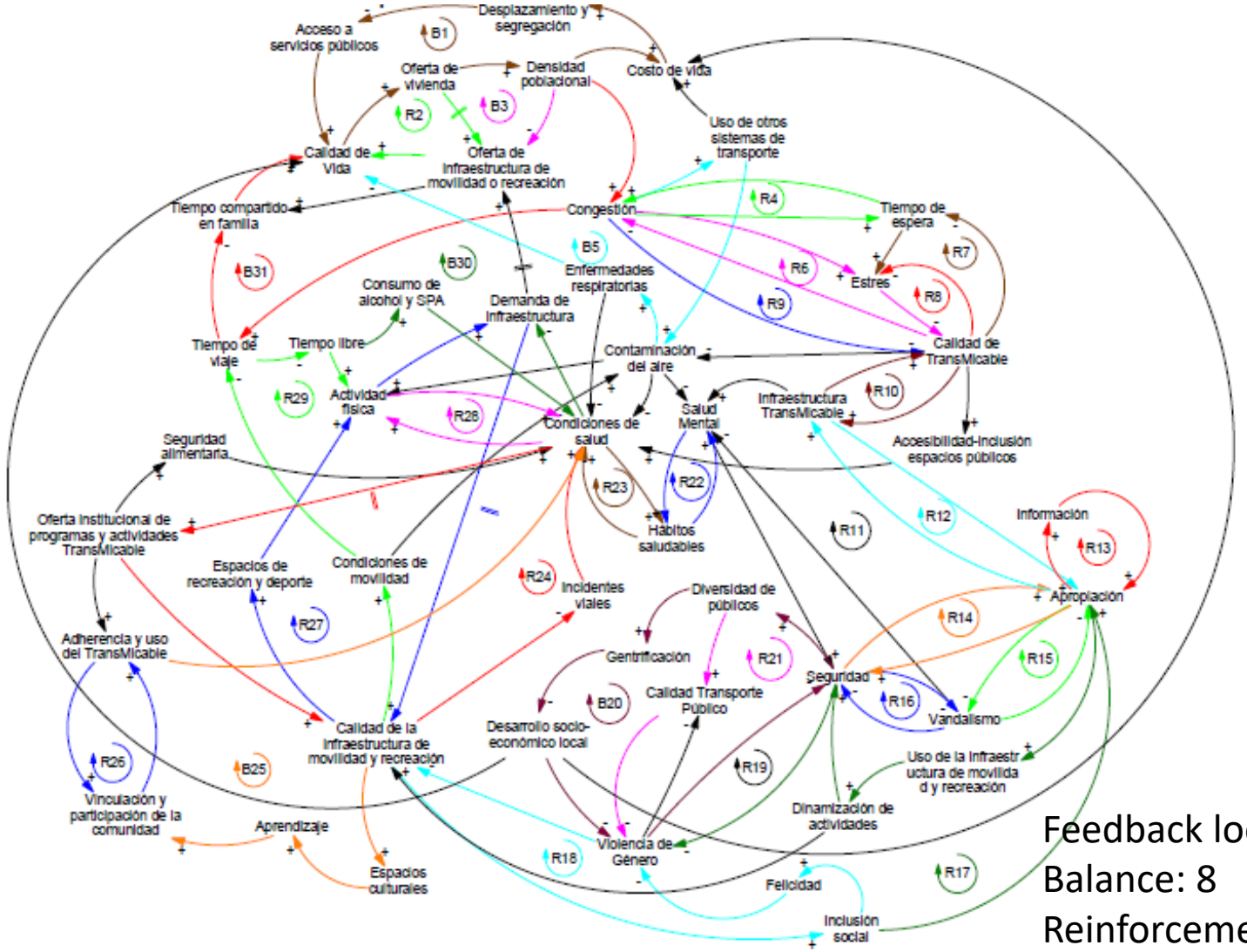
- One day worshop: 9 sectors & 31 participants
  - Academia
  - Government
  - Civil Society

- 4 intersectorial groups to build the Causal Loop Diagrams
- Participants received the report and the materials of the workshop



Synthesized Causal Loop Diagram

- Result of an **iterative process** of variability elicitation, structure building, synthesis, and refinement.
- These diagrams are **qualitative models** that embody and convey a **set of hypotheses** concerning the underlying structures that **drive system behaviors.**
- These hypotheses can therefore be **accepted, challenged, revised, or refined**.
- There are different **feedback loops** identified in the causal loop diagram.

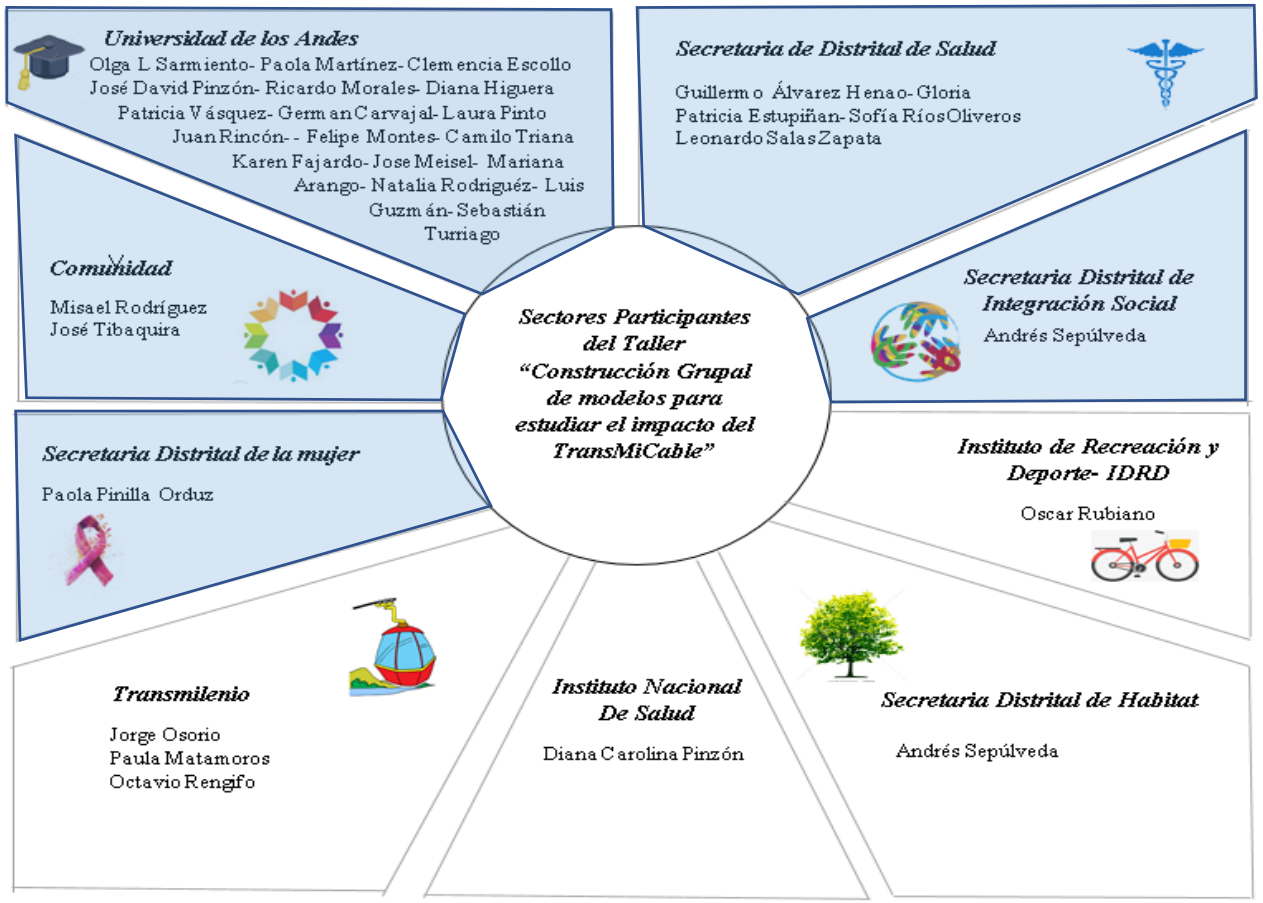


Feedback loops: 3
Balance: 8
Reinforcement: 2

Post workshop activities

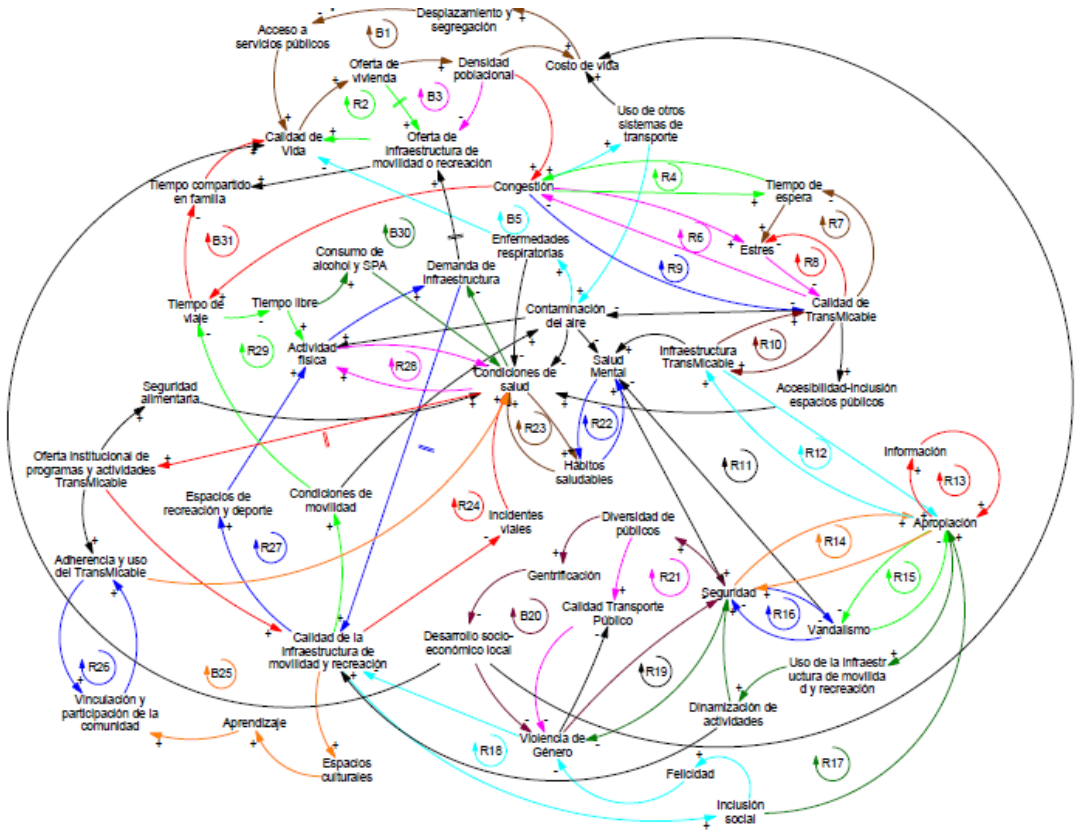
Interviews with stakeholders from 5 sectors were possible:

1) To socialize the causal loop diagram of TransMiCable with the Stakeholders of the workshop
2) shed light on feedback loops depicted in the causal loop diagram;
3) 2) clarify terminology in order to be accurate on the jargon of each discipline and sector.

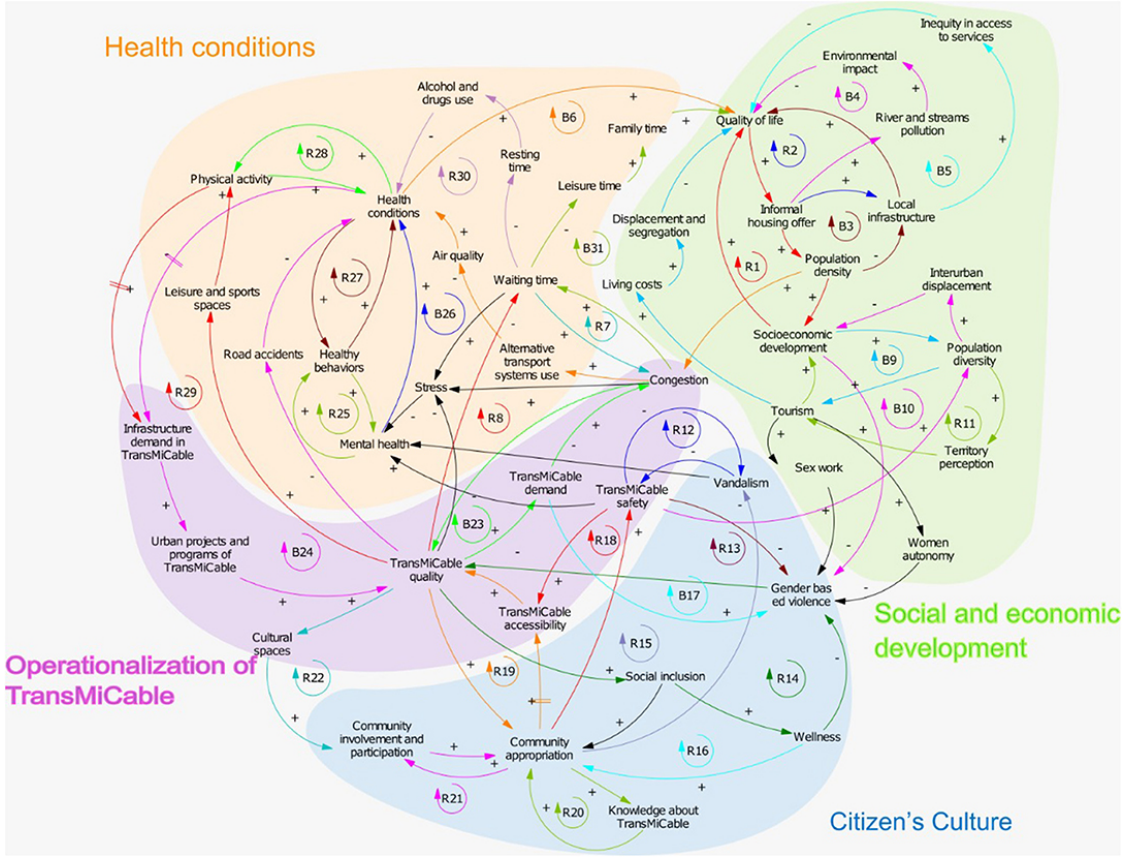


Results of the synthesis

Causal Loop Diagram of the workshop



Updated Causal Loop Diagram



1. Specify terminology (redundant variables with different names)
2. Clarify feedback loops
3. Identify broader constructs

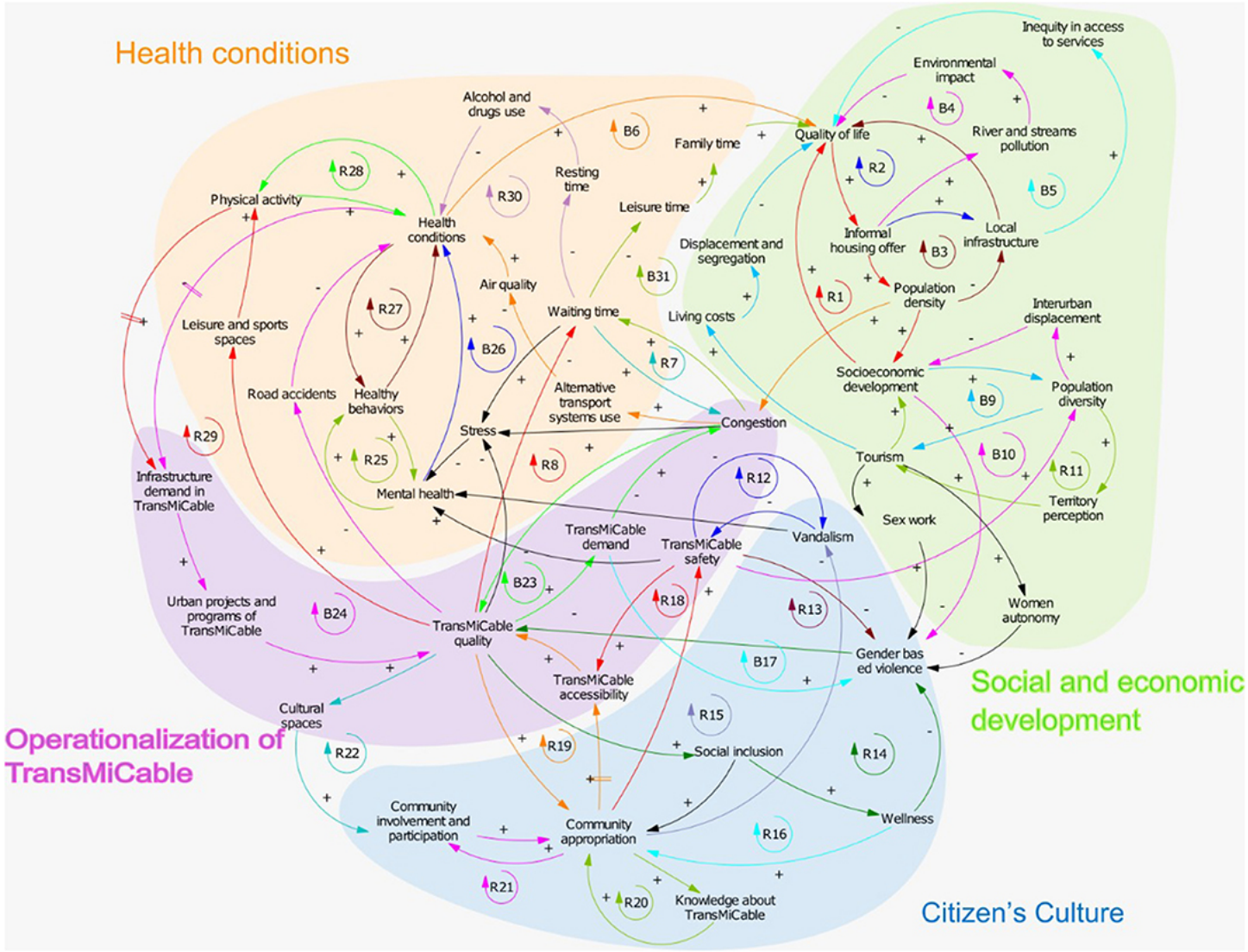
Four domains

Health conditions in which social dynamics favor physical activity promotion and the dynamics of transport that could influence mental health and leisure activities.

Social and economic development in which social dynamics could have an impact on mobility, inter-urban displacement, and quality of life.

Citizen's culture, involving community participation and ownership, and reinforcement of inclusive behaviors that nurture well-being and reduce vandalism and gender-based violence.

Operationalization of TransMiCable, which entails the provision of an efficient service.



Reflections

1. The Causal Loop of TransMiCable was co-created as the **framework for the natural experiment evaluation**

    Four Domains

    a. Socio economic development
    b. Health conditions
    c. TransMiCable Quality
    d. Cultura Ciudadana – Citizen's Culture

2. Stakeholders valued the **socialization and co creation** of a conceptual framework for research and project evaluation.

3. Community reach coordinator of TransMiCable **adopted this conceptual framework.**

4. The new cable will be implemented in the control area.

LAC-URBAN HEALTH

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wellcome