

Potential impacts of policies to reduce purchasing of ultra-processed foods in Latin American cities: an agent-based modeling approach



Diets (like cities!) are complex

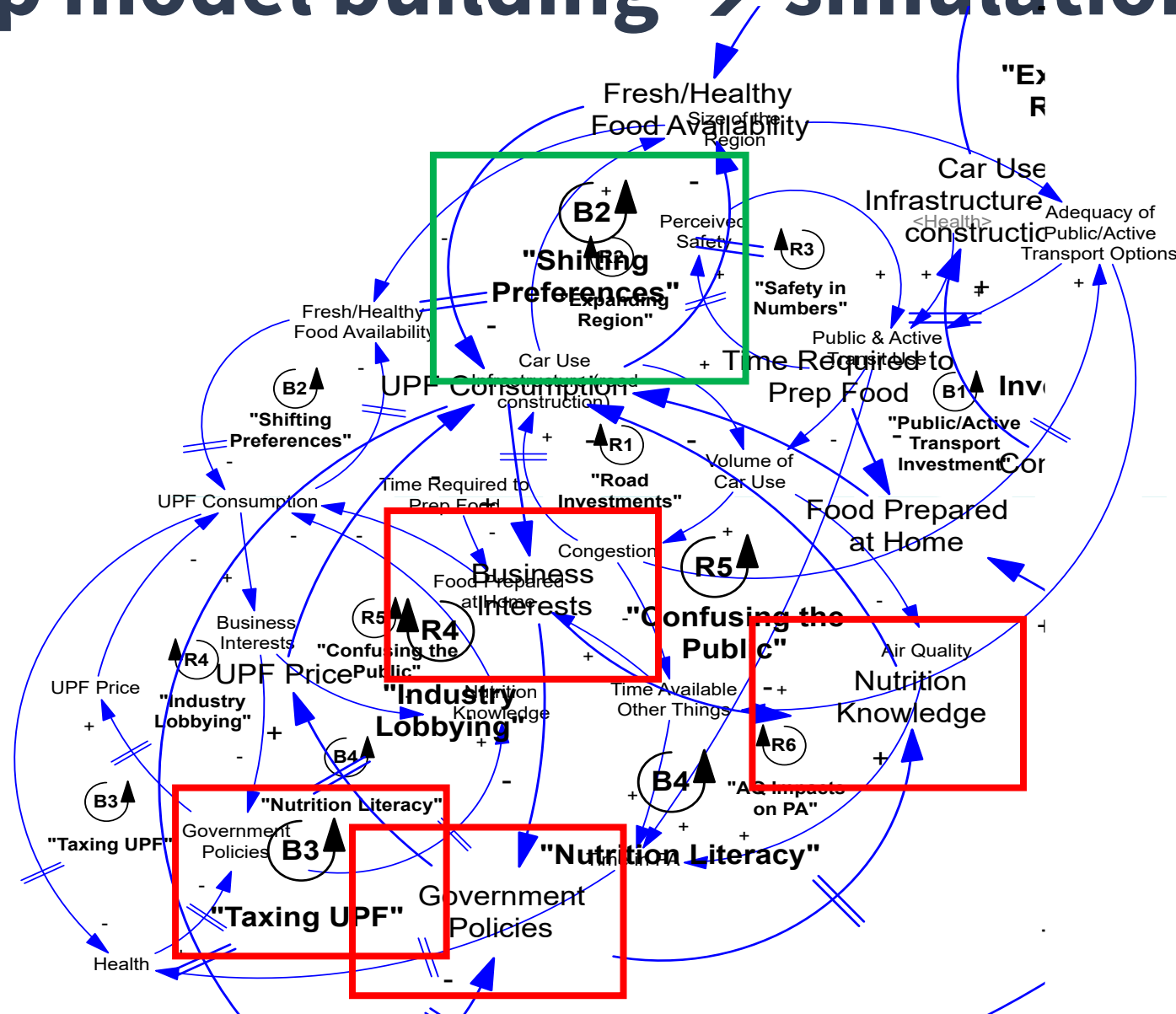
- **Multiple levels of influence**
 - Individual (income, nutrition knowledge)
 - Interpersonal (social influence)
 - Community (food prices, food environment)
 - Policy (price, environment, labeling)
- **Human-environment interactions (community food environment)**
- **Feedback loops**
- **Change over time**
 - Secular trends in price/availability/preferences
 - Change in values (e.g., environmental sustainability)
- **Diets are a complex behavior**

Ultra processed food purchasing

Questions –

1. How can food **labeling**, **advertising**, and **taxes** be used to reduce purchasing of UPF in Latin American cities?
2. Do policy effects vary across different population segments (high versus low income and educational attainment)?
3. Do equity effects vary by countries' level of social transition in UPF consumption

Group model building → simulation model



Model design -- agents

- **1,000 agents -- adult females that are the primary food purchasers in their households**
- **Outcome: Weekly UPF purchasing in kCal**
- **Input data from Mexico**
- **Properties: Age, income, educational attainment**

Model design – social network

- Social influence on diet
- Agents are organized in a social network
 - ~5.5 friends per agent (range is 3-50)
- Ties more likely among agents with similar age, income, education

Agent actions: updates to UPF purchasing

- **Social influence and norms:**
 - Follow-the-average mechanism
 - Compare own UPF consumption to:
 - Social network
 - All agents with “like” characteristics
 - If difference exceeds a threshold → adjust
- **Policy effects:**
 - Own price elasticities of UPF
 - Advertising elasticity
 - Label evaluation study in Chile
 - Differs by educational attainment



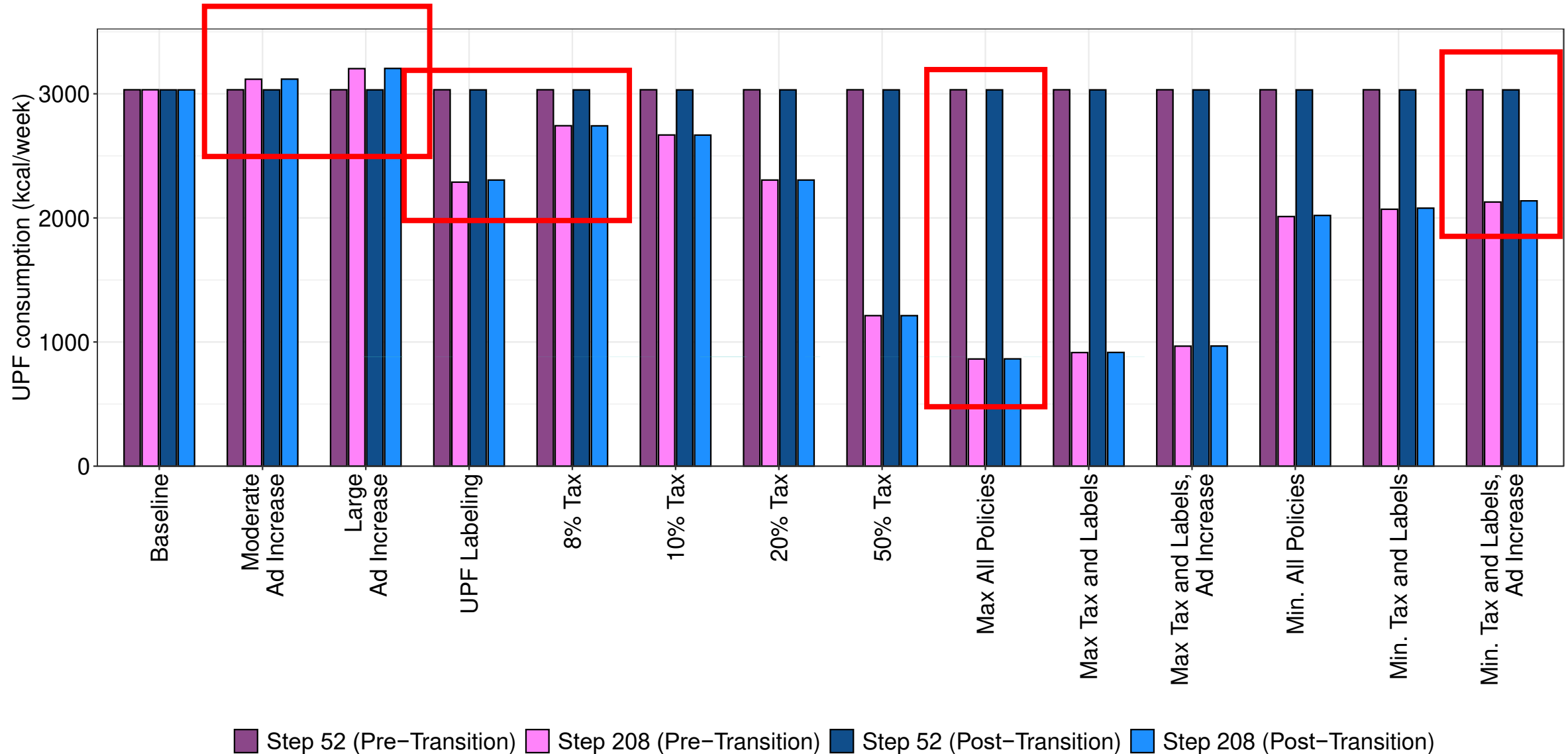
Policy counterfactuals

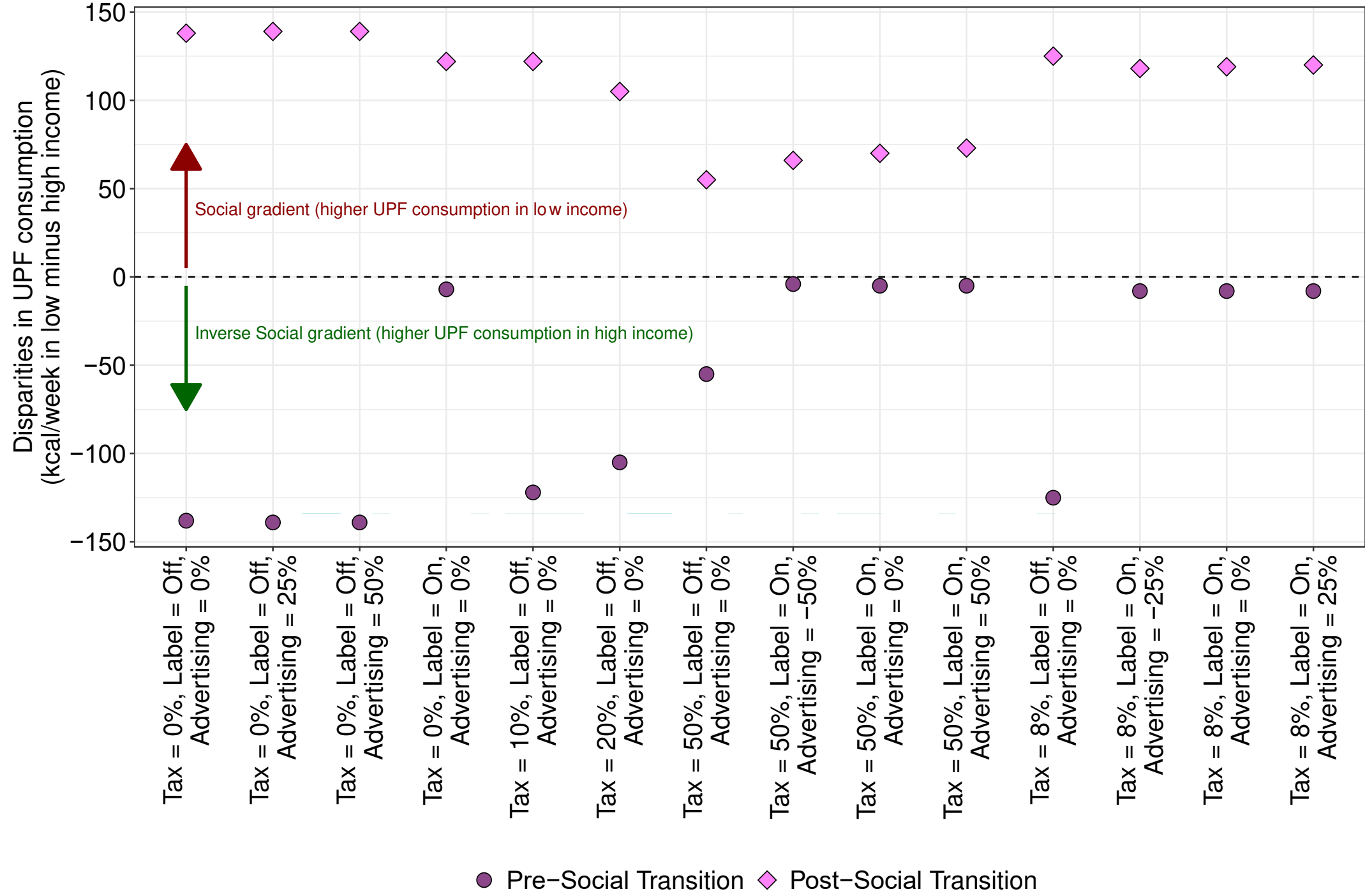
- Tax increases to UPF price
 - 8% (actual junk food tax in Mexico)
 - 20% (beverage tax level considered in Mexico but not passed)
 - 50% (make believe “high tax” scenario)
- Nutrition labeling is on/off
- Advertising
 - 25% or 50% **increase** (industry ad campaign)
 - 25% or 50% **decrease** (ad restriction policy)

Baseline scenarios

- Two “baseline” (no policy) scenarios
- Social transition in UPF
 - Pre-transition -- UPF purchasing is higher among high-income
 - 3,446 vs 2,966 kcal per week
 - Similar to Mexico
 - Post-transition – UPF purchasing is higher among low-income population
 - 2,620 vs 3,100 kcal per week
 - Similar to Chile

Results





Conclusions & next steps

- **Started (relatively simple)**
 - Tax and labeling policies under consideration in several countries
 - Policy effects vary in different contexts
- **Development of modeling infrastructure**
 - Urban food policy lab
 - Change parameters (environment, tax levels) as new policies are considered
- **Next iteration**
 - Build on SALURBAL data infrastructure
 - Multiple diet categories
 - Link other outcomes (health, environmental sustainability)

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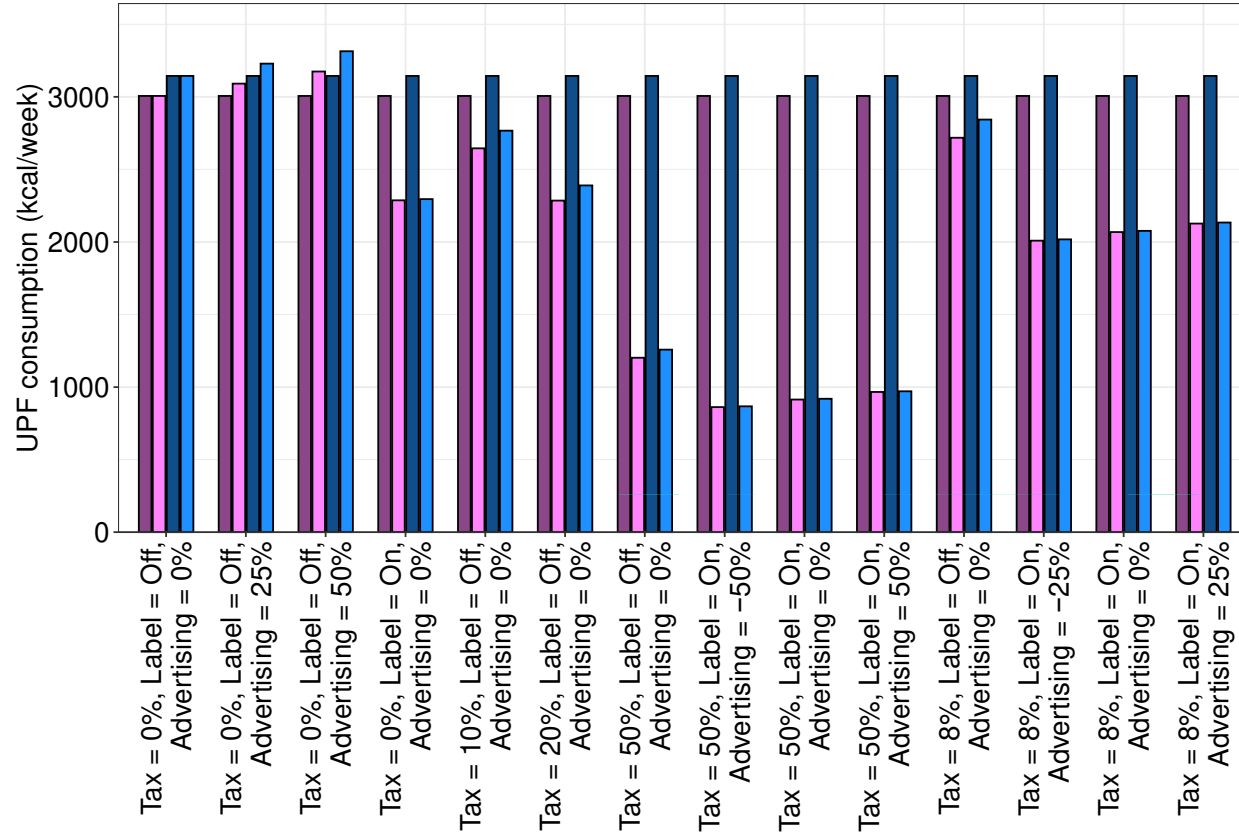
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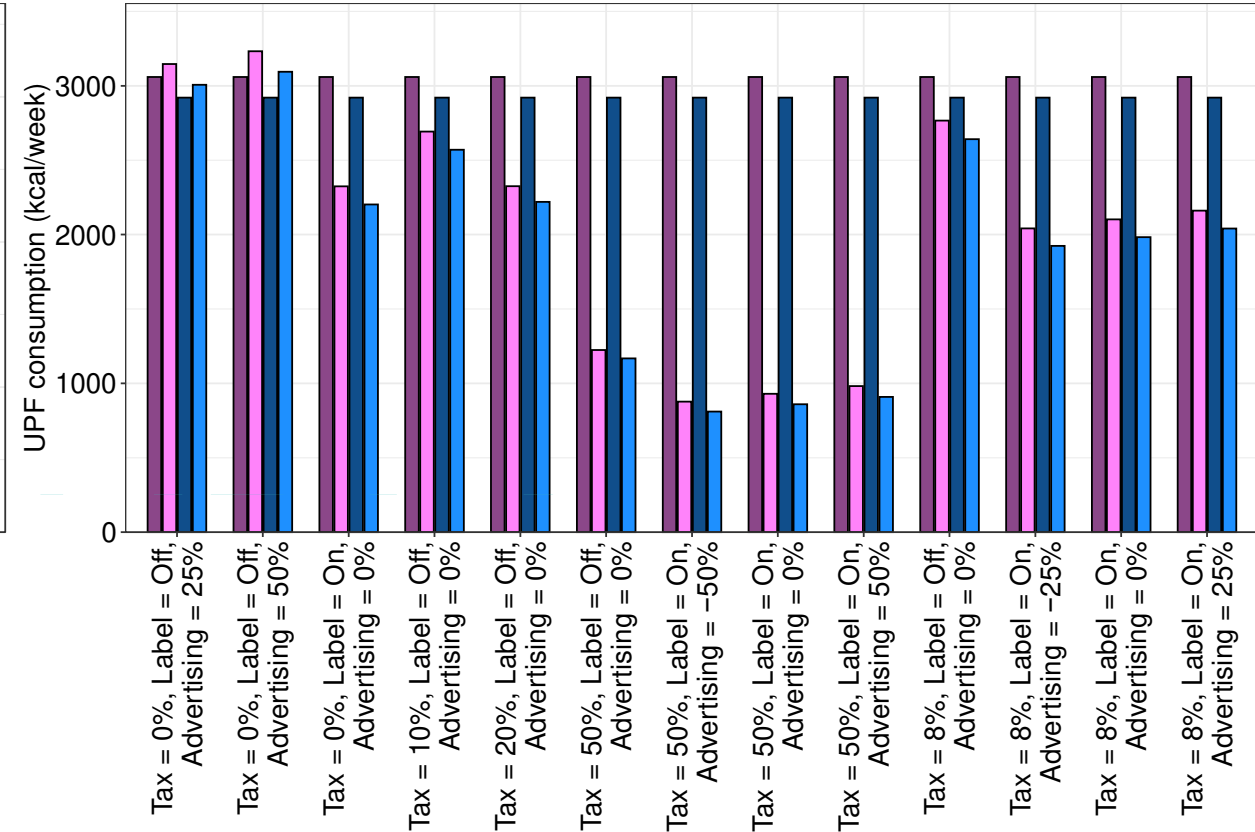


Results

Pre-social transition



Post-social transition



Step 52 (Low Income)
 Step 208 (Low Income)
 Step 52 (High Income)
 Step 208 (High Income)