"Policies for the prevention of obesity and chronic diseases in Latin America".

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Barry M. Popkin Disclosure

NO relevant financial relationships exist in terms of employment, management, consulting, or current membership on any industry-linked advisory committee.
Outline: The whys and consequences

1. Understanding the unique dimensions of recent increased weight gain and underlying drivers
2. Major Global Drivers: Why focus so much on food system and diet shifts
3. Early stages of global, large-scale public health efforts: methodological challenges for evaluations
4. Future strategies and major gaps
1. State of BMI across Latin America

- **BMI** distribution shifting rightward, increasing significantly
  - Age-period cohort work in China showed 8-10 kg increase in weight over a decade and Latin America no similar data but repeated cross-sections shows similar but smaller weight gain.

- Waist circumferences increasing along with BMI

- A critical shift is increasing waist circumferences at the same BMI level with unclear causal mechanisms.

- Mexican-American have higher risks of diabetes at lower BMI levels than non-Hispanic whites.

- Large shift from undernutrition to overweight across all countries, with some critical exceptions
  - Accelerated increase in annualized prevalence of rural overweight status
BMI Increases across Selected Countries at the 95th Centile in Age 30- and 40-year-old Women*

*Based on quantile regression from nationally representative surveys of all countries except China
Popkin, Amer J Clin Nutr: (2010 v 91)
Figure Predicted mean WC (cm) for BMI=25 kg/m$^2$ in Year 2 compared to Year 1 for women and men aged 20-29 years in the US (by race/ethnicity), England, Mexico, and China.

A. Women

B. Men

*Bonferroni Corrected t-test significant at <.05 level.

*\(p<0.05\), compares diabetes prevalence among non-Hispanic blacks and Mexican-Americans to non-Hispanic white referent group within BMI categories and within survey years.

Source: Albrecht, Mayer-Davis, Popkin (2017). Diabetes/Metabolism Research and Reviews 33
Latin America and the Caribbean: Recent Prevalence and annualized change of undernutrition and overweight burden (percentage point prevalence change per year)

- % Children aged 0-4 who are wasted: 1.97
- % Children aged 0-4 who are stunted: 16.60
- % Children aged 0-4 who are overweight or obese: 6.62
- % Women who are overweight or obese: 56.11

Annualized Change:
- Annualized Change in wasted children aged 0-4: -0.22
- Annualized Change in stunted children aged 0-4: -0.79
- Annualized Change in children aged 0-4 who are overweight or obese: -0.15
- Annualized Change in Women who are overweight or obese: [VALUE]
Figure 1. The global double burden of malnutrition in low- and middle-income countries based on 1990s and 2010s based only on weight and height measures* (based on UNICEF, WHO, World Bank, and NCD-RisC estimates supplemented with selected DHS and other country direct measures)

1a. 1990s double burden countries according to weight/height data
1b. 2010s double burden countries according to weight/height data

* Double burden of malnutrition (DBM) = at least 1 child, adolescent, or adult in household with severe levels of wasting/stunting/thinness and 1 with overweight/obesity (shown at 20%, 30%, or 40% overweight prevalence)
Figure 1. The global double burden of malnutrition based on two alternate measures for all countries using the most recent data for low- and middle-income countries (based on UNICEF, WHO, World Bank, and Institute for Health Metrics and Evaluation estimates)

a. Current Double burden countries according to weight/height data: at least 1 wasted/stunted/thin and 1 overweight/obese child, adolescent, or adult in household

b. Double burden countries (anemic/wasted/stunted and overweight/obese in household) in most recent survey year, based on 20%, 30%, and 40% overweight/obesity cutoffs

Criteria, any two: child with wasting ≥15%, stunting ≥30%, wasting and stunting both ≥35%, or overweight ≥15%; woman with overweight ≥40% or thinness ≥20%

Criteria, any 2: Child with wasting ≥15%, stunting ≥30%, wasting and stunting both ≥35%, overweight ≥15%, and/or severe anemia ≥40%; woman with overweight ≥40%, thinness ≥20%, and/or severe anemia ≥40%

Not for use or quotation until published Popkin et al Lancet 2019

Double burden at:

- 20% overweight prevalence
- 30% overweight prevalence
- 40% overweight prevalence
- No double burden
- High-income countries

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Major direct drivers: Role of our history

Core biochemical and physiologic processes have been preserved from those who appeared in Africa between 100,000 and 50,000 years ago.

### Mismatch: Biology, which has evolved over the millennia, clashes with modern technology

<table>
<thead>
<tr>
<th>Biology Evolved</th>
<th>Modern Technology</th>
</tr>
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<tbody>
<tr>
<td>Over 100,000 Years</td>
<td>has taken advantage of this biology</td>
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- **Sweet preferences** ➔ Cheap caloric sweeteners, food processing create habituation to sweetness
- **Thirst, hunger/satiety mechanisms not linked** ➔ Caloric beverage revolution
- **Fatty food preference** ➔ Edible oil revolution — high yield oilseeds, cheap removal of oils, modern processed food/restaurant sector
- **Desire to eliminate exertion** ➔ Technology in all phases of work and movement reduce energy expenditure, enhance sedentarianism
- **Snacking Behavior** ➔ Modern food marketing; modern accessibility everywhere of unhealthy nonessential convenient ready-to-eat snack foods
From traditional to modern meals
From traditional to modern snacking
From traditional to modern marketing of food
Mexican SSB distribution by age group
(per-capita kcal/day), Ensanut 2012
What About 100% Fruit Juice

- Hundreds of **short-term**, 1-hour to 1-3 day, studies showing increased levels of various vitamins in fruit juice.
- **Long-term** studies suggest a very different adverse health effect similar to that of SSB’s, with a prominent increased risk of diabetes.
- Rolls, Mattes studies show no reduction in food intake (compensation) when drinking 100% fruit juice.
- Need to build a larger body of data, but some countries now terming 100% fruit juice as very unhealthy; several considering taxing like other SSB’s.

Second major global concern: Snacking

- Snacking is a norm created by the food industry
- The history of snacking — very rare until the mid-1900s except for festivals, royalty, war
- When did snacking become a norm?
  - In the United States really began post-WWII
- Today a different issue:
  - Brazil, Mexico, and the United States are three countries where our studies show >22% of kcal come from snacks, increasingly highly processed foods and beverages
- Increasingly refined carbohydrate and sugary snacks
Total daily per capita junk food sales in Latin America and select countries, 2017

- Mexico: 58 grams
- Chile: 52 grams
- Latin America: 32 grams
- Brazil: 26 grams
- Colombia: 16 grams

Source: Euromonitor International Limited 2018 © All rights reserved
Per capita away-from-home food and nonalcoholic beverage yearly expenditures, 1995–2016

Source: FAOSTAT
Energy Imbalance

Physical activity declines in LMICs represent a significant component of the energy imbalance and increasing physical activity is critical for good health.

- In countries with detailed longitudinal data on all components of physical activity, we find very large declines in METS and any other measure of activity
- **Metabolic Equivalent of Task (MET)**, or simply **metabolic equivalent**, is a physiological measure expressing the energy cost of physical activities
- Slow, downward shift in high-income countries in last half century — starting from much lower METS baseline — and very steep decline in LMICs
- See review across a number of low-and high-income countries by Ng and Popkin *Obes Rev* 2012
- *Can not offset a sugary beverage or many other high glycemic index foods with activity offsets (e.g 12 oz. (355 mL) soft drink walk 1.5 miles, or run nearly 15 minutes)*
Chinese adults: Met-hours per week of physical activity & hours/week of time in sedentary behavior; measured for 1991-2009 and forecasted for 2010-2030

1991: 399 MET-hr/week

2009: 213 MET-hr/week

by 2020: 200 MET-hr/week

by 2030: 188 MET-hr/week

Source: Ng S.W. & Popkin B.M. Obesity Reviews 13 (8):659-80
The cost of a daily sugary drink

Drinking one 8 oz. (236.5 mL) *soft drink* every day for a year:

- $\approx 100 \text{ calories} \times 365 \text{ days} = 36,500 \text{ calories}$ per year, the energy equivalent of over 10 pounds of fat per year

To avoid weight gain:

- To burn off the calories from an 8 oz. sugary drink, the average person would have to walk 1 mile or run about 10 minutes every day — over 5 full days of running per year!

One 8-oz can soda contains 6 tsp sugar
2. Food system transformation in LAC

Diet changes have occurred parallel to, and in two-way causality with, broad changes in the food system, driven by:

- income increases
- opportunity cost of women’s time to shop & cook
- employment featuring daily commuting away-from-home
- FDI and domestic investment in modern food industry, especially 1990s to present

→ Rapid rise of consumption of convenience foods, a large subset of which are nonessential ultra-processed foods with major role for food marketing.

See Popkin and Riordan(2018). Obesity and the food system transformation in Latin America. *Obesity Reviews* 19
Fresh markets are disappearing, being replaced by convenience stores and supermarkets

- In 1990 in Latin America, 15-20% of food was sold in supermarkets
- In 2000: 60% of the average population share.
  - They are becoming the main buyers in the supply chains for processed foods
- Top 5 chains control two-thirds of the supermarket sector in Latin America (Wal-Mart, Carrefour, Ahold)
- Similar trend underway in Asia, urban Africa at much more rapid paces

See Popkin and Riordan(2018). Obesity and the food system transformation in Latin America. *Obesity Reviews* 19
Away-from-home eating: less understanding of details on consumption

- Rapid rise of fast-food chains, selling...
  - mainly high-fat/salt/sugar meals & snacks
  - with excessive refined carbohydrates
Per capita yearly away-from-home food and nonalcoholic beverage expenditures, 1995-2017

Source: Euromonitor International Limited 2018 © All rights reserved
3. Early Stages of large-scale Regulatory options
3. What We Thought We Should Do: Our Initial Toolkit

- Latin America is leading the way in demonstrating and initiating major large scale food regulatory options to reduce intake ultra-processed foods
  - **Fiscal Policy: Taxation** of unhealthy beverages and foods: many countries sugary beverages, junk food (Mexico, now 39 countries). Presented last SLAN in detail
  - **Marketing regulation:** Chile leading the way. Wed at SLAN
  - **Front-of-the-package profiling**—best combined with marketing, taxation, no claims, and
  - **Public institution** healthy eating (schools, hospitals, etc). Ideal to link to **nutrition profiling model** like with Chile. The most innovative model—the Brazil law to require local food purchases (30%), real food purchases (another 40%) lacks an evaluation. But no evaluation yet of effects on diet or small farmers.
Mexico: SSB tax

Findings:

- On average, SSB purchases were 6% lower (-12ml/cap/d) while purchases of untaxed beverages (mainly water) were 4% higher compared to counterfactual in 2014
- Increased reduction in year 2
- Larger decline among low SES households and high consumers

Mexico: Junk food tax — bigger reach, potentially larger impact as larger proportion of food expenditures and also reduced unhealthy taxed food purchases

8% tax on non-basic foods (subject if >275kcal/100g)

- salty snacks
- confectionary
- chocolates
- flans
- sweetened fruit or vegetables
- peanut or hazelnut butter
- milk candies
- ice-cream if energy dense
- grain-based foods
  (all except: tortilla, pasta, plain bread, flour, baby cereals)

Missing foods

- Not collected in Nielsen:
  - Most of unpackaged items
  - Confectionary and candies

- Not collected consistently in Nielsen:
  - Bread from bakery
  - Tortillas
  - Chocolates

Sugary drink taxes around the world

**Americas:**
USA (8 local)  
Mexico  
Dominica  
Barbados  
Peru  
Chile  
Bermuda

**Europe:**
United Kingdom  
Ireland  
Norway  
Finland  
Estonia  
Belgium  
France  
Hungary  
Spain (Catalonia)  
Portugal  
St Helena

**Western Pacific:**
Philippines  
Brunei  
Cook Islands  
Fiji  
Palau  
French Polynesia  
Kiribati  
Nauru  
Samoa  
Tonga  
Vanuatu

**Africa, Eastern Mediterranean and Southeast Asia:**
Saudi Arabia  
Bahrain  
United Arab Emirates  
India  
Sri Lanka  
Thailand  
Maldives  
Mauritius  
South Africa

Updated July 2, 2018  
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Sugary drink taxes: Americas

**SEATTLE, WA: 1.75 cents per ounce**
on sugary drinks; exempts diet sodas, milk-based products, & fruit juice.  
*Implemented January 2018*

**SAN FRANCISCO, CA: 1 cent per ounce**
on drinks with added sugar and >25 kcal per 12 oz; applies to syrup and powder concentrates; exempts 100% juice, artificially sweetened beverages, infant formula, milk products, medical drinks, and alcoholic beverages.  
*Implemented July 2017*

**ALBANY, CA: 1 cent per ounce**
on drinks with added caloric sweetener; exempts 100% juice, artificially sweetened beverages, infant formula, milk products, medical drinks, and alcoholic beverages.  
*Implemented April 2017*

**BERKELEY, CA: 1 cent per ounce**
on sweetened drinks; exempts meal-replacement and dairy drinks, diet sodas, 100% fruit juice, and alcohol.  
*Implemented March 2015*

**OAKLAND, CA: 1 cent per ounce**
on drinks with added sugars; exempts 100% juice, artificially sweetened beverages, infant formula, milk products, medical drinks, and alcoholic beverages.  
*Implemented July 2017*

**MEXICO: 1 peso per liter ($0.05)**
on all drinks with added sugar, excluding milks or yogurts.  
*Implemented Jan. 2014*

**PERU: 8% additional tax to 25%**
on drinks with >6 g sugar/100 mL (increase from 17% tax).  
*Implemented May 2018*

**CHILE: 18% ad valorem tax (+ 5%)**
on sugary drinks containing >6.25 g sugar/100 mL; includes all non-alcoholic drinks with added sweeteners; exempts 100% fruit juice and dairy-based beverages;  
*10% ad valorem tax*
on drinks with <6.25 g sugar/100 mL.  
*Implemented Oct. 2014*

**BOULDER, CO: 2 cents per ounce**
on beverages with added sugars or sweeteners.  
*Implemented Jul. 2017*

**PHILADELPHIA, PA: 1.5 cents per ounce**
on sugar- and artificially-sweetened drinks, incl. diet soda.  
*Implemented Jan. 2017*

**NAVAJO NATION: 2% junk food tax**
on "minimal-to-no nutritional value food items," including sugar-sweetened beverages.  
*Implemented Apr. 2015*

**BERMUDA: 50% import tax**
on sugar, sugary drinks, candies and dilutables; exempts diet sodas, 100% juice, and diet iced teas.  
*Implementation Oct. 2018*

**DOMINICA: 10% excise tax**
on food and drinks with high sugar content, including soft drinks and energy drinks.  
*Implemented Sept. 2015*

**BARBADOS: 10% excise tax**
on sugary drinks, including carbonated soft drinks, juice drinks, and sports drinks; exempts 100% juice, coconut water, and plain milk.  
*Implemented Aug. 2015*
Chile’s marketing restrictions: critical issue a systematic nutrient profiling model used for many purposes—first full presentation of year 1 results at SLAN --very impactful

First law June 2016

✓ Applies to all foods and beverages
✓ Uses uniform nutrition criteria across categories
✓ Restricts all characters on packages for foods deemed unhealthy
✓ Adds warning logos to packaged foods high in added sodium/sat fat/sugar
✓ No advertising of unhealthy foods when 20%+ of audience is <14y
✓ Includes comprehensive in-school restrictions

New June 2018 law and implementation guidelines

✓ Adds total ban on advertising from 6am to 10pm
✓ Adds warning message to any ads for foods and beverages with warning logos outside this time frame
Mandatory regulation of **broadcast food advertising to children**

* Not showing countries with regulations that apply to only specific/limited products
Countries with voluntary industry self-regulatory schemes

Not shown: IFBA’s Global Policy provides minimum criteria for marketing directed to children <12y that is paid for/controlled by IFBA companies in **every country where they market their products**. Companies include:

- Ferrero
- General Mills
- Grupo Bimbo
- Kellogg Company
- McDonald’s
- Mondelēz International
- Mars, Incorporated
- Nestlé S.A.
- PepsiCo, Inc.
- Unilever

National or regional industry self regulation
Application: Some existing FOP nutrition labels

Negative

Interpretive/Summary

Informative/Complex
WHY the focus on warning labels?

• Globally there is extensive experience from tobacco control that warning labels work whereas other positive approaches do not increase smoking cessation.

• Dozens of random controlled studies have compared front-of-the-package (FOP) labels with other approaches and found a much greater impact from the warning label than from other approaches. Later we review briefly some of these studies.

• Of the seven countries with statutory FOP system, five have laws and regulations that use the warning label system used in Chile (Israel, Peru, Uruguay, Canada).

• Chile is the only system that has been rigorously evaluated and selected preliminary results from the year 1 evaluation are presented at SLAN Wed.

• Singapore and Thailand are the two with statutory positive logos. Singapore is now considering implementation of a warning label system due to the lack of impact of the positive logo.
Warning label Symbols

Chile

Israel

Other countries considering

Brazil (from Anvisa)
Countries with either mandatory or voluntary interpretive labels on packaged foods

- Denmark
- Iceland
- Lithuania
- Norway
- Sweden
- Australia
- New Zealand
- Singapore
- Thailand
- Argentina
- Philippines
- Brunei
- United Kingdom
- France
- Slovenia
- Croatia
- Nigeria
- United Arab Emirates
- Belgium
- Czech Republic
- Netherlands
- Poland
- Mexico
- Finland
- Brazil
- Indonesia
- United States
- Vietnam
- Japan
- South Korea

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4. Future strategies and major gaps

- Fiscal policies focused on unhealthy products with minimal discussions to date on ways to **use tax funds to encourage healthy food purchases** (i.e. subsidizing foods, providing ways for low income families to afford healthy food)

- Focused solely on retail sales and have ignored major dietary components: **food service, street vendors/stalls**

- Food service: portion control via calorie labeling and then calorie pricing controls. Large research gaps, policy gaps on increasingly important sector.

- Street vendors: absolutely minimal policy efforts to date.

- This generation: reduce ultra-processed food consumption

- **Next challenge: promotion of truly healthy eating.** One focus is reduction refined carbohydrates—which will be a challenge for future generations.
5. Our ultimate goal: How to use multiple approaches to change BOTH supply and demand?

Spectrum of approaches for changing behaviors

- Fiscal Measures (e.g., tax)
- Marketing/advertising controls/FOP
- Labeling & claims regs; Menu, Package
- Industry’s voluntary efforts
- Social marketing/nutrition education
- Modify choice architecture
- Cultural/ societal norms for healthy eating
- Behaviors (measureable) as proxies for norms (non-measurable)

Effectiveness potential (population level)

Individuals, communities, food manufacturers, retailers, food service, policymakers, regulatory agencies all have roles to play but to date little evidence they will without regulatory efforts

Slide derived from Shu Wen Ng
The Struggle Over the Millenia to Eliminate Arduous Effort Could Not Foresee Modern Technology