Program and Policy Options for Preventing Obesity in Low, Middle, and Transitional Income Countries: background research and program evaluation

Brazil

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• Background in obesity, diabetes, and hypertension prevalence and trends

• Background in economics research

• Taxation potential

• National school feeding program farm-to-school regulatory policy evaluation proposal

• Future actions
Obesity, diabetes (and diet), and hypertension: secular and recent trends in Brazil
Secular trends in the prevalence (%) of obesity
Brazilian child and adolescent population, 1975-2009

Secular trends in the prevalence (%) of obesity
Brazilian adult population, 1975-2013


\[ y = 0.0011x^3 - 6.8173x^2 + 13573x - 9E+06 \]

\[ R^2 = 0.995 \]

- **Obesity: 20.8% (95% CI 20.2, 21.4)** ~ **26.6 million Brazilian adults**
  - Women: 24.3 (95% CI 23.5, 25.1)
  - Men: 16.8 (95% CI 16.0, 17.6)
Secular trends in the prevalence (%) of obesity
Brazilian, Mexican and US adult population

Sources: National anthropometric surveys
Secular trends in the prevalence (%) of obesity among adults (20 y+)... with forecast for 2020

Sources: National anthropometric surveys

- **Diabetes (self-reported):** 6.2 % (95% CI 5.9,6.6) ~ 7.9 million Brazilian adults
  - Women: 7.0 (95% CI 6.6,7.5)
  - Men: 5.4 (95% CI 4.9,5.9)
Recent trends in self-reported prevalence (%) of obesity and diabetes Brazilian adult population in 27 state capitals: 2006-2016

**OBESITY**
+ 0.73 percentage points per year

**DIABETES**
+ 0.28 percentage points per year

Source: VIGITEL – Brazil http://portal.saude.gov.br/
Recent trends in self-reported prevalence (%) of diabetes Brazilian adult population in 27 state capitals: 2006-2016
... with forecast for 2022

Annual change in diabetes prevalence regressed on the annual change in obesity prevalence in 27 Brazilian state capitals, 2006-2016

\[ y = 0.2804x + 0.0079 \]

\[ R^2 = 0.2234 \]
Prevalence of hypertension among adults Brazilian National Health Survey, 2013

- **Hypertension**: 32.3% (95% CI 31.6, 33.1) ~ 41.2 million Brazilian adults
  - Women: 31.7 (95% CI 30.8, 32.6)
  - Men: 33.0 (95% CI 32.0, 34.1)
Recent trends in the prevalence (%) of self-reported hypertension
Brazilian adult population of 27 state capitals: 2012-2016

HYPERTENSION
+ 0.35 percentage points per year

Source: VIGITEL – Brazil http://portal.saude.gov.br/
Secular trends in the national household food basket
Brazil: 1987-2009

Source: Adapted from Martins et al 2013 Rev Saude Pub 47:656-65
Recent trends in consumption of beans $\geq 5$ days/week

Brazilian adult population of 27 state capitals: 2012-2016

CONSUMPTION OF BEANS
- 1.46 percentage points per year

Source: VIGITEL – Brazil http://portal.saude.gov.br/
Recent trends in consumption of soft drinks >= 5d/week
Brazilian adult population of 27 state capitals: 2012-2016

Source: VIGITEL – Brazil http://portal.saude.gov.br/
Recent trends in mean consumption of soft drinks (ml/day)

Brazilian adult population of 27 state capitals: 2012-2016

CONSUMPTION OF SOFT DRINKS
- 25 ml/day per year

Source: VIGITEL – Brazil http://portal.saude.gov.br/
Economics research background
Household purchase of sugar sweetened beverages (% total calories acquired). Brazil, 2002/03 and 2008/09.

Source: Martins et al., 2013

Source: Martins et al., 2013
Methods

• National Household Budget Survey 2008/09:
  • 55,590 households:
    • Detailed information on the acquisition of 1.7 thousand foods and drinks acquired for household consumption during 1 week;
    • Sociodemographic information.

• Unit prices and budget shares were used for the estimation of a censored demand system (9 groups):
  • 2 stage QUAIDS;
  • Income, own-price and cross-price elasticity;
  • Total population and according to income levels.
## Price (US$) of selected beverage and food groups**. Brazil. POF-IBGE 2008/09.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular soft drinks</td>
<td>0.68</td>
</tr>
<tr>
<td>Low-calorie soft drinks</td>
<td>0.73</td>
</tr>
<tr>
<td>Fruit juices and teas</td>
<td>0.55</td>
</tr>
<tr>
<td>Low-calorie fruit juices and teas</td>
<td>1.02</td>
</tr>
<tr>
<td>Milk</td>
<td>0.86</td>
</tr>
<tr>
<td>Bottled water</td>
<td>3.05</td>
</tr>
<tr>
<td>Candies and sweets</td>
<td>2.89</td>
</tr>
<tr>
<td>Salty snacks</td>
<td>0.19</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.53</td>
</tr>
</tbody>
</table>

*: Per liter for the beverages and per kilo for foods.

**: Considered for the estimation of the demand system.

Source: Prepared by the authors.
Income-elasticity of selected beverage and food groups**. Brazil. POF-IBGE 2008/09.

**: Considered for the estimation of the demand system.

Source: Prepared by the authors
Income-elasticity of selected beverage and food groups**, according to income level. Brazil. POF-IBGE 2008/09.

**: Selected among those considered for the estimation of the demand system.

Source: Prepared by the authors
Own and cross price elasticity (non-compensated) of the demand for selected beverage and food groups. Brazil. HBS-IBGE 2008/09.

<table>
<thead>
<tr>
<th>Beverage and food groups</th>
<th>Own price elasticity (1% increase in the own price)</th>
<th>Cross price elasticity (1% increase in the price of soft drinks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular soft drinks</td>
<td>-0.64</td>
<td></td>
</tr>
<tr>
<td>Low-calorie soft drinks</td>
<td>-1.00</td>
<td>0.23</td>
</tr>
<tr>
<td>Fruit juices and teas</td>
<td>-1.06</td>
<td>0.33</td>
</tr>
<tr>
<td>Low-calorie fruit juices and teas</td>
<td>-1.00</td>
<td>0.29</td>
</tr>
<tr>
<td>Milk</td>
<td>-0.95</td>
<td>0.26</td>
</tr>
<tr>
<td>Bottled water</td>
<td>-1.07</td>
<td>0.30</td>
</tr>
<tr>
<td>Candies and sweets</td>
<td>-0.85</td>
<td>0.17</td>
</tr>
<tr>
<td>Salty snacks</td>
<td>-0.61</td>
<td>0.21</td>
</tr>
<tr>
<td>Sugar</td>
<td>-0.86</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Obs: p<0.001 for all values.

Source: Prepared by the authors
Own and cross price elasticity (non-compensated) of the demand for selected beverage and food groups, according to income level. Brazil. HBS-IBGE 2008/09.

<table>
<thead>
<tr>
<th>Beverage and food groups</th>
<th>20% POORER</th>
<th>20% RICHER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Own price elasticity</td>
<td>Cross price elasticity (1% increase in the price of soft drinks)</td>
</tr>
<tr>
<td>Regular soft drinks</td>
<td>-0,833</td>
<td>-0,453</td>
</tr>
<tr>
<td>Low-calorie soft drinks</td>
<td>-0,989</td>
<td>0,258</td>
</tr>
<tr>
<td>Fruit juices and teas</td>
<td>-1,241</td>
<td>0,334</td>
</tr>
<tr>
<td>Low-calorie fruit juices and teas</td>
<td>-1,045</td>
<td>0,235</td>
</tr>
<tr>
<td>Milk</td>
<td>-0,884</td>
<td>0,229</td>
</tr>
<tr>
<td>Bottled water</td>
<td>-1,018</td>
<td>0,297</td>
</tr>
<tr>
<td>Candies and sweets</td>
<td>-0,911</td>
<td>0,254</td>
</tr>
<tr>
<td>Salty snacks</td>
<td>-0,998</td>
<td>0,074</td>
</tr>
<tr>
<td>Sugar</td>
<td>-0,694</td>
<td>0,437</td>
</tr>
</tbody>
</table>

Obs: p<0,001 for all values.

Source: Prepared by the authors
Predicted impact of a 20% tax on regular soft drinks on its consumption. Brazil. HBS-IBGE 2008/09.
Taxation opportunity
SENADO FEDERAL
PROJETO DE LEI DO SENADO
Nº 430, DE 2016

Institui Contribuição de Intervenção no Domínio Econômico incidente sobre a comercialização da produção e da importação de refrigerantes e bebidas açucarados (Cide-Refrigerantes), e dá outras providências

Senador Jorge Viana

Relator: Assuntos Econômicos, em decisão terminativa
Contribution of intervention in the economic domain ("CIDE")

- Contribution of intervention in the economic domain

  - In Portuguese: *CIDE*;

  - The Contribution of intervention in the economic domain are a special type of Brazilian taxes, of exclusive competence of the Union (Article 149 of the FC);

    - They are tributes of an extra-fiscal nature and linked to consumption.
Affects sales and imports of soft drinks and other sweetened beverages;

Revenues should be directed to use in public health (National Health Fund);

20% EXTRA TAX.
Alíquota de vinte por cento. Determina que o montante da Cide-Refrigerantes será recolhido ao Tesouro Nacional e repassado de (FNS).

**Participe**

927

401

**Opine sobre esta matéria**

Resultado apurado em 10/02/2017 as 15:18

**Acompanhar esta matéria**
In addition...

• Taxing exemptions for non-alcoholic beverages are being removed.

• States are already increasing state taxes for non-essential goods:
  • Including non-alcoholic beverages.

• Federal government is currently discussing the possibility of a major fiscal reform.
Brazilian National school feeding program
Farm-to-school regulatory policy evaluation proposal
Brazilian National School Feeding Program

- Implemented in 1955, it is universal and free
- In 2014, it served 42.2 million public school students (75% of the total number of students in the country)
  - early childhood education, elementary school, high school, and basic education for adults.
- R$ 3.7 billion (US$ 1.2 billion) budget in 2014
- Strongly regulated and is the responsibility of the National Fund for Educational Development (FNDE), which is linked to the Ministry of Education
Brazilian National School Feeding Program timeline

**Law nº 8.913, July 12, 1994.** The National School Feeding Program management is decentralized.

**Executive Order 1784, December 14, 1998.** Consolidates the decentralization of the Program.

**Family Health Program,** later named Family Health Strategy, initiated nationwide aiming to empower primary care actions.

**National Food and Nutrition Policy** recognizes overweight and obesity as key priorities for all life stages and social groups.

**National Workers’ Food Program** updated its nutritional requirements to confront rising obesity and NCD levels and established a requirement for nutritional education at the worksite.

**System for Risk and Protective Factors for NCD through Telephone Interviews (Vigitel)** implemented, providing annual estimates of the prevalence of diabetes, hypertension and NCD risk factors among adults living in all 26 state capitals and the Federal District.

The Brazilian Regulation for the Marketing of Food to Infants and Young Children was instituted.

**Resolution FNDE nº 26, June 17, 2013.** Establishes that a minimum of three servings (200 grams) of fruits and vegetables (not counting beverages) per week shall be included in school menus, prohibits the purchase of soda and a few other sugary drinks, it regulates the obligation that at least 70% of the food purchased by the Program should be basic foodstuff, and establishes recommended maximum values for added sugar, fat, saturated fat, trans fats, and salt.

**New edition of the Brazilian Dietary Guidelines released, based exclusively on food-based dietary advice and avoidance of ultra-processed food and drink products.**
They aim to provide both healthier school meals for children and economic security to small and medium-sized family farmers – which often struggle to survive in a global economy.

By approving Article 14 of Law 11,947, Brazil became the first country to have a national law that requires a link between school feeding and agricultural production (Hawkes et al., 2016)

**Article 14 of 2009 Law 11,947:**

“At least 30.0% of the foods in school meals should be purchased directly from family farms and local rural enterprises, giving priority to the resettled farmers (former landless people), traditional indigenous communities and *quilombolas* as a means of supporting local economic development.”
National School Feeding Program

Table 1 Number and Percentage of Municipalities, by Region and for Brazil, Which Received Funds From FNDE for School Feeding in the Period 2011–14

<table>
<thead>
<tr>
<th>Regions</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>North</td>
<td>374</td>
<td>83.3</td>
<td>363</td>
<td>80.8</td>
<td>434</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>424</td>
</tr>
<tr>
<td>Northeast</td>
<td>1627</td>
<td>90.7</td>
<td>1623</td>
<td>90.5</td>
<td>1792</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1780</td>
</tr>
<tr>
<td>Southeast</td>
<td>1624</td>
<td>97.4</td>
<td>1627</td>
<td>97.5</td>
<td>1655</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1647</td>
</tr>
<tr>
<td>South</td>
<td>1180</td>
<td>99.3</td>
<td>1179</td>
<td>99.2</td>
<td>1184</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1189</td>
</tr>
<tr>
<td>Midwest</td>
<td>440</td>
<td>94.6</td>
<td>436</td>
<td>93.8</td>
<td>456</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>453</td>
</tr>
<tr>
<td>Total and Brazil</td>
<td>5245</td>
<td>94.3</td>
<td>5228</td>
<td>94</td>
<td>5521</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5493</td>
</tr>
</tbody>
</table>

Table 2 Participation of Family Farming in School Feeding Supply in the Period 2011–14, Brazil

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Municipalities that purchased from family farming</td>
<td>3097</td>
<td>59.0</td>
<td>3484</td>
<td>66.6</td>
<td>3529</td>
</tr>
<tr>
<td>Municipalities that did not purchase from family farming</td>
<td>2148</td>
<td>40.9</td>
<td>1744</td>
<td>33.4</td>
<td>1992</td>
</tr>
<tr>
<td>Municipalities that purchased over 50%</td>
<td>1410</td>
<td>26.8</td>
<td>1576</td>
<td>30.1</td>
<td>1412</td>
</tr>
<tr>
<td>Ratio of participation of family farming to the total national PNAE funds</td>
<td>10.8</td>
<td>14.5</td>
<td>16.8</td>
<td>23.3</td>
<td></td>
</tr>
</tbody>
</table>

Source: FNDE, elaborated by Schneider et al., 2016
International cooperation

Program of Brazil-FAO International Cooperation

Program Summary Projects News Events Resources Partners

Implementation of a Model for Public Procurement within Rural Family Farming for School Feeding Programs

Latin America is promoting measures aimed at reducing hunger and malnutrition; however, the complexity of this issue affects progress and achievements. For this reason, countries of the region have launched various initiatives to develop programs focused on improving the food and nutritional security of the population, based on a dynamic exchange of successful experiences through South-South Cooperation. Examples of such programs are the national initiatives of strengthening the School Feeding Programs and their connection with family farming.

Strengthening the School Feeding Programs and supporting the local socio-economic development, through local procurement from family farms is an opportunity to offer the farmers a market (of school food programs) and to offer the students of the schools a variety of healthy, fresh food that respects the local food culture.

Project Factsheet

Objective: Contribute to increasing the food and nutritional security of rural communities in El Salvador, Nicaragua, Honduras and Paraguay, through the School Feeding Programs; strengthened and coordinated with the production of local and regional family farms.

Geographic areas to benefit: El Salvador, Honduras, Nicaragua and Paraguay.

Symbol: TCP/RLA/3406

School Feeding

Sustainable Schools

Humanitarian Cooperation

Public Procurement within Rural Family Farming

Strengthening the Civil society

Strengthening the Cotton Sector

Agro-Environmental Policies

Food and Nutritional Security

Strengthening School Feeding Programs in the Framework of the Zero Hunger Initiative in Latin America and the Caribbean 2025

The experience in Brazil of its National School Feeding Program (PNAE, for its acronym in Portuguese) has been recognized for over 60 years, especially by developing countries, as a point of reference for its sustainability, quality, progress and challenges; thus allowing for the provision of necessary support to the countries of Latin America and the Caribbean.

The lessons learned in Brazil with school feeding were based on several key elements, such as program coverage; systematization and continuity of supply; quality of food offered at the schools; comprehensive program regulations; nutritional recommendations; public oversight; procurement of food from family farming; construction of on-site and virtual support systems; monitoring and evaluation; decentralized management; mechanisms and educational tools for food and nutrition through school gardens, among others. The scope of this collaborative implementation includes the participation of 5,570 municipalities and 27 states, assisting 43 million students per day for 200 school days. The PNAE also highlights the model of school feeding as part of the human right to food, prompting discussion on the processes of food assistance still present in many countries.

Project Factsheet

Objective: To strengthen the institutionalization of school feeding programs and the associated food security policies, through regional and national mechanisms.

Partners: Belize, Costa Rica, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Paraguay, Peru, Dominican Republic, Saint Lucia, and Saint Vincent and the Grenadines.

Symbol: GCP/RL/180/BRB

More information
- Sustainable Schools
• Aim 1: Explore to what extent municipal and state-level determinants (such as participatory democracy and incentives and policies that support local farming agriculture) help explain the compliance with the farm-to-school regulatory policy that states that at least 30% of the foods must come from family farming as well as differences in the implementation rate.

• Aim 2: Evaluate the impact of a farm-to-school regulatory policy on dietary intake of Brazilian public middle-school students living in Brazilian state capitals and the Federal District.
Methods: Aim 1

• Outcome: annual percentage of the food procurement from family farming in each municipality and state

• Exposure:
  • measures of participatory democracy related to the implementation of the farm-to-school regulatory policy (presence and characteristics of local and state sectoral school feeding program management councils (Conselhos de Alimentação Escolar))
  • presence of incentives and policies that support local agriculture
Methods: Aim 1

• Secondary data on federal transfers to 5,526 municipalities (out of a total of 5,570 municipalities in the country), the Federal District and all 26 states for food procurement as part of the Brazilian National School Feeding Program from 2011 to 2015

• Year and municipality/Federal District or year and state fixed-effect models will be used:
  • for the 26 states
  • for the municipalities/Federal District
Methods: Aim 2

• Pooled cross-sectional analysis using food procurement data in the 26 state capitals and the Federal District

• Data: Publicly available survey data of Brazilian 9th graders attending public schools across all 26 state capitals and the Federal District (2009, 2012 and 2015 National School-Based Health Surveys (PeNSE))

• PeNSE surveys are based on the Global School-Based Student Health Survey and the Youth Risk Behavior Surveillance System
Methods: Aim 2

• Sample
  • 45,597 students from 1,109 schools in 2009
  • 44,269 students from 1,048 schools in 2012
  • 36,250 students from 940 schools in 2015

• Outcome
  • Consumption of fruits, vegetables, and beans

• Exposure
  • Annual percentage of the National School Feeding Program municipal purchases that come from family farming in each year of the study
Federals transfers for food procurement from family farming

*Bars denote mean (95%CI)*

Source: FNDE
### Weighted federal transfers for food procurement from family farming (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Median</th>
<th>p25</th>
<th>p75</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>0.68</td>
<td>0.00</td>
<td>4.71</td>
</tr>
<tr>
<td>2012</td>
<td>1.75</td>
<td>0.00</td>
<td>8.24</td>
</tr>
<tr>
<td>2013</td>
<td>10.09</td>
<td>1.84</td>
<td>21.02</td>
</tr>
<tr>
<td>2014</td>
<td>14.92</td>
<td>5.01</td>
<td>25.87</td>
</tr>
</tbody>
</table>

Source: FNDE
Questions

• Discuss whether evaluations of regulatory measures of school feeding programs are worth pursuing
  • Including other program regulations (restriction of a few processed foods)

• If these evaluations are worth pursuing, discuss the availability of other secondary datasets considering the strong limitations of the National School-Based Health Surveys (PeNSE))

• Other suggestions
Future actions

NUPENS/USP
1. Estimate price elasticities for nonessential foods
2. Effect of regulatory policies that ban sales of sugar-sweetened beverages and snacks inside schools on students’ dietary intake
3. Update on obesity and diabetes cost and propose simulations of effects of a potential tax on obesity and diabetes

In-country partners (ACT and IDEC)
1. School food environment regulation
2. Food labelling (including FOP) under discussion
3. Marketing restrictions