FOOD PATTERNS IN LATIN AMERICA

Mauro Fisberg - MD, PhD

Associate Professor of Pediatrics Federal University of Sao Paulo- Brazil
Director Feeding Difficulties Center- Pensi Institute- Sabará Children’s Hospital
Healthy Life Style Task Force- ILSI Brasil
Interest disclosure

- Invited speaker - Abbott, CPW, Coca-Cola, Danone Research and Institute, EMS, Mondelez, Nestlé, Nutrociencia, Wyeth
- Scientific Board Membership - Danone, Danone Institute International, ILSI Brazil, Mondelez, Piracanjuba
- Grants for Research - Abbott, Abitirgo, CPW, CNPq, Coca Cola, Danone Research, Fapesp, Fap Unifesp, Nestlé
- I do not have participation in shares or profit in any of private, governamental or non governamental organizations.
- I do not accept interference from these organizations in the content of conferences or papers with my participation.
3.5 Billion People Malnourished
1.5 billion adults are overweight
500 millions are obese
And COUNTING...

(WOF, 2016)
LATIN AMERICA HAS THE WORST SCENARIOS OF OBESITY FOR COUNTRIES IN EMERGING REGIONS BY 2030.

And latins and african american in developed countries (excluding refugees...)

Transition in Latin America

• Population is getting older
• High mortality and morbidity for chronic diseases but also for new-old infectious diseases
• High mortality in youngsters by means of violence
• Increased access and affordability of food away from house, ready to eat and industrial food
• Decrease of general physical activity besides high enrollment in structured activity...
FOOD IN LATIN AMERICA
569 million inhabitants

From past to the Future...
Pre Colombian cultures

Aztecs
Mayan
Inca
Mapuche
Guarani

Amazon tribes
First native inhabitants
Higher development
Native latin american inhabitants
lower development
Food in Native Latin America

Mandioca

[Image of Mandioca]

[Image of corn]

[Image of indigenous people in a boat]

[Image of palm trees and animals]

[Image of grass]
First non native food arrived in America with the great navigators:

- **CABRAL**
- **VASCO DA GAMA**
- **CABOTO**

**Colon**
African slaves route

Food wastes or very small amounts of food - culture of survival
Europeans and asians expected to find a thriving land, labor and fertile land for agriculture and livestock in Latin America.
# Food Cultures – native origin

<table>
<thead>
<tr>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
</tr>
<tr>
<td>Meat-Fish-Seafood</td>
</tr>
<tr>
<td>Manioc</td>
</tr>
</tbody>
</table>

- **European influence – spanish and portuguese**
- **Secondary influences - english, dutch, african**
- **New waves of migration - german, italian, japonese**
Latin american food habits

• Different meal occasions (early x late hours)
• Breakfast on the road or at home
• Main meals away from home
• The legend of siesta...
• Meal skipping
BRAZIL - A MELTING POT OF CULTURAL INFLUENCES...

NATIVE- PORTUGUESE- AFRICAN
Food heritage in Brazil by Region
### Chronic diseases in Brazil

<table>
<thead>
<tr>
<th>Condition</th>
<th>Woman (%)</th>
<th>Men (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low level of PA</td>
<td>51,5</td>
<td>39,8</td>
</tr>
<tr>
<td>Overweight (IMC ≥25)</td>
<td>48,0</td>
<td>50,1</td>
</tr>
<tr>
<td>Obesity (IMC ≥30)</td>
<td>16,9</td>
<td>12,5</td>
</tr>
<tr>
<td>Hypertension*</td>
<td>24,2</td>
<td>18,3</td>
</tr>
<tr>
<td>Diabetes*</td>
<td>7</td>
<td>5,4</td>
</tr>
<tr>
<td>Hypercholesterolemia*</td>
<td>15,1</td>
<td>9,7</td>
</tr>
</tbody>
</table>

Food heritage in Argentina by Region

Fuente: Saberes y Sabores de nuestro país. Ingredientes de nuestra identidad.
Food heritage in Argentina

- combination of native patterns and Spanish influence by colonization and later European immigration (German and Italian and later East Europe, Arabian and Asian).

- potato, corn, meat, wheat & milk, later enriched by European and Latin-American recipes.
# Chronic diseases in Argentina

<table>
<thead>
<tr>
<th>Condition</th>
<th>Woman (%)</th>
<th>Men (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low level of PA</td>
<td>57,4</td>
<td>51,8</td>
</tr>
<tr>
<td>Overweight (IMC ≥25 y &lt;30)</td>
<td>31,3</td>
<td>43,3</td>
</tr>
<tr>
<td>Obesity (IMC ≥30)</td>
<td>18,8</td>
<td>22,9</td>
</tr>
<tr>
<td>Hypertension</td>
<td>36,4</td>
<td>31,4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10,4</td>
<td>9,1</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>29,9</td>
<td>29,7</td>
</tr>
</tbody>
</table>

Source: National Survey of Risk Factors 2013
Risk factors and chronic diseases in Chile

epidemiologic surveys 2009-2010

Obesidad: 25%

Hipertensión arterial: 32%

Síndrome metabólico: 26%

Diabetes: 9%

Riesgo cardiovascular alto y muy alto: 18%

Fuente: Encuesta Nacional de Salud 2009-2010, Ministerio de Salud, Chile
Food issues in Chile
Programa Aliméntate Sano CNMEC-UC

Low intake of fish and seafood: only 6% report 2 or higher weekly intake

Low intake of legumes: 11% more than twice a week

Low intake of vegetables and fruits: 11%
5 or more portions a day

Low intake of insaturated fat

High intake of sugar and sweets: 38%
moderated intake
Pasta consumption per capita is only 3kg in Colombia.
<table>
<thead>
<tr>
<th>Orden</th>
<th>Alimento</th>
<th>%, IC</th>
<th>%, IC</th>
<th>gr, IC</th>
<th>gr, IC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arroz</td>
<td>73,8</td>
<td>73,0</td>
<td>74,7</td>
<td>189,4</td>
</tr>
<tr>
<td>2</td>
<td>Aceite vegetal</td>
<td>72,6</td>
<td>71,7</td>
<td>73,3</td>
<td>14,0</td>
</tr>
<tr>
<td>3</td>
<td>Azúcar</td>
<td>60,8</td>
<td>59,7</td>
<td>61,8</td>
<td>22,0</td>
</tr>
<tr>
<td>4</td>
<td>Papa</td>
<td>54,5</td>
<td>53,3</td>
<td>55,7</td>
<td>230,8</td>
</tr>
<tr>
<td>5</td>
<td>Café en infusión</td>
<td>47,6</td>
<td>46,4</td>
<td>48,9</td>
<td>180,6</td>
</tr>
<tr>
<td>6</td>
<td>Leche líquida</td>
<td>47,2</td>
<td>45,9</td>
<td>48,5</td>
<td>235,2</td>
</tr>
<tr>
<td>7</td>
<td>Plátano</td>
<td>43,4</td>
<td>42,1</td>
<td>44,7</td>
<td>202,7</td>
</tr>
<tr>
<td>8</td>
<td>Carne de res</td>
<td>41,0</td>
<td>40,5</td>
<td>43,2</td>
<td>58,0</td>
</tr>
<tr>
<td>9</td>
<td>Pana</td>
<td>41,5</td>
<td>40,1</td>
<td>42,8</td>
<td>55,4</td>
</tr>
<tr>
<td>10</td>
<td>Pan</td>
<td>40,5</td>
<td>39,1</td>
<td>41,9</td>
<td>74,4</td>
</tr>
<tr>
<td>11</td>
<td>Tomate</td>
<td>38,7</td>
<td>37,3</td>
<td>40,1</td>
<td>45,8</td>
</tr>
<tr>
<td>12</td>
<td>Huevo de gallina</td>
<td>36,5</td>
<td>35,1</td>
<td>37,0</td>
<td>64,8</td>
</tr>
<tr>
<td>13</td>
<td>Cebolla cabezona</td>
<td>30,1</td>
<td>28,6</td>
<td>31,6</td>
<td>31,8</td>
</tr>
<tr>
<td>14</td>
<td>Zanahoria</td>
<td>28,7</td>
<td>27,1</td>
<td>30,2</td>
<td>30,4</td>
</tr>
<tr>
<td>15</td>
<td>Chocolate</td>
<td>23,9</td>
<td>22,3</td>
<td>25,0</td>
<td>13,5</td>
</tr>
<tr>
<td>16</td>
<td>Pollo</td>
<td>22,3</td>
<td>21,6</td>
<td>24,0</td>
<td>68,0</td>
</tr>
<tr>
<td>17</td>
<td>Grasa oto</td>
<td>21,8</td>
<td>20,1</td>
<td>23,4</td>
<td>370,5</td>
</tr>
<tr>
<td>18</td>
<td>Cebolla común</td>
<td>21,7</td>
<td>20,1</td>
<td>23,4</td>
<td>6,7</td>
</tr>
<tr>
<td>19</td>
<td>Queso</td>
<td>19,7</td>
<td>18,0</td>
<td>21,3</td>
<td>42,5</td>
</tr>
<tr>
<td>20</td>
<td>Yuca</td>
<td>19,3</td>
<td>17,6</td>
<td>21,0</td>
<td>83,2</td>
</tr>
<tr>
<td>21</td>
<td>Grasa vegetal</td>
<td>18,7</td>
<td>17,0</td>
<td>20,4</td>
<td>12,3</td>
</tr>
<tr>
<td>22</td>
<td>Arepa</td>
<td>17,9</td>
<td>16,3</td>
<td>19,6</td>
<td>20,6</td>
</tr>
<tr>
<td>23</td>
<td>Arveja</td>
<td>16,9</td>
<td>15,2</td>
<td>16,6</td>
<td>48,9</td>
</tr>
<tr>
<td>24</td>
<td>Pasta</td>
<td>16,3</td>
<td>14,6</td>
<td>16,0</td>
<td>105,5</td>
</tr>
<tr>
<td>25</td>
<td>Grasa de animal</td>
<td>15,5</td>
<td>13,8</td>
<td>17,3</td>
<td>3,8</td>
</tr>
</tbody>
</table>
PREVALENCE OF CHRONIC DISEASES IN COSTA RICA

Hypercholesterolemia: 42%
Hipertriglyceridemia 43.1%
Hypertension: 37.8%
Diabetes 10.8%

Metabolic Syndrome: 24.96%
Abdominal obesity: 57.3%
Overweight: 36.1%
Obesity: 6%
Sedentarism 50.9%

FOOD HERITAGE IN COSTA RICA

- passageway between civilizations Inca, Maya and Aztec
- culture of corn, cocoa, beans and peach palm (Pejibaye *Bactris gasipaes*).
- Enrichment with meat hunting deer, iguana, wild boar, rabbit, peccary (javelina), tepescuintle (paca), duck and other birds; fish, clams, scallops, and crabs.
During the colony - Iberian origin: wheat, rice, oats, sugar cane, coffee, cotton, fruits - oranges and bananas, cattle, pigs and poultry farming.

**gallo pinto** (rice and beans stir-fried together),
casado (rice and beans serve side by side with some meat beef, fish, chicken or pork,

tamales (boiled plantain leaves stuffed with corn meal mix, saffron rice, pork, and a variety of vegetables)

**picadillos** (finely chopped vegetables with or without meat).
FOOD HERITAGE IN ECUADOR

• Incas based their nutrition in production and consumption of corn; along with tubers cultivation, especially potato.

• protein from llama meat.

• Fruits

European influence in Ecuador.

Royal Audience of Quito: 1563

Introduction of food products such as wheat, pork, milk, cheese, the first breads, beers.
# CHRONIC DISEASES IN ECUADOR

<table>
<thead>
<tr>
<th>Chronic Disease</th>
<th>Prevalence</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total %</td>
<td>n</td>
<td>Female %</td>
<td>n</td>
<td>Male %</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2.7</td>
<td>264</td>
<td>2.8</td>
<td>169</td>
<td>2.6</td>
</tr>
<tr>
<td>Insulin Resistance</td>
<td>39.9</td>
<td>5521</td>
<td>47.5</td>
<td>3952</td>
<td>33.0</td>
</tr>
<tr>
<td>Hypertension</td>
<td>9.3</td>
<td>2003</td>
<td>7.5</td>
<td>895</td>
<td>11.2</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>24.5</td>
<td>3301</td>
<td>23.5</td>
<td>2094</td>
<td>25.4</td>
</tr>
<tr>
<td>High LDL</td>
<td>19.9</td>
<td>2693</td>
<td>19.2</td>
<td>1742</td>
<td>20.5</td>
</tr>
<tr>
<td>Hypertriglyceridemia</td>
<td>28.7</td>
<td>3797</td>
<td>23.7</td>
<td>2169</td>
<td>33.3</td>
</tr>
<tr>
<td>Low HDL</td>
<td>40.5</td>
<td>5824</td>
<td>34.2</td>
<td>3252</td>
<td>46.3</td>
</tr>
<tr>
<td>Metabolic Syndrome</td>
<td>27.0</td>
<td>3250</td>
<td>29.2</td>
<td>2094</td>
<td>25.2</td>
</tr>
<tr>
<td>Abdominal Obesity</td>
<td>50.0</td>
<td>6793</td>
<td>63.7</td>
<td>4938</td>
<td>38.9</td>
</tr>
</tbody>
</table>

- Freire, W. et al, 2014  ENSANUT-ECU
## CHRONIC DISEASES in VENEZUELA (Mortality)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Prevalence</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Heart Diseases</td>
<td>20.68</td>
<td>30,467</td>
</tr>
<tr>
<td>Cancer</td>
<td>15.41</td>
<td>22,815</td>
</tr>
<tr>
<td>Stroke</td>
<td>7.64</td>
<td>11,308</td>
</tr>
<tr>
<td>Diabetes</td>
<td>7.11</td>
<td>10,528</td>
</tr>
<tr>
<td>Chronic Obstructive Pulmonary Disease</td>
<td>2.78</td>
<td>4,116</td>
</tr>
</tbody>
</table>

# CHRONIC DISEASES VENEZUELA (Morbidity)


<table>
<thead>
<tr>
<th>Cause</th>
<th>Prevalence</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate by 100,000 people</td>
<td>n</td>
</tr>
<tr>
<td>Neoplasm</td>
<td>75.8</td>
<td>22,185</td>
</tr>
<tr>
<td>Diabetes Mellitus &lt;25 years</td>
<td>94.4</td>
<td>13,124</td>
</tr>
<tr>
<td>Diabetes Mellitus &gt;25 years</td>
<td>717.0</td>
<td>110,289</td>
</tr>
<tr>
<td>Undernutrition &lt;15 years</td>
<td>220.5</td>
<td>18,752</td>
</tr>
<tr>
<td>Overweight</td>
<td>299.9</td>
<td>87,810</td>
</tr>
<tr>
<td>Hypertension &gt;45 years</td>
<td>4,489.1</td>
<td>308,809</td>
</tr>
<tr>
<td>Ischemic Diseases</td>
<td>89.5</td>
<td>26,218</td>
</tr>
</tbody>
</table>
FOOD HERITAGE IN VENEZUELA

• corn (in the form of arepas)
• yucca (casaba)
• cocoa (chocolate).
• Hallacas, which is a mixed beef stew inside corn dough and wrapped in plantain leaves, and includes almonds, raisins, olives and capers

Peru - a transition from incaic to modern food
The next big issue in the region

Ultra-processed foods are driving the obesity epidemic in Latin America
September 2015
PAN AMERICAN HEALTH ORGANIZATION / WORLD HEALTH ORGANIZATION

NOVA- processing classification
UPF – a synonym of industrial food?
Home prepared food is always good?
Industrialization is always bad?
Several large multicenter observational studies have been conducted in order to investigate the nutritional and physical activity statuses of population;

Majority of these studies were performed separately and unified later - NO representative samples of each country.
<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Sample size</th>
<th>Sample size that underwent dietary assessment</th>
<th>Method</th>
<th>Analysis of the dietary data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina (ENNyS)</td>
<td>2004-2005</td>
<td>36,354</td>
<td>36,354</td>
<td>24-h Recall</td>
<td>Food Composition database developed for ENNyS</td>
</tr>
<tr>
<td>Brasil (POF)</td>
<td>2008-2009</td>
<td>159,941</td>
<td>34,003</td>
<td>Two 24-h recall</td>
<td>NDSR software and Food Composition database developed for POF</td>
</tr>
<tr>
<td>Colombia (ENSIN)</td>
<td>2008-2010</td>
<td>162,331</td>
<td>17,897</td>
<td>Food-Frequency Questionnaire</td>
<td>Qualitative (daily frequency of intake)</td>
</tr>
<tr>
<td>Chile (ENCA)</td>
<td>2014</td>
<td>4,920</td>
<td>4,920</td>
<td>Quantitative Food-Frequency Questionnaire and 24-h Recall</td>
<td>PC-SIDE software</td>
</tr>
<tr>
<td>Ecuador (ENSANUT-ECU)</td>
<td>2011–2013</td>
<td>57,727</td>
<td>19,932</td>
<td>24-h Recall</td>
<td>PC-SIDE software</td>
</tr>
<tr>
<td>México (ENSANUT)</td>
<td>2012</td>
<td>96,031</td>
<td>10,563 to 12,484 according to method used</td>
<td>Semi-quantitative Food Frequency and 24-h recall in 11% and 13% of sample, respectively</td>
<td>Food Composition database developed by National Institute of Public Health</td>
</tr>
<tr>
<td>Perú (ENINBSC)</td>
<td>2006</td>
<td>4,206</td>
<td>4,206</td>
<td>24-h Recall</td>
<td>ANDREA software, developed by CENAN-INS</td>
</tr>
<tr>
<td>Venezuela (ESCA)</td>
<td>2012-2014</td>
<td>20,670</td>
<td>6,316</td>
<td>Diet history and food frequency questionnaire</td>
<td>Food Composition database developed for ESCA</td>
</tr>
</tbody>
</table>
• Lack of studies that combine nutrition and physical activity assessment in representative samples of Latin American countries.

• Up to now, there is no Latin American study using a central standard methodology across a group of participating countries.
Latin American Study of Nutrition and Health
ELANS - household-based multi-national cross-sectional survey
8 Latin American Countries
(40% of region population- 1 year period)

- Total of 9,000 subjects;
- Representative sample of the urban household population of each country;
- Stratified by geographical location (only urban areas), gender, age and socioeconomic status:
  - 15 – 19.9 years (adolescents)
  - 20 – 34.9 years (young adults)
  - 35 - 49.9 years (adults)
  - 50 - 65 years (senior adults)
Variables

**INTAKE**
- two 24-hours dietary recall with multiple pass methodology
- Beverage intake questionnaire

**EXPENDITURE**
- IPAQ-Long Questionnaire (LA adapted)
- Accelerometry (7 days) 40% of survey

**ANTHROPOMETRY**
- Body weight
- Height
- Waist, hip and neck circumferences
Food data management in one software for all countries- latin american data banks when available
# Food and beverages standardization in LA

<table>
<thead>
<tr>
<th>country</th>
<th>Standardization numbers</th>
<th>agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>foods</td>
<td>recipes</td>
</tr>
<tr>
<td>Argentina</td>
<td>638</td>
<td>195</td>
</tr>
<tr>
<td>Brasil</td>
<td>666</td>
<td>495</td>
</tr>
<tr>
<td>Chile</td>
<td>130</td>
<td>31</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>512</td>
<td>235</td>
</tr>
<tr>
<td>Colombia</td>
<td>145</td>
<td>65</td>
</tr>
<tr>
<td>Ecuador</td>
<td>220</td>
<td>130</td>
</tr>
<tr>
<td>Perú</td>
<td>652</td>
<td>281</td>
</tr>
<tr>
<td>Venezuela</td>
<td>291</td>
<td>44</td>
</tr>
</tbody>
</table>

4730 preparations
2 traducir cuadro

viviana, 11/4/2015
Partial Results- BMI

BMI by Country (% of total sample)

Country | Underweight | Normal Weight | Overweight | Obese | Morbidly Obese
--- | --- | --- | --- | --- | ---
Argentina | 3% | 32% | 39% | 3% | 3%
Brasil | 4% | 38% | 31% | 2% | 1%
Chile | 1% | 38% | 31% | 2% | 1%
Perú | 2% | 37% | 34% | 2% | 1%
Colombia | 5% | 34% | 36% | 2% | 1%
Costa Rica | 3% | 33% | 36% | 2% | 1%
Ecuador | 4% | 34% | 36% | 2% | 1%
Total | 3% | 34% | 38% | 2% | 2%
BMI

BMI (OVERWEIGHT & OBESE) by Gender by Country

- Argentina M: 36% overweight, 21% obese
- Argentina F: 28% overweight, 27% obese
- Brazil M: 32% overweight, 20% obese
- Brazil F: 34% overweight, 25% obese
- Chile M: 44% overweight, 23% obese
- Chile F: 32% overweight, 31% obese
- Peru M: 34% overweight, 16% obese
- Peru F: 36% overweight, 25% obese
- Colombia M: 32% overweight, 12% obese
- Colombia F: 34% overweight, 19% obese
- Costa Rica M: 34% overweight, 21% obese
- Costa Rica F: 34% overweight, 32% obese
- Ecuador M: 34% overweight, 18% obese
- Ecuador F: 34% overweight, 28% obese
- Total M: 31% overweight, 18% obese
- Total F: 36% overweight, 26% obese
Energy

**Energy (Kcal)**

- **Argentina**: 2168 Kcal
- **Brazil**: 1853 Kcal
- **Chile**: 2192 Kcal
- **Colombia**: 1742 Kcal
- **Costa Rica**: 2147 Kcal
- **Ecuador**: 1910 Kcal
- **Peru**: 2242 Kcal
- **Total**: 2026 Kcal
IPAQ – Sitting Time

SITTING TIME BY GENDER (hrs/week)

Argentina Brasil Chile Perú Colombia Costa Rica Ecuador Total

Males Females
ELANS

Scientific Committee

**International chairs:**
- Mauro Fisberg
- Irina Kovalskys

**Co-Chair**
- Georgina Gómez Salas

**Project Manager:**
- Ioná Zimberg
- Viviana Guajardo

Local PIs:
- Attilio Rigotti
- Lilia Yadira Cortés Sanabria
- Martha Yépez García
- Rossina Pareja Torres
- Marianella Herrera-Cuenca

External advisors

- Michael Pratt
- Luis A. Moreno
- Berthold Koletzko
- Katherine L. Tucker

Expert Advisers

- **Accelerometry:** Claudia Alberico and Priscila Bezerra
- **Statistical analysis:** Alexandre Chiavegatto Filho
- **NDS-R:** Natasha França and Agatha Previdelli

Global IPSOS
ELANS Working Group
This research is funded by The Coca-Cola Company.
Thank you

mauro.fisberg@gmail.com