ILSI LA collaborative research - The ELANS

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Interest Disclosure

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- The funders had no role in study design, data collection, analysis, the decision to publish, or the preparation of data for workshops or manuscripts. This manuscript do represent the original idea of all authors and do not necessarily represent ILSI views.
LATIN AMERICA HAS THE WORST SCENARIOS OF OBESITY FOR COUNTRIES IN EMERGING REGIONS BY 2030.

An Ecological Model of Diet, Physical Activity, and Obesity

**Influences**

**Biological & Demographic**
- Age, sex, race/ethnicity, SES, genes

**Psychological**
- Beliefs, preferences, emotions, self-efficacy, intentions, pros, cons, behavior change skills, body image, motivation, knowledge

**Social/Cultural**
- Social support, modeling, family factors, social norms, cultural beliefs, acculturation

**Organizational**
- Practices, programs, norms, & policies in schools, worksite, Health care settings, businesses, community orgs

**Physical Environment**
- Access to & quality of foods, recreational facilities, cars, sedentary entertainment; urban design, transportation infrastructure, information environment

**Policies/Incentives**
- Cost of foods, physical activities, & sedentary behaviors; incentives for behaviors; regulation of environments

**Behaviors**

**Eating**
- Dietary patterns, nutrient intake

**Sedentary Behaviors**
- TV, computer use, driving

**Physical Activity**
- Recreation, transportation, occupation, domestic

**Energy Balance**

**Health Outcomes**

**Body Weight, Fat, & Distribution**

**Risk Factors, CVD, Diabetes, Cancers, Costs**
• 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.
<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>
Latin American Study of Nutrition and Health

Aims

• Provide up-to-date reliable and comparable data of dietary intake, physical activity, and its association with anthropometric profile among representative urban populations of eight Latin American countries (~ 40% of the population of the Americas);

• Measure variations by region, cultural background, socioeconomic status, age and gender;

• Add new scientific-based evidence to describe the interplay among energy intake, energy expenditure, and anthropometric measurements.
ELANS work group

8 PIs and Teams

4 Advisors

2 Project manager

Central IRB
Western Institutional Review Board
(#20140605)

Local IRB

Clinical Trials
(#NCT02226627)
Overall Design and Methods

**Sample:**
- 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)

- Socioeconomic level (SEL): high, medium and low.
Latin American Study of Nutrition and Health (ELANS): rationale and study design


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SECTION

Energy balance-related behaviors

Metrics

Article accesses: 2926
Variables

**INTAKE**
- Two 24-hours dietary recall
- Beverage intake questionnaire

**EXPENDITURE**
- IPAQ-Long Questionnaire
- Accelerometry

**ANTHROPOMETRY**
- Body weight
- Height
- Waist, hip and neck circumferences
Dietary assessment

24-h recall

[Diagram of USDA 5-Step Multiple-Pass Method]

Step 1: Quick List
- ... reports an uninterrupted listing of all foods and beverages consumed

Step 2: Forgotten Foods List
- ... answers a series of 5 food category questions for additional foods

Step 3: Time and Occasion
- ... answers the time they consumed foods and what they called eating occasions

Step 4: Detail Cycle
- ... provides descriptions and amounts of each food reported...reviews each occasion and times between occasions

Step 5: Final Review Probe
- ... a final probe for anything else consumed

[Table for recording dietary intake]

<table>
<thead>
<tr>
<th>TIME</th>
<th>MEAL</th>
<th>PLACE</th>
<th>FOODS &amp; DEVIATIONS</th>
<th>METODOLOGY OF PREPARATION</th>
<th>SERVING SIZE</th>
</tr>
</thead>
</table>

[Images of kitchen utensils and food portions]

[Additional text on the right side, not fully visible]
Dietary assessment

Beverage intake questionnaire

<table>
<thead>
<tr>
<th>BEVERAGES INTAKE</th>
<th>How often do you drink?</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NON-ALCOHOLIC BEVERAGES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water sparkling/still</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Flavored water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sugar free</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>with sugar or fruit</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Carbonated beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>common (cola, lemon, etc)</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Light/Zero (cola, lemon, etc)</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Energy drinks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>isotonic (e.g. Gatorade)</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>vitamin drinks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit juices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>juice powder or sugar</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>fresh fruit juice with pulp 24%</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td><strong>ALCOHOLIC BEVERAGES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beer lager/ stout</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Wine (white/red)</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Sparkling (champagne)</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>others Vodka; Whisky; Tequilas</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td><strong>INFUSIONS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With out sugar or with sweetener 0%</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>With sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With out sugar or with sweetener 0%</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>With sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without sugar or with sweetener 0%</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>With sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With low fat milk</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Whole milk</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
<tr>
<td>Espresso</td>
<td>N-1-2-3-4-6-7-8-9-10</td>
<td>D-W-M</td>
</tr>
</tbody>
</table>

*The serving will be obtained from the 24 hrs recall*
Standardization of the Food Composition Database Used in the Latin American Nutrition and Health Study (ELANS)

Irina Kovalskys 1,*, Mauro Fisberg 2,*, Georgina Gómez 3, Atilio Rigotti 1,
Lilia Yadira Cortés 1, Martha Cecilia Yépez 1, Rossina G. Pareja 4,
Maricel Herrera-Cuenca 1, Ioná Z. Zimberg 5, Katherine L. Tucker 1, Berthold Koletzko 1,6,
Michael Pratt 1, on behalf of the ELANS Study Group 1

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3 Fundação Jose Luiz Egydio Setubal, Hospital Infantil Sabara, Instituto Pensi, Av Angelica 1968, São Paulo 01239-040, Brazil; E-Mail: mauro.fisberg@gmail.com
4 Centro de Atendimento e Apoio ao Adolescente, Departamento de Pediatría, Universidade Federal de São Paulo, R. Botucatu 715, São Paulo 04023-062, Brazil
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6 Departamento de Nutrición, Diabetes y Metabolismo, Centro de Nutrición Molecular y Enfermedades Crónicas, Escuela de Medicina, Pontificia Universidad Católica, Santiago 833-0024, Chile; E-Mail: arigotti@med.puc.cl
7 Departamento de Nutrición y Bioquímica, Pontificia Universidad Javeriana, Carrera 7 # 43-82 ofc 52-613, Bogotá, Colombia; E-Mail: yeortes@javeriana.edu.co
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Food standardization procedures.
Nutrient and Food Group Calculation Software

Identification of foods commonly consumed in each country
- According to national food consumption data available and pilot study

Food matching
- Nutritional equivalency of local food items (food, beverages) to foods available in NDS-R database
- Identical or very similar food nutrient composition

If the food item is not available in NDS-R database

Development of recipe files
- Broken down into ingredients and entered into the software

Documentation of food matching
- According to a common format in excel

Nutrition Data System for Research
2013
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University of Minnesota
Nutrition Coordinating Center
Epidemiology and Community Health
Minneapolis, Minnesota

ILSI
**Food and Drink Standarization.**  
**By country**

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of food and drink preparations</th>
<th>Agreement Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food</td>
<td>Recipes</td>
</tr>
<tr>
<td>Argentina</td>
<td>638</td>
<td>195</td>
</tr>
<tr>
<td>Brazil</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>Peru</td>
<td>652</td>
<td>281</td>
</tr>
<tr>
<td>Venezuela</td>
<td>291</td>
<td>44</td>
</tr>
</tbody>
</table>

4730 total food standardized
Need to evaluate those plausible reporters - exclusion of under and over reporters

PREVIDELLI, A. N. et al.
Physical activity measures-IPAQ

- Validated for physical activity in Latin America;
- The Mexican (Spanish) version of IPAQ (Salvo et al, 2014) was adapted for all countries of ELANS
- Only the sections leisure-time and transport physical activity (LTPA and TPA) were included;

Outcomes:
- Total vigorous, moderate, sedentary time in minutes/week
- Transport and Leisure time vigorous, moderate, sedentary time in minutes/week
- Differentiation by week and weekend
Physical activity measure - Accelerometry

- 40% of the sample
- Objectively monitor physical activity and inactivity
- Accelerometer (model GT3X+, ActiGraph, Pensacola, FL, USA)
- Elasticized belt at hip level on the right mid-axillary line
- 7 days
Planning the Conduct of Multicenter Research

- Assure standardization
- Uniformity of procedures
- Important outcome measures
- Ethical approval by international and local IRB
- Sponsor role in the study

Selection of the sites and team

- Coordinating Center and External Advisors Committee responsibility
- Cooperation between institutions
- Develop infrastructure
- Funding

Data Quality

- Preparatory meetings
- Manual of operation
- Site visits
- Technical visits to participating centers
- Close monitoring of data collection and data entry
- Inconsistency checks

Dissemination of findings

- Plan of analysis
- Plan of communication
- Plan of publication
Developing a cooperative multicenter study in Latin America: Lessons learned from the Latin American Study of Nutrition and Health Project

Mauro Fisberg,1 Irina Kovalskys,2 Georgina Gómez Salas,3 Rossina Gabriella Pareja Torres,4 Martha Cecilia Yépez García,5 Lila Yadira Cortés Sanabria,6 Marianella Herrera-Cuenca,7 Attilio Rigotti,8 Viviana Guajardo,9 Ioná Zalcman Zimberg,9 Agatha Nogueira Previdelli,10 Luis A. Moreno,11 Michael Pratt,12 Berthold Koletzko,13 Katherine L. Tucker,14 and the ELANS Study Group15

Suggested citation

ABSTRACT
This report examines the challenges of conducting a multicenter, cross-sectional study of countries with diverse cultures and shares the lessons learned. The Latin American Study of Nutrition and Health (ELANS) was used as a feasibility study involving the most populous cities of eight countries in Latin America (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Peru, and Venezuela). 2014-2015, about 40% of the population of the Americas. Sampling was conducted in May and June 2015 from 9 to 95 years of age, and was stratified by socioeconomic status.

Six principal challenges faced during the feasibility study were: developing a single methodology that was appropriate for different Latin American countries; data collection; and achieving a high rate of participation.
Publications

Primary Publications ELANS database (all Countries)

Descriptive article
Highlights from food habits, dietary intake, Physical activity level and associated factors

Secondary Publications ELANS database (all Countries)

Secondary approaches

Secondary Publications Local database (by each country)

To be defined by each country – It will be discussed with global team
Presentations and operational items with ILSI LA and regional branches support

19 abstracts at IUNS congress in 2017

2 workshops at IUNS

Many regional presentations
(Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Peru, Venezuela, and US)

Operational workshop with ILSI Latin America Branches and local health and education authorities

Support for publishing ELANS and regional papers

Support for statistical analysis, translation, certification and publishing
ELANS Applications and Future Directions

• Influence with Science based information on Public Health
  – Chronic disease prevention Programs
  – Fortification Programs
  – Drivers of Food Choice
  – Diet diversity interventions….and more
  – New data arriving from Mexico (EMANS)
  – Paraguay prospecting workshop and participation

• Answering health and also environmental questions
  – i.e. Sustainability of the LA diet?
  – Biological vs cultural preferences ?
  – Comparative data with other data basis
  – ...... many more....

• One ILSI opportunity ! LA integration of branches
  – Diet composition, recipes , potential future open data, regional workshops, political influence....
ELANS Working Group and ILSI members
Main results and next steps
ELANS: Overall Study Sample sociodemographics

ARGENTINA: n = 1,266
BRAZIL: n = 2,000
CHILE: n = 879
COLOMBIA: n = 1,230
COSTA RICA: n = 798
ECUADOR: n = 800
PERU: n = 1,113
VENEZUELA: n = 1,132

SEX

52.2% Average age 37.0 yr old
47.8% Average age 34.5 yr old

AGE DISTRIBUTION

13.1% 15-19 yrs old
37.7% 20-34 yrs old
28.5% 35-49 yrs old
20.5% 50-65 yrs old

EDUCATION

9.5% University or higher
29.2% Middle-high school
60.1% Lower school
1.2% None

SOCIOECONOMIC LEVEL (SEL)

42% High
43% Medium
15% Low

SEX

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60.1% Lower school
1.2% None

SOCIOECONOMIC LEVEL (SEL)

42% High
43% Medium
15% Low
ELANS: Body Mass Index

Body Mass Index (kg/m²)

<table>
<thead>
<tr>
<th>Country</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>24.80</td>
<td>26.40</td>
</tr>
<tr>
<td>Peru</td>
<td>25.71</td>
<td>26.71</td>
</tr>
<tr>
<td>Brasil</td>
<td>25.06</td>
<td>25.76</td>
</tr>
<tr>
<td>Ecuador</td>
<td>25.75</td>
<td>26.76</td>
</tr>
<tr>
<td>Argentina</td>
<td>27.09</td>
<td>27.75</td>
</tr>
<tr>
<td>Venezuela</td>
<td>27.25</td>
<td>27.62</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>27.50</td>
<td>28.60</td>
</tr>
<tr>
<td>Chile</td>
<td>28.30</td>
<td>29.60</td>
</tr>
</tbody>
</table>

p > 0.05 between sexes among all countries

60% Excess weight
ELANS: Overweight and Obesity

Prevalence (%) of Overweight and Obesity

<table>
<thead>
<tr>
<th>Country</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>46.43</td>
<td>54.70</td>
</tr>
<tr>
<td>Argentina</td>
<td>58.10</td>
<td>58.29</td>
</tr>
<tr>
<td>Brazil</td>
<td>55.31</td>
<td>60.78</td>
</tr>
<tr>
<td>Ecuador</td>
<td>52.14</td>
<td>68.73</td>
</tr>
<tr>
<td>Peru</td>
<td>54.30</td>
<td>66.27</td>
</tr>
<tr>
<td>Venezuela</td>
<td>61.69</td>
<td>62.24</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>57.36</td>
<td>68.81</td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELANS</td>
<td>54.43</td>
<td>62.47</td>
</tr>
</tbody>
</table>
Mean energy intake (Kcal/d) by country

Kcal/d

Argentina: 2103
Brasil: 1866
Chile: 1781
Peru: 2031
Colombia: 2036
Costa Rica: 1893
Ecuador: 2110
Venezuela: 1887
ELANS: 1959
Mean energy intake (Kcal/d) by sex

(p < 0.001)
Source of energy intake (big group)

- **Grains, Pasta and Bread**
- **Meat (not processed) and Eggs**
- **Oils, Fats and Dressings**
- **Non-alcoholic beverages - RTD**
- **Non-alcoholic beverages - Homemade**
- **Processed Meat**
- **Cookies, Crackers, Popcorn, Breakfast cereal**
- **Milk, Yogurt and Soy milk**
- **Roots**
- **Beans, Legumes and Soybeans**
- **Sugars and Sweets**
- **Dairy products**
- **Tortillas/Tacos/Turnovers**
- **Vegetables**
- **Others**
- **Nuts & Seeds**
- **Pizza**
Mean fruit and vegetable intake by country and gender (g/d)

![Bar chart showing mean fruit and vegetable intake by country and gender (g/d)]
The distribution of energy throughout the day in the different meal times does not have a homogeneous distribution among the eight countries.
Micronutrients deficiency (%)

- **Iron**
  - Female: 1.5%
  - Male: 6.2%
  - Total: 10.58%

- **Vitamin C**
  - Female: 35.9%
  - Male: 43.4%
  - Total: 39.5%

- **Vitamin A**
  - Female: 44.2%
  - Male: 51.9%
  - Total: 60.4%

- **Calcium**
  - Female: 81.67%
  - Male: 85.5%
  - Total: 88.98%

- **Vitamin D**
  - Female: 98.5%
  - Male: 97.9%
  - Total: 98.3%
Dietary quality

Based on relatively high consumption of healthy foods and low consumption of unhealthy foods
Impact of socioeconomic status

ELANS  | Argentina  | Venezuela  | Chile  | Colombia  | Brazil  | Costa Rica  | Ecuador  | Perú
--- | --- | --- | --- | --- | --- | --- | --- | ---
57.9 | 57.1 | 55.3 | 57.7 | 58.5 | 58.0 | 58.9 | 59.0 | 58.3
56.8 | 56.8 | 54.3 | 56.8 | 56.7 | 56.5 | 57.7 | 57.0 | 58.3
55.6 | 55.1 | 53.3 | 53.4 | 55.4 | 55.8 | 57.0 | 57.9 | 58.7

High | Middle | Low
Physical Activity

Active vs Inactive (IPAQ by age and sex)

Physical Activity Level (IPAQ) by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 19 y.o.</td>
<td>52%</td>
<td>48%</td>
<td>48%</td>
</tr>
<tr>
<td>20 to 34 y.o.</td>
<td>57%</td>
<td>43%</td>
<td>52%</td>
</tr>
<tr>
<td>35 to 49 y.o.</td>
<td>58%</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>50 to 65 y.o.</td>
<td>45%</td>
<td>40%</td>
<td>51%</td>
</tr>
</tbody>
</table>

Insuf.active vs Active
Accelerometers: MVPA (Moderate vigorous Physical Activity)

Minutes of MVPA by Week for Men by Age Range
ELANS Total Sample
- Lower Limit
- Media
- Upper Limit

Minutes of MVPA by Week for Women by Age Range
ELANS Total Sample
- Lower Limit
- Media
- Upper Limit
In summary

• 34.4% are obese and 60% have excess weight, with the higher rate observed in Chile and the lower in Colombia.

• Mean energy intake varies among countries, sex and age group.

• Low consumption of fruits and vegetables and other sources of micronutrients and fiber.

• High prevalence of vitamin A, calcium and vitamin D deficiency.

• Low diet quality score, that seems not to be related to social income, or nutritional status.

• Almost half of the participants were insufficiently active specially among adolescents
Other Approaches

- Individual associations with energy intake/expenditure:
  - (e.g.: gender, SEL, age, marital status, education)
- LA Costs of food supply
- Environmental and Social assoc. with weight and energy intake/expenditure:
  - (e.g.: income, violence and inequality)
- SEL, Gender or age diet associated behaviors
- Sleep time duration and obesity

- Alignment between nutrient and energy intake and dietary guidelines
- Misreporting of energy intake and associated factors
- Total added sugar consumption
- Sources of Nutrients

- HE I score Latam?
- Diet Quality Index
- Food Groups
- Food patterns
- Meals at home or outside
- Breakfast consumption
- Meal caloric density
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