Which consumption data are needed to perform risk-benefit assessment?

Duarte Torres
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EXPOSURE ASSESSMENT

The accuracy of any exposure assessment will ultimately depend on the precision in the two calculation inputs — chemical concentration and food intake.

\[
\text{EXPOSURE} = \text{CONCENTRATION} \times \text{INTAKE}
\]

INDIVIDUAL DIETARY SURVEYS → provide information on the distribution of food consumption in well-defined groups of individuals.
IAN-AF Sampling

**Sampling frame:** National Heath Registry (RNU)

**Target population:** Portuguese population aged 3 months to 84 years

Stratification by the 7 NUTS II

Sampling by stages

**Random selection of Primary Health Units** in each region, weighted by the number of registered individuals:

- 21 Units (North, Centre and Lisbon (AML))
- 12 Units (Alentejo and Algarve)
- 6 Units (Azores and Madeira)

**Random selection of registered individuals** in each Primary Health Unit, by sex and age group
IAN-AF participants

- Selected participants with valid contacts (n = 29,183)
  - Unknown Eligibility (n = 5,616)
  - Known Eligibility (n = 23,567)
    - Eligible (n = 19,635)
      - Non Eligible (n = 3,932)
        - Institutionalised (n = 231)
        - Living in Portugal for less than 1 year (n = 411)
        - Non-Portuguese speakers (n = 205)
        - Insufficient/incorrect information (n = 2,323)
        - Deceased (n = 82)
        - Cognitive deficits (n = 680)
    - Non participants (n = 13,082)
      - Refusals (n = 10,811)
      - Missed the appointment (n = 2,152)
      - Incomplete data (n = 119)
  - Participants (n = 6,553)
    - With only one interview (n = 734)
    - With both interviews (n = 5,819)
## Total sampling, by age group and gender

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Children</th>
<th>Adolescents</th>
<th>Adults</th>
<th>Elderly</th>
</tr>
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<tbody>
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<td></td>
<td></td>
<td>♂</td>
<td>♂</td>
<td>♂</td>
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<tr>
<td>Selected Participants (n)</td>
<td>29183</td>
<td>1923</td>
<td>952</td>
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<td>8336</td>
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<td>Unknown Eligibility (n)</td>
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<td>Known Eligibility (n)</td>
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<td>755</td>
<td>825</td>
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<tr>
<td>Eligible (n)</td>
<td>19635</td>
<td>1410</td>
<td>658</td>
<td>719</td>
<td>5725</td>
</tr>
<tr>
<td>Non Eligible (n)</td>
<td>3932</td>
<td>125</td>
<td>97</td>
<td>106</td>
<td>934</td>
</tr>
<tr>
<td>Contact rate (%) ¹</td>
<td>77.8%</td>
<td>78.4%</td>
<td>77.9%</td>
<td>77.0%</td>
<td>81.5%</td>
</tr>
<tr>
<td>Participants 1st interview (n)</td>
<td>6553</td>
<td>769</td>
<td>746</td>
<td>351</td>
<td>348</td>
</tr>
<tr>
<td>Cooperation rate (%) ²</td>
<td>33.4%</td>
<td>54.5%</td>
<td>52.4%</td>
<td>53.3%</td>
<td>48.5%</td>
</tr>
<tr>
<td>Participation rate (%) ³</td>
<td>26.0%</td>
<td>42.8%</td>
<td>40.8%</td>
<td>41.1%</td>
<td>39.5%</td>
</tr>
<tr>
<td>Participants 2 interviews (n)</td>
<td>5819</td>
<td>669</td>
<td>661</td>
<td>319</td>
<td>313</td>
</tr>
<tr>
<td>Cooperation rate (%) ²</td>
<td>29.6%</td>
<td>47.4%</td>
<td>46.5%</td>
<td>48.5%</td>
<td>43.6%</td>
</tr>
<tr>
<td>Participation rate (%) ³</td>
<td>23.0%</td>
<td>37.2%</td>
<td>36.2%</td>
<td>37.3%</td>
<td>35.5%</td>
</tr>
</tbody>
</table>

1. **Contact Rate** = eligible/(eligible + unknown eligible individuals);
2. **Cooperation Rate** = participants/ eligible individuals;
3. **Participation Rate** = participants/(eligible + unknown eligible individuals).
Assessment Dimensions

IAN-AF 2015-2016

- Eating behaviors
- Food consumption and nutritional intake
- Use of nutritional supplements
- Physical activity levels
- Sedentary behaviors
- Food security
- Sociodemographics and general health
- Anthropometry

Dimensions:

- Anthropometry
- Food consumption and nutritional intake
- Use of nutritional supplements
- Physical activity levels
- Sedentary behaviors
- Food security
- Sociodemographics and general health

- Eating behaviors
NATIONAL FOOD CONSUMPTION SURVEY (IAN-AF)

Electronic Platform
For management and conducting interviews

Information collection by trained interviewers using a computer-assisted personal interview (CAPI): OCT 2015- SEPT 2016
### Modules

#### You

- Socio-demographics (SD)
  - Age groups (years): 3 m-2, 3-5, 6-9, 10-14, 15-17, 18-64, 65-84
  - SD1, SD1, SD1, SD2, SD2, SD3, SD3, SD3

- General health (G)
  - G1, G2, G2, G3, G3, G4, G4, G5

- Anthropometry (A)
  - A1, A2, A2, A2, A2, A2, A2, A3

- Food Security (FS)*
  - FS, FS, FS, FS

- FFQ
  - FFQ1, FFQ1, FFQ2, FFQ2, FFQ2, FFQ2, FFQ2, FFQ3

#### Eat24

- Food dairies (FD)
  - FD1, FD2, FD2, - , - , - , - , -

- 24-h recall 1 (24h)
  - 24h, 24h, 24h, 24h, 24h

- 24-h recall 2 (24h)
  - 24h, 24h, 24h, 24h, 24h

#### Move

- Physical activity diaries (PAD)
  - PAD1, PAD2, - , - , - , -

- Physical activity**
  - PA1, PA2, PA3, PA4, PA5, PA5, PA6

---

**FFQ**: Food frequency questionnaire

*Assessed by the Household Food Security (HFS) survey.

**Assessed by the IPAQ and Sedentary behaviours.
IAN-AF - 24h recall methodology (5 steps)

1. Quick List
   - Meal; hour; place
   - items consumed (foods, recipes, supplements)
   - Special diet; special day

2. Probe questions for foods forgotten during the Quick List

3. Foods (2479), recipes (1696) and supplements (117)
   description and quantification.
   - Description using Facets and descriptors (FOODEX2, other facets); quantification by Photos; household measures; standard units; volume; weight; default

4. New probe question for forgotten foods

5. Final quality control
   - Overall review; validity verification
FOODEX2 - food description system

<table>
<thead>
<tr>
<th>FACETS IN THE eAT24 (non-implicit)</th>
<th>OTHER FACETS_FoodEx2 (implicit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source</td>
<td>2 Part-nature</td>
</tr>
<tr>
<td>3 Physical-state</td>
<td>5 Flavour-note</td>
</tr>
<tr>
<td>4 Ingredient</td>
<td>7 Fat-content</td>
</tr>
<tr>
<td>6 Surrounding-medium</td>
<td>8 Sweetening-agent</td>
</tr>
<tr>
<td>9 Fortification-agent</td>
<td>11 Alcohol-content</td>
</tr>
<tr>
<td>10 Qualitative-info</td>
<td>12 Dough-Mass</td>
</tr>
<tr>
<td>10.1 Sugars-related info</td>
<td>14 Final-preparation</td>
</tr>
<tr>
<td>10.2 Fat-related info</td>
<td>16 Structural-treatment</td>
</tr>
<tr>
<td>13 Cooking-method</td>
<td>18 Packaging format</td>
</tr>
<tr>
<td>15 Preservation-technique</td>
<td>21 Production-method</td>
</tr>
<tr>
<td>17 Extent-of-cooking</td>
<td>24 Intended-use</td>
</tr>
<tr>
<td>19 Packaging material</td>
<td>25 Risky-Ingredient</td>
</tr>
<tr>
<td>20 Part consumed analysed</td>
<td>26 Generic-term</td>
</tr>
<tr>
<td>22 Preparation production place</td>
<td>27 Source-commodities</td>
</tr>
<tr>
<td>23 Target-consumer (only for supplements)</td>
<td>28 Process</td>
</tr>
<tr>
<td>29 Purpose of raising</td>
<td>30 Reproductive level</td>
</tr>
<tr>
<td></td>
<td>31 Animal age class</td>
</tr>
<tr>
<td></td>
<td>32 Gender</td>
</tr>
<tr>
<td></td>
<td>33 Legislative classes</td>
</tr>
</tbody>
</table>
APPLICATION OF THE FOODEX2 CLASSIFICATION AND DESCRIPTION SYSTEM

FACET: PACKAGING MATERIAL
APPLICATION OF THE FOODEX2 CLASSIFICATION AND DESCRIPTION SYSTEM

FACET: COOKING METHOD

cozido

processado
formado
Assado
tostado
micro-ondas
guisar
frito
confeccionado
estufado
refogar/estragir
roquecido
gordura
chapa/poeira
APPLICATION OF THE FOODEX2 CLASSIFICATION AND DESCRIPTION SYSTEM

FACET: EXTENT OF COOKING
Prevalence of use food / nutritional supplements in the last 12 months (previous month in children)
EATING BEHAVIORS SUPPLEMENTATION – ALL INDIVIDUALS
EATING BEHAVIORS
SUPPLEMENTATION – FEMALES
EATING BEHAVIORS
SUPPLEMENTATION – MALES

Proteína Whey
Multivitaminas
Vitamina D3
Sais Minerais

Omega 3
Ácidos Gordos
Glucosamina
Ácido Ascórbico
Vitamina C
Vitamina E
Condroitina
Aminoácidos
Magnezio
Cálcio
EPA
Ferro

Iniciativas
Saúde Pública

carnaf
EATING BEHAVIORS SUPPLEMENTATION – CHILDRENS

VitaminaD3

VitaminaC | Ferro | ÁcidoAscorbico | Multivitaminas
EATING BEHAVIORS
SUPPLEMENTATION – TEENAGERS

SaisMinerais
Vitamina 03
ÁcidoAscórbico
VitaminaC
ÁcidosGordos
Magnésio
Omega 3
Omega
ProteínaWhey
Multivitaminas
EATING BEHAVIORS
SUPPLEMENTATION – ADULTS
EATING BEHAVIORS
SUPPLEMENTATION – ELDERLY
METHODS - EXPOSURE ASSESSMENT
MATCHING FOOD INTAKE DATABASES WITH DATABASES OF CHEMICAL CONCENTRATION IN FOODS

Individual data from IAN-AF

 datasets on nutrient composition of foods, chemicals and microbials occurrence in foods
# Energy intake (IAN-AF 2015-2016), by age group and sex

<table>
<thead>
<tr>
<th>Energia</th>
<th>Nacional</th>
<th>Crianças (&lt;10 anos)</th>
<th>Adolescentes (10-17 anos)</th>
<th>Adultos (18-64 anos)</th>
<th>Idosos (65-84 anos)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Mulheres</td>
<td>Homens</td>
<td>Total</td>
<td>Mulheres</td>
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<tr>
<td>kcal</td>
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<td></td>
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<tr>
<td>Média</td>
<td>1910</td>
<td>1635</td>
<td>2228</td>
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<tr>
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<td>2352</td>
<td>3279</td>
<td>2666</td>
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</table>
## Energy intake (IAN-AF 2015-2016), by region

<table>
<thead>
<tr>
<th>Energia</th>
<th>Norte</th>
<th>Centro</th>
<th>AM Lisboa</th>
<th>Alentejo</th>
<th>Algarve</th>
<th>RA Madeira</th>
<th>RA Açores</th>
</tr>
</thead>
<tbody>
<tr>
<td>kcal</td>
<td></td>
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<tr>
<td>Média</td>
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<td>1900</td>
<td>1908</td>
<td>1895</td>
<td>1905</td>
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<tr>
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<tr>
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<td>2905</td>
<td>2882</td>
<td>2899</td>
<td>2910</td>
<td>2913</td>
</tr>
</tbody>
</table>
Contributo dos grupos de alimentos para a ingestão energética diária (%)

- CEREAIS, DERIVADOS E TUBÉRULOS: 31,5%
- CARNES, PESCADO E OVOS: 17,1%
- PRODUTOS LÁCTEOS: 11,0%
- BOLACHAS, BOLOS E DOCES: 10,9%
- FRUTA E PRODUTOS HORTÍCOLAS: 9,6%
- ÓLEOS E GORDURAS: 9,5%
- BEBIDAS ALCOÓLICAS: 3,6%
- REFRIGERANTES E NÉCTARES: 2,4%
- SNACKS SALGADOS E PIZAS: 1,7%
CONCLUSIONS

• For the first time in Portugal we have representative data of individual food intake collected according to European standards;

• The actual Portuguese food consumption data can be matched with datasets on nutrient composition of foods, chemicals and microbials occurrence in foods, among other datasets, to estimate the distribution of exposure, where any percentile of interest can be calculated. The average contribution of each food or food category to the total exposure can also be estimated.
CONSORTIUM

INSTITUTIONAL SUPPORT

FUNDING

Programa EEA Grants – Iniciativas de Saúde Pública
Thank you for your attention!