Evaluation of the Acute and Chronic Food Consumption by the Brazilian Population through the Family Budget Survey (POF 2008-2009 – IBGE) to Assess Pesticide Dietary Exposure

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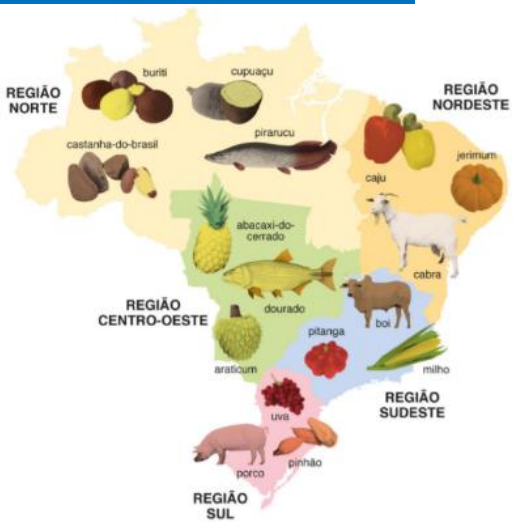
WG POF/ Task Force Agrochemicals ILSI Brazil

Planitox – The Science-based Toxicology Company

IBTox – Brazilian Institute of Toxicology



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DIETARY RISK ASSESSMENT OF FOOD PRODUCTS CONTAINING PESTICIDES RESIDUES

TOXICITY ASSESSMENT
Hazard identification
Dose-response Assessment

EXPOSURE ASSESSMENT
Pesticide Residue Level
FOOD CONSUMPTION

RISK CHARACTERIZATION
Estimation of the adverse effects likely to occur in a given population, including attendant uncertainties

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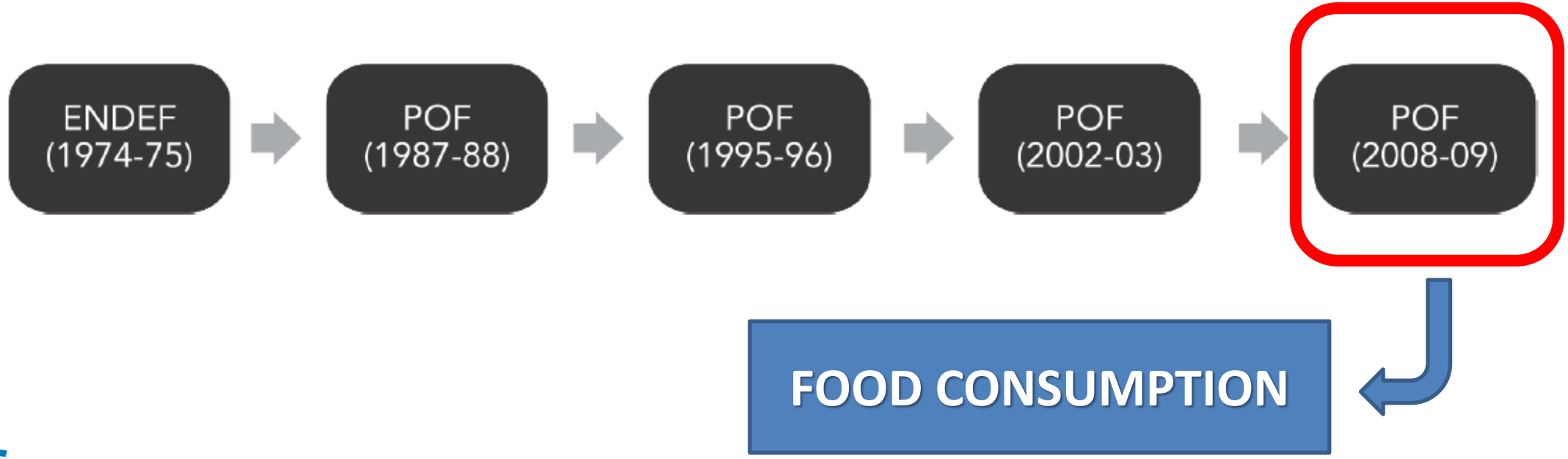
IBGE
Instituto Brasileiro de Geografia e Estatística

Brazilian Institute of Geography and Statistics

Family Budget Surveys (POF)



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Prepared Food

Processed Food

Raw Commodities (*in natura*)

Raw Commodities (*in natura*) - TOTAL

DIETARY RISK ASSESSMENT

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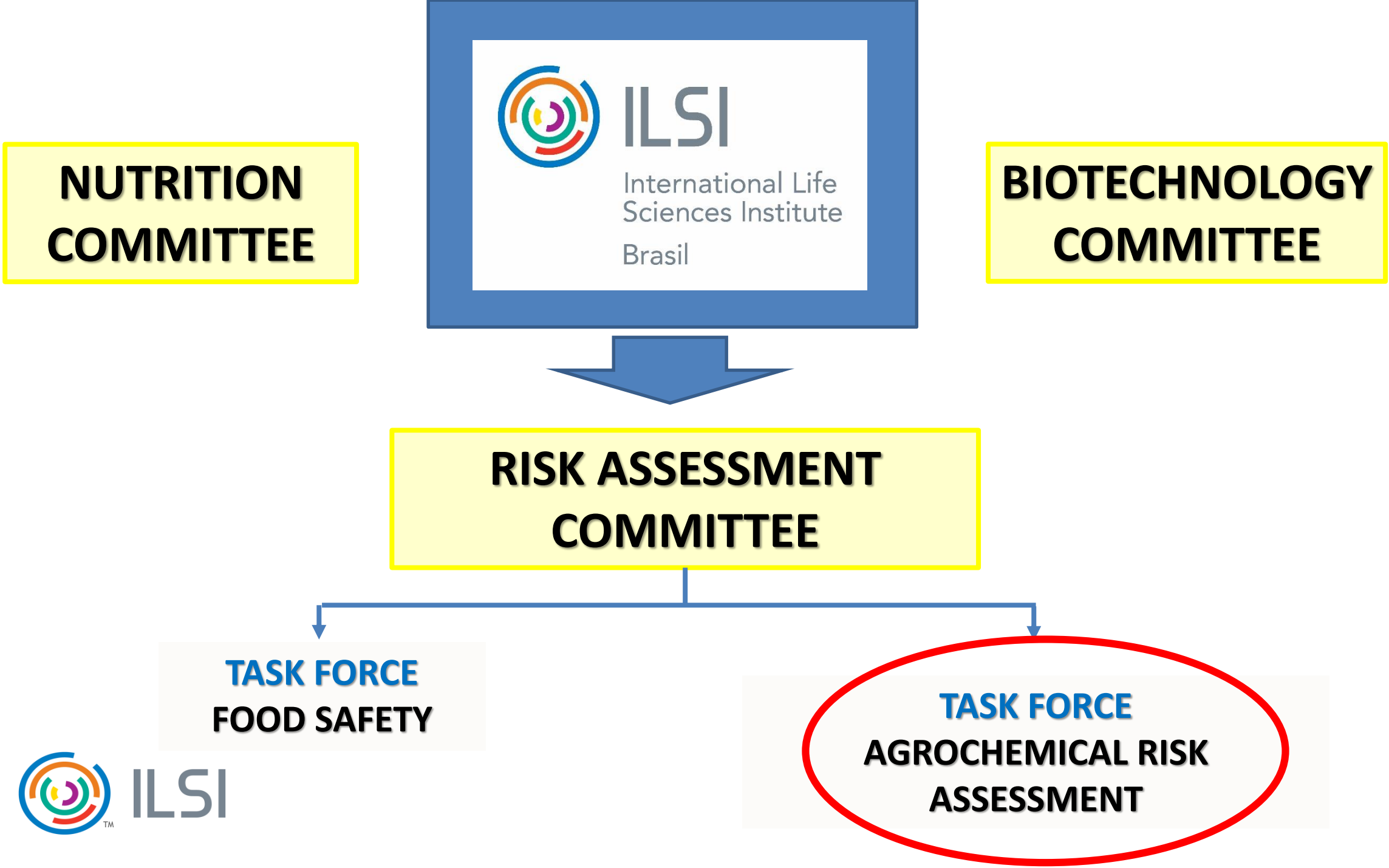
NUTRITION COMMITTEE
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International Life Sciences Institute
Brasil
BIOTECHNOLOGY COMMITTEE
RISK ASSESSMENT COMMITTEE
TASK FORCE
FOOD SAFETY
TASK FORCE
AGROCHEMICAL RISK ASSESSMENT
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- ✓ Carlos A. S. Ledo*
- ✓ Paulo T. Yatsuzuka

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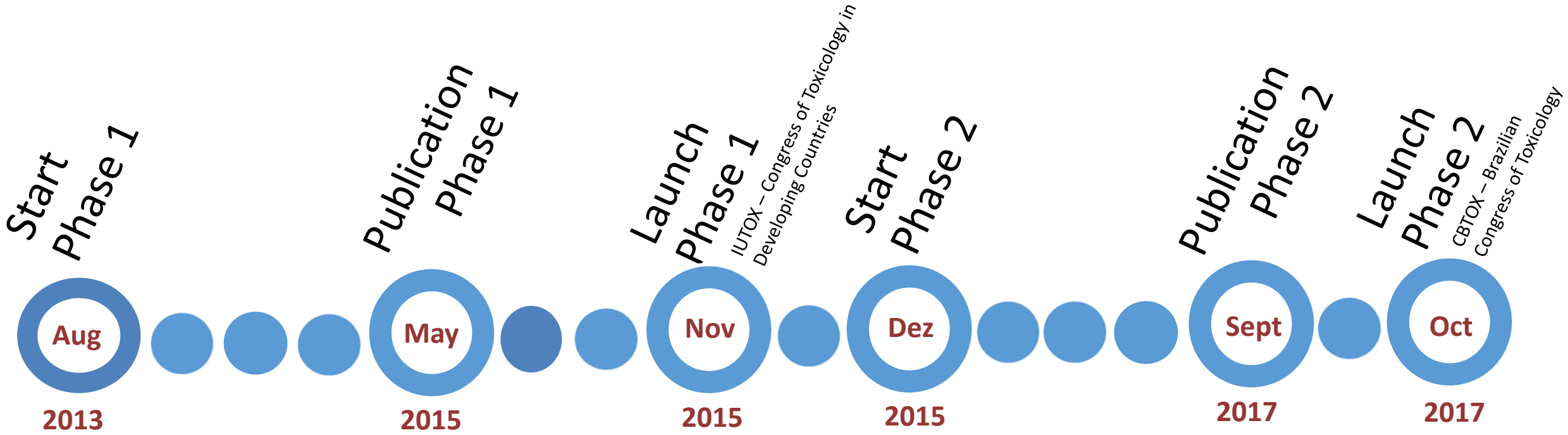
* 1ª phase

Timeline



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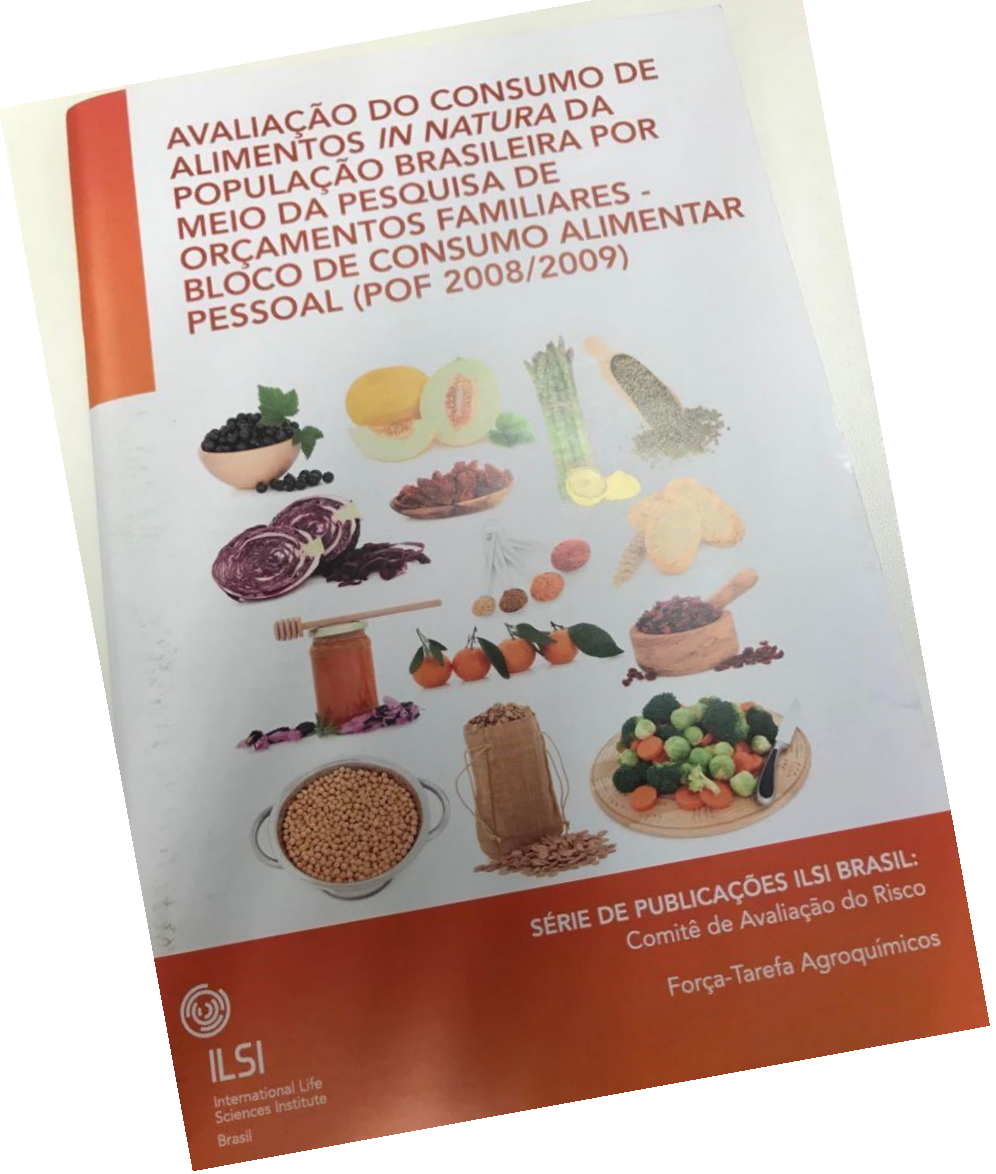

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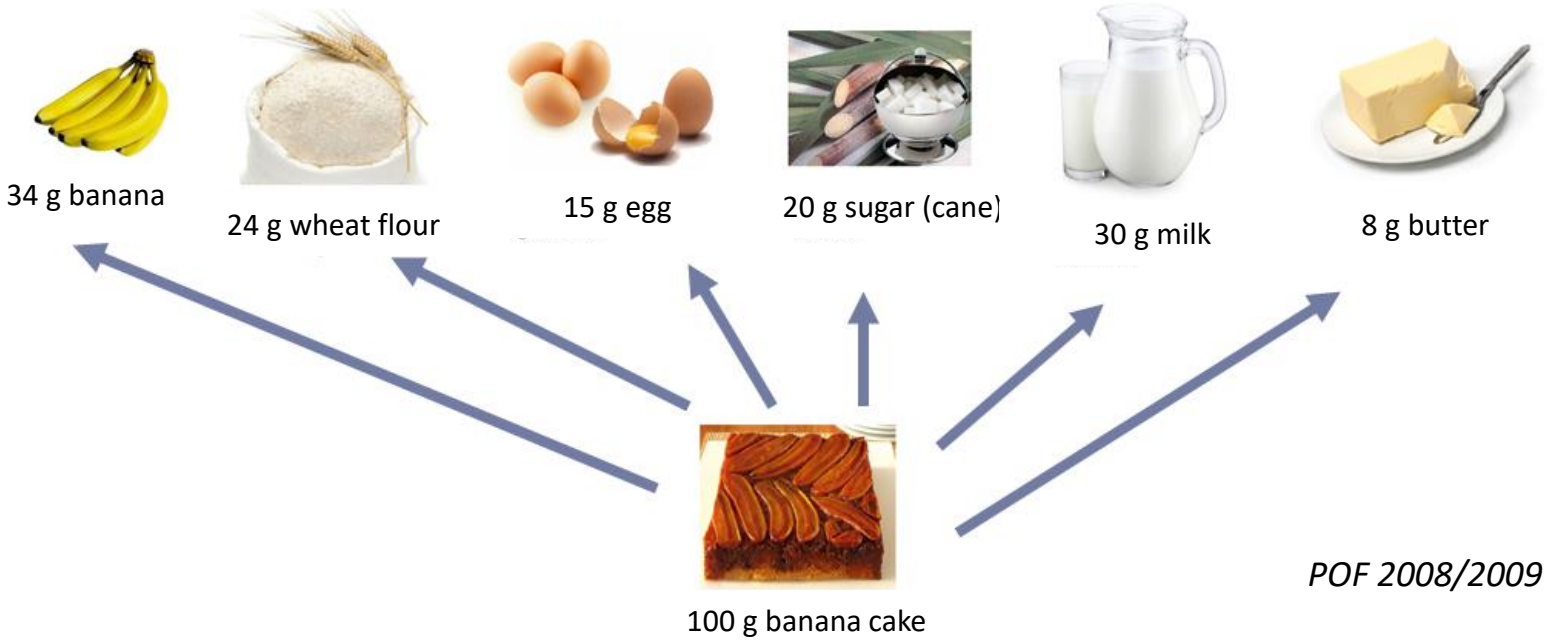
FIRST PHASE

MAIN OBJECTIVE

Calculate the daily **average consumption** of raw commodities by the Brazilian population in each of five main geographic regions (North, South, Middlewest, Northeast, and Southeast) with the objective of using these data in **chronic exposure evaluation** of chemical substances present in food products.

SPECIFIC OBJECTIVE

1- Disaggregate the prepared food products into their initial ingredientes (in percentage according to a standard recipe)



POF 2008/2009 / ILSI Brasil (2015)

SPECIFIC OBJECTIVE

2- Estimate the raw (*in natura) commodity* from processed food (processed food were linked to their respective raw or natural commodity;

3- Establish case-by-case premises (p.s.: alcoholic beverages);

4- Extract and adequate consumption data from POF-2008/2009 to obtain the average consumption;

5- Associate the ingredients from recipes with the consumption data to estimate the daily average food consumption in each of main Brazilian geographic regions.

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METHODOLOGY 01
Consumption Data from the first day

- First day presents better quality in the collection of information than the subsequent days;
- Statistical procedures used in the usual consumption estimates.

METHODOLOGY 02
Consumption Data considering the 2 days of the survey

- When interpersonal variability and individual consumption distribution are required (average consumption).

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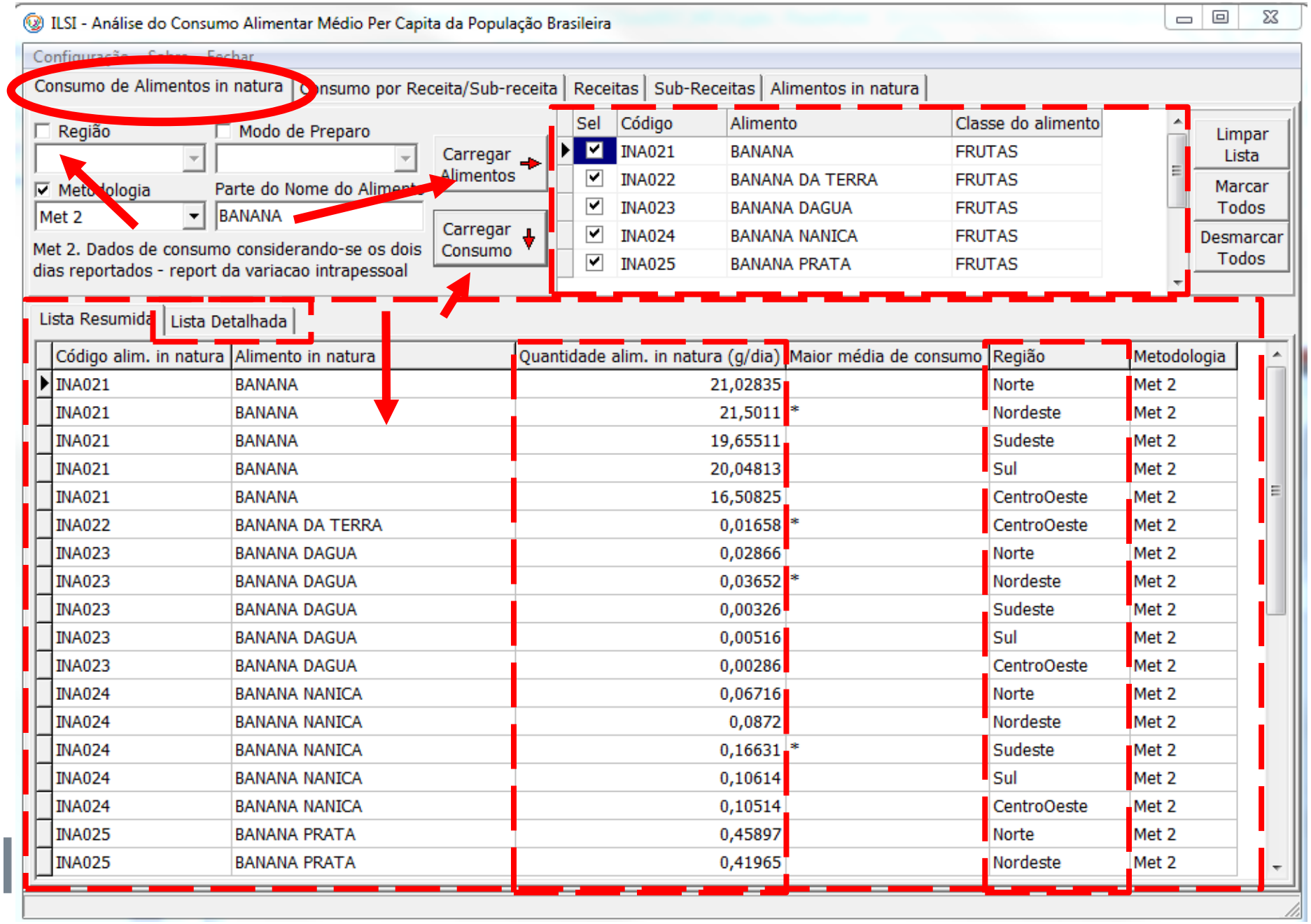
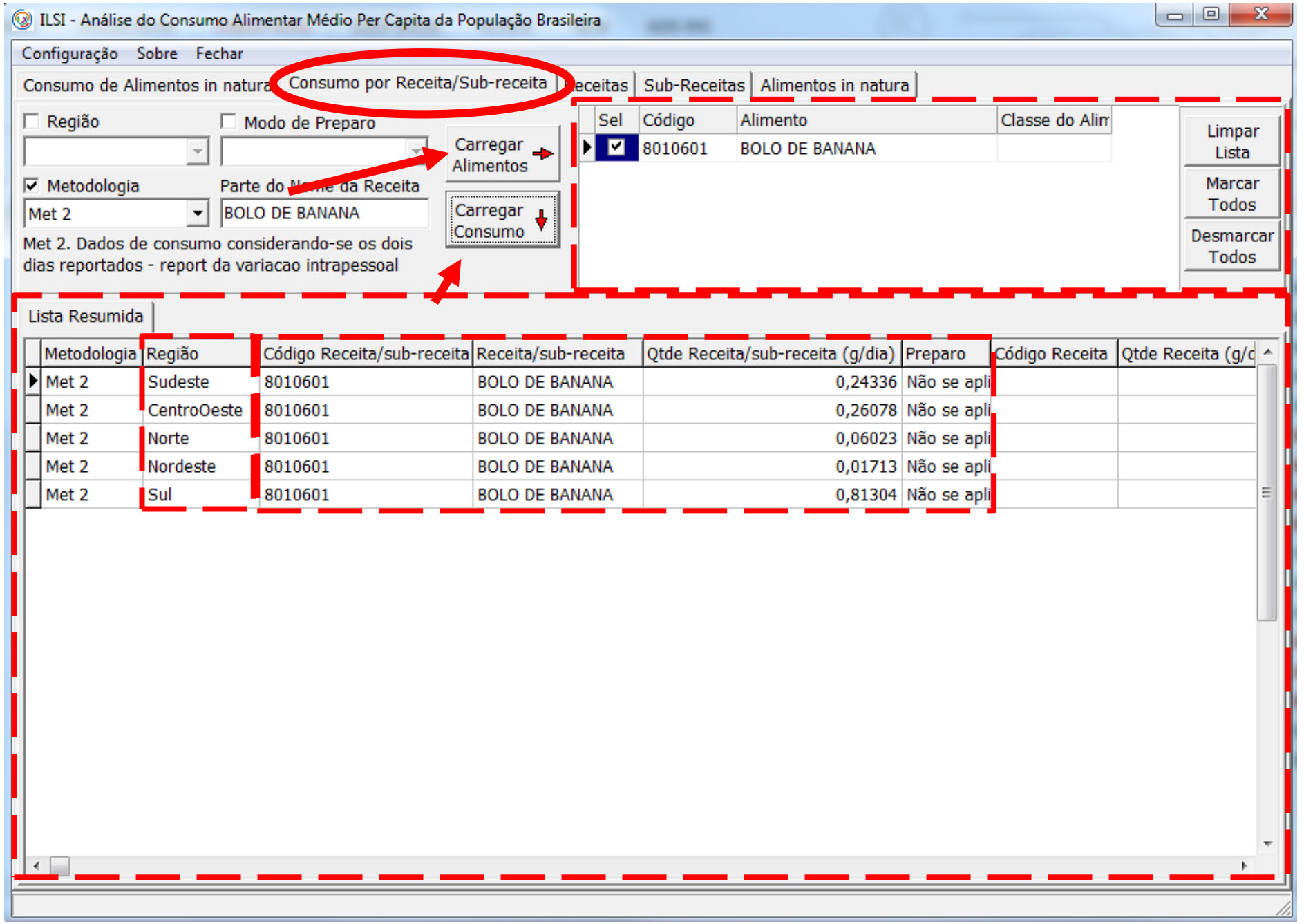
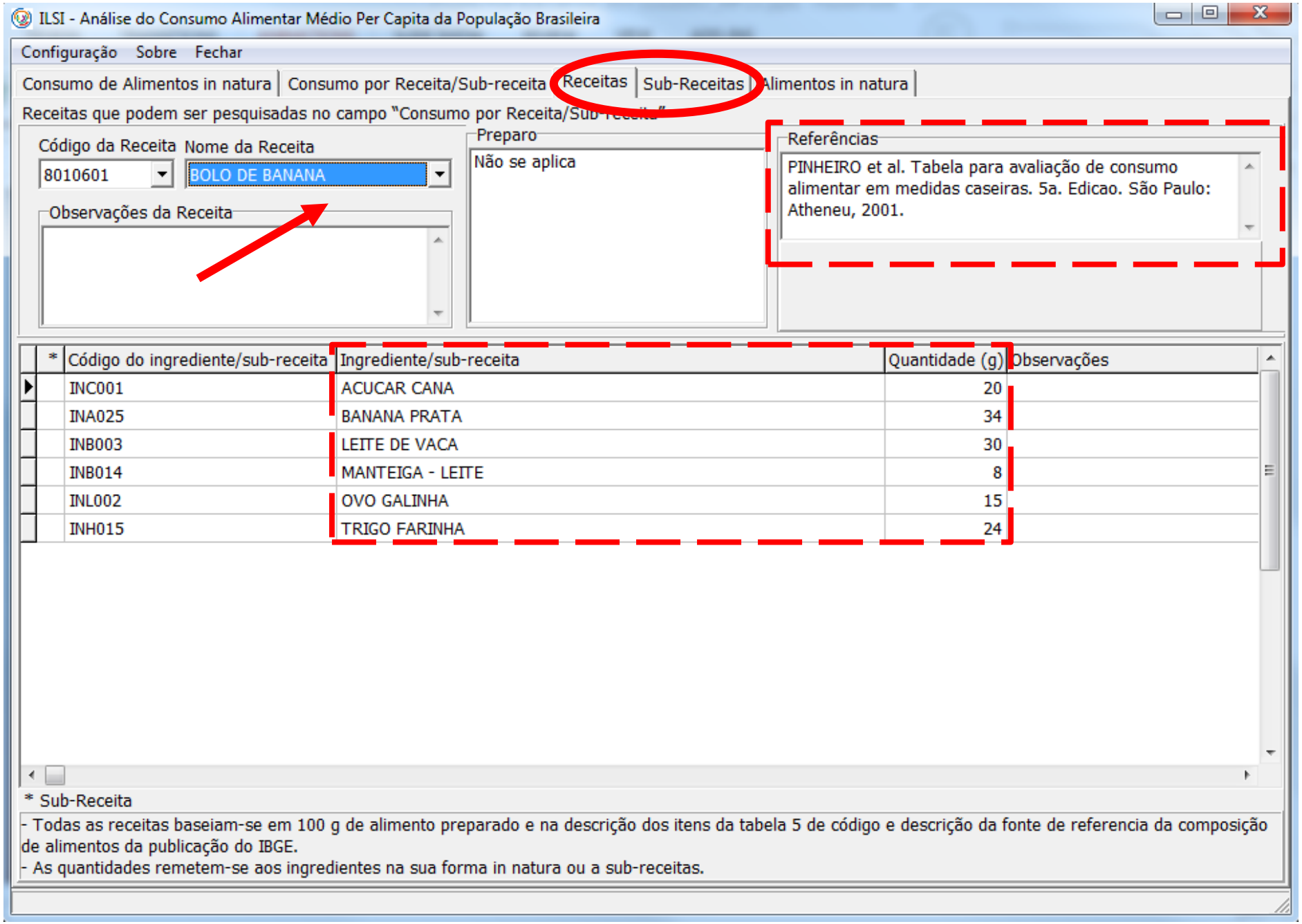

ILSI - Análise do Consumo Alimentar Médio Per Capita da População Brasileira
Consumo de Alimentos in natura
Consumo por Receita/Sub-receita
Receitas
Sub-Receitas
Alimentos in natura
Região
Modo de Preparo
Metodologia
Met 2
Parte do Nome do Alimento
BANANA
Carregar Alimentos
Carregar Consumo
Met 2. Dados de consumo considerando-se os dois dias reportados - report da variacao intrapessoal
Sel
Código
Alimento
Classe do alimento
INA021 BANANA FRUTAS
INA022 BANANA DA TERRA FRUTAS
INA023 BANANA DAGUA FRUTAS
INA024 BANANA NANICA FRUTAS
INA025 BANANA PRATA FRUTAS
Limpar Lista
Marcar Todos
Desmarcar Todos
Lista Resumida
Lista Detalhada
Código alim. in natura
Alimento in natura
Quantidade alim. in natura (g/dia)
Maior média de consumo
Região
Metodologia
INA021 BANANA 21,02835 Norte Met 2
INA021 BANANA 21,5011 * Nordeste Met 2
INA021 BANANA 19,65511 Sudeste Met 2
INA021 BANANA 20,04813 Sul Met 2
INA021 BANANA 16,50825 CentroOeste Met 2
INA022 BANANA DA TERRA 0,01658 * CentroOeste Met 2
INA023 BANANA DAGUA 0,02866 Norte Met 2
INA023 BANANA DAGUA 0,03652 * Nordeste Met 2
INA023 BANANA DAGUA 0,00326 Sudeste Met 2
INA023 BANANA DAGUA 0,00516 Sul Met 2
INA023 BANANA DAGUA 0,00286 CentroOeste Met 2
INA024 BANANA NANICA 0,06716 Norte Met 2
INA024 BANANA NANICA 0,0872 Nordeste Met 2
INA024 BANANA NANICA 0,16631 * Sudeste Met 2
INA024 BANANA NANICA 0,10614 Sul Met 2
INA024 BANANA NANICA 0,10514 CentroOeste Met 2
INA025 BANANA PRATA 0,45897 Norte Met 2
INA025 BANANA PRATA 0,41965 Nordeste Met 2


ILSI - Análise do Consumo Alimentar Médio Per Capita da População Brasileira
Configuração
Sobre
Fechar
Consumo de Alimentos in natura
Consumo por Receita/Sub-receita
eceitas
Sub-Receitas
Alimentos in natura
Região
Modo de Preparo
Carregar Alimentos
Metodologia
Met 2
Parte do Nome da Receita
BOLO DE BANANA
Carregar Consumo
Met 2. Dados de consumo considerando-se os dois dias reportados - report da variacao intrapessoal
Sel
Código
Alimento
Classe do Alim
8010601
BOLO DE BANANA
Limpar Lista
Marcar Todos
Desmarcar Todos
Lista Resumida
Metodologia
Região
Código Receita/sub-receita
Receita/sub-receita
Qtde Receita/sub-receita (g/dia)
Preparo
Código Receita
Qtde Receita (g/d
Met 2 Sudeste 8010601 BOLO DE BANANA 0,24336 Não se apli
Met 2 CentroOeste 8010601 BOLO DE BANANA 0,26078 Não se apli
Met 2 Norte 8010601 BOLO DE BANANA 0,06023 Não se apli
Met 2 Nordeste 8010601 BOLO DE BANANA 0,01713 Não se apli
Met 2 Sul 8010601 BOLO DE BANANA 0,81304 Não se apli


ILSI - Análise do Consumo Alimentar Médio Per Capita da População Brasileira
Configuração
Sobre
Fechar
Consumo de Alimentos in natura
Consumo por Receita/Sub-receita
Receitas
Sub-Receitas
Alimentos in natura
Receitas que podem ser pesquisadas no campo "Consumo por Receita/Sub-receita"
Código da Receita
8010601
Nome da Receita
BOLO DE BANANA
Observações da Receita
Preparo
Não se aplica
Referências
PINHEIRO et al. Tabela para avaliação de consumo alimentar em medidas caseiras. 5a. Edicao. São Paulo: Atheneu, 2001.
* Código do ingrediente/sub-receita
Ingrediente/sub-receita
Quantidade (g)
Observações
INC001 ACUCAR CANA 20
INA025 BANANA PRATA 34
INB003 LEITE DE VACA 30
INB014 MANTEIGA - LEITE 8
INL002 OVO GALINHA 15
INH015 TRIGO FARINHA 24
* Sub-Receita
- Todas as receitas baseiam-se em 100 g de alimento preparado e na descrição dos itens da tabela 5 de código e descrição da fonte de referencia da composição de alimentos da publicação do IBGE.
- As quantidades remetem-se aos ingredientes na sua forma in natura ou a sub-receitas.

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SECOND PHASE

MAIN OBJECTIVE

Calculate the highest **individual consumption** of raw commodities by the Brazilian population in each of five main geographic regions (North, South, Middlewest, Northeast, and Southeast) with the objective of using these data in **acute exposure evaluation** of chemical substances present in food products.

DIETARY EXPOSURE ASSESSMENT TO PESTICIDE RESIDUES

CHRONIC
DIETARY EXPOSURE

ACUTE
DIETARY EXPOSURE

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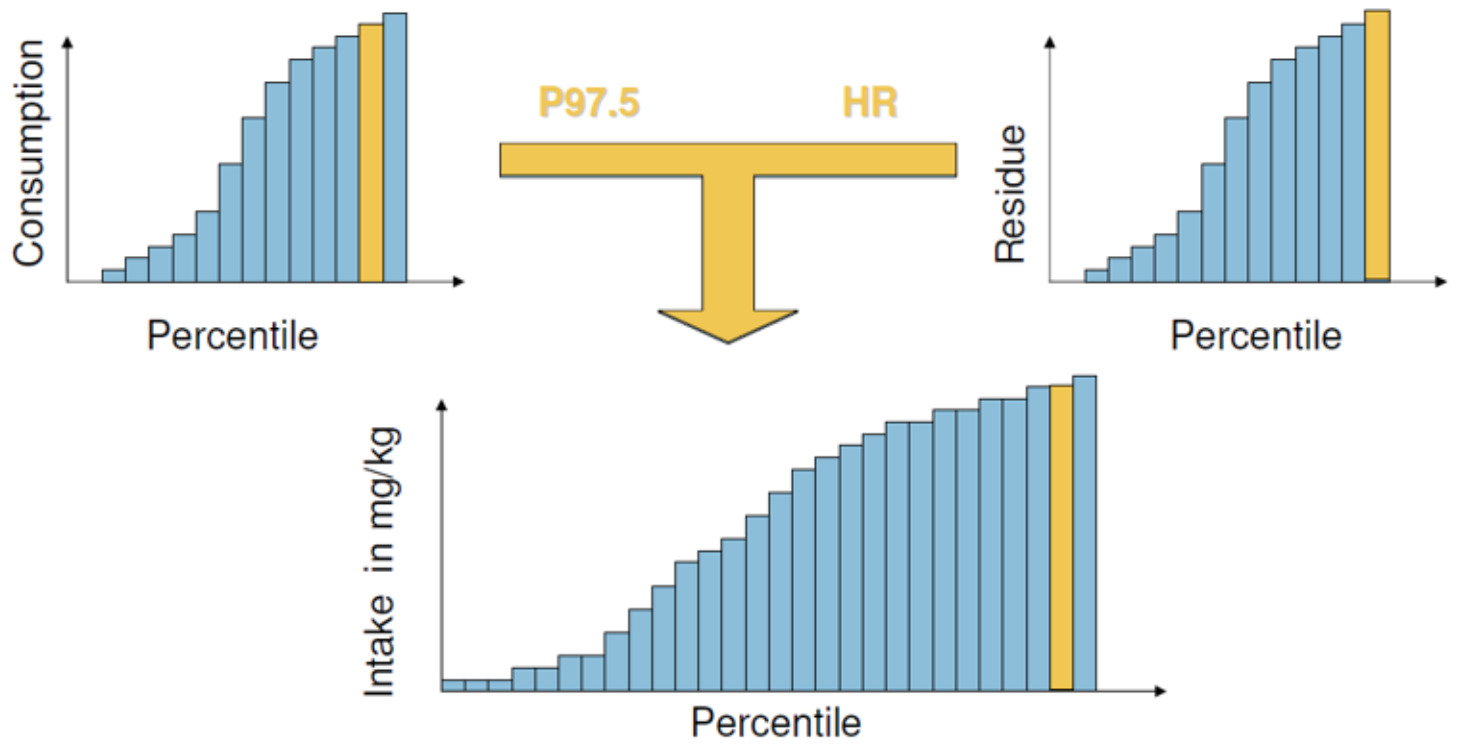
LARGE PORTION

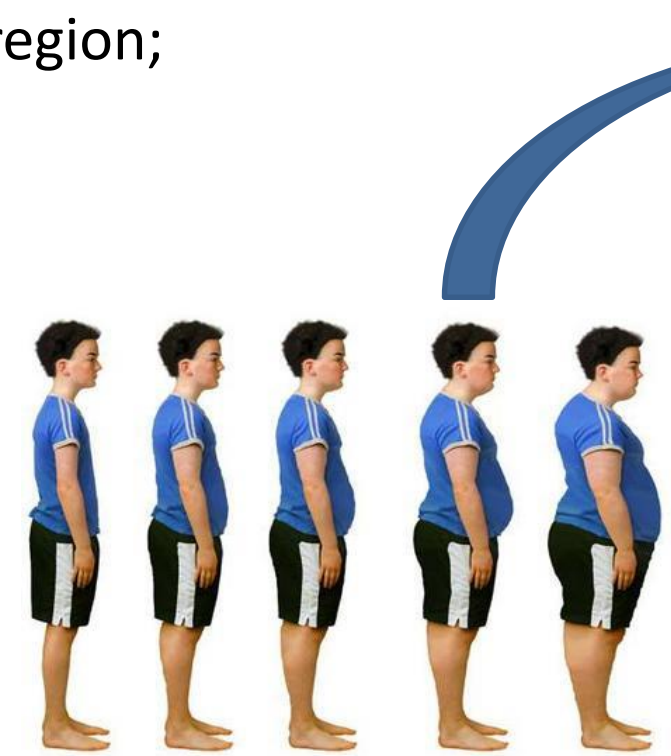
DIETARY EXPOSURE ASSESSMENT TO PESTICIDE RESIDUES

Calculation of exposition under consideration of probability



SPECIFIC OBJECTIVE

1) Calculate mean body weight (bw) of Brazilian population in each main geographic region;



SPECIFIC OBJECTIVE

2) Establish food Unit weight (U), that will be used in some cases, according to JMPR, 1997; FAO, 2003:

- Case 2a → U > 25g e < LP

$$IESTI = \frac{(U \times HRorHRp \times v) + (LP - U) \times HRorHRp}{bw}$$

- Case 2b → U > LP

$$IESTI = \frac{(LP \times HRorHRp \times v)}{bw}$$

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UNIT WEIGHT - CRITERIA

- Consider Brazilian data presented in the WHO publication (WHO, 2014), or;
- National references: books or published articles, or;
- International data, presented at WHO publication (WHO, 2014);

Using the same criteria, it was defined the edible portion of the unit weight to obtain “Ue”.

Commodities with unit weight lower than 25 g or not listed in the Brazilian minor crop legislation [*Instrução Normativa Conjunta INC01 - 2014 (MAPA) and Ato no. 08 de 08/Mar/2016 (MAPA)] were not considered.*

SPECIFIC OBJECTIVE

3) Estimate the highest reported (97.5th percentile) intake (LP – large portion) for each food *(in natura* total, *in natura only* and processed/prepared (g/day)

4) Estimate the highest reported (97.5th percentile) intake (LP_{bw}) for each food by individual body weight (g/kg b.w./day)

5) Create a **FOOD CONSUMPTION DATABASE**.

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GROUPS

Group of raw commodities

Purple bean

White bean

Black bean

Green bean

Fradinho bean

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GROUPS

Group of processed/prepared foods

Preparation mode

Eggplant fries

Aubergine Breaded

Cooked eggplant

Brased eggplant

Eggplant stew

COOKED EGGPLANT

AUBERGINE BREADED/FRIED

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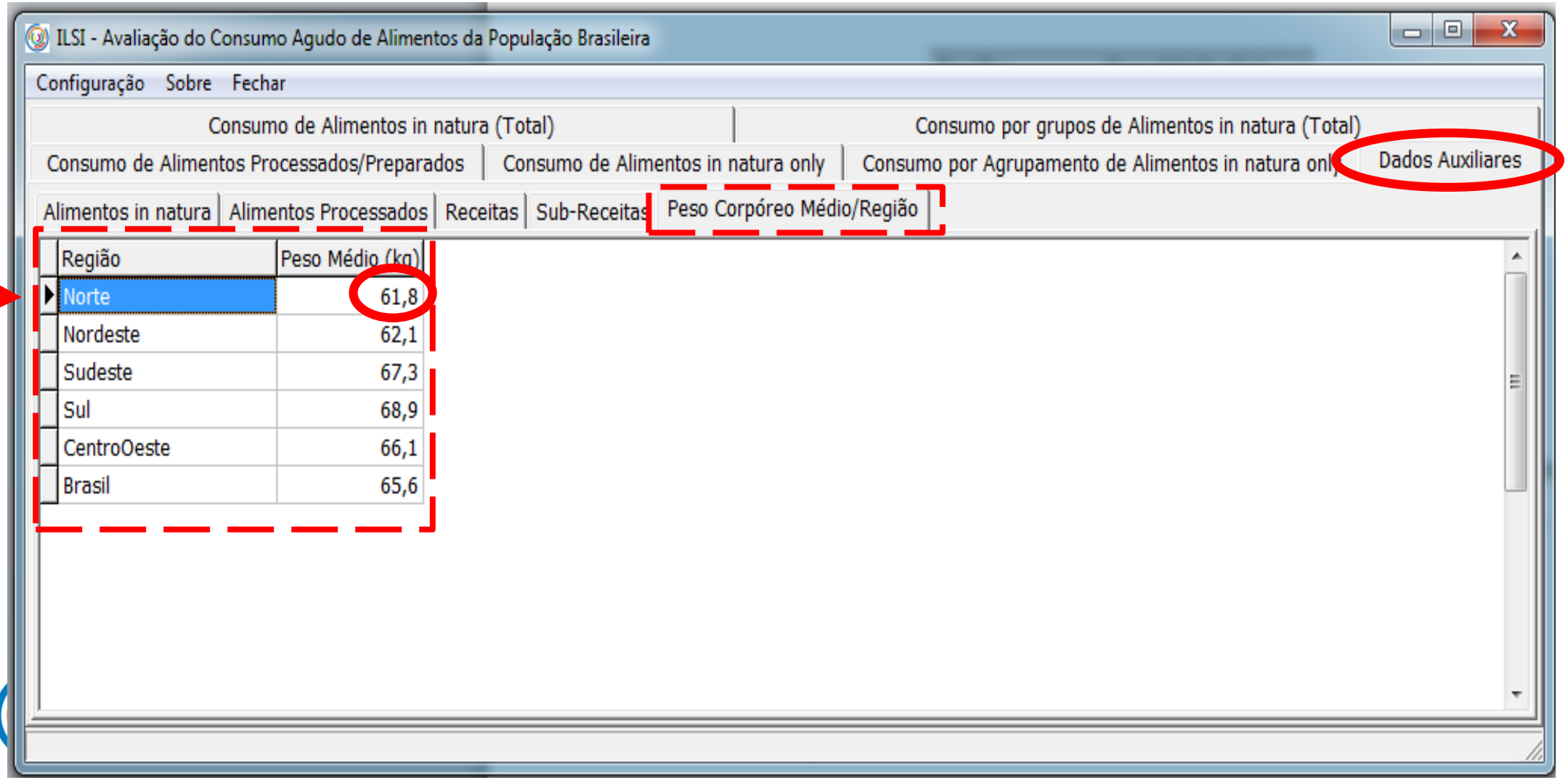
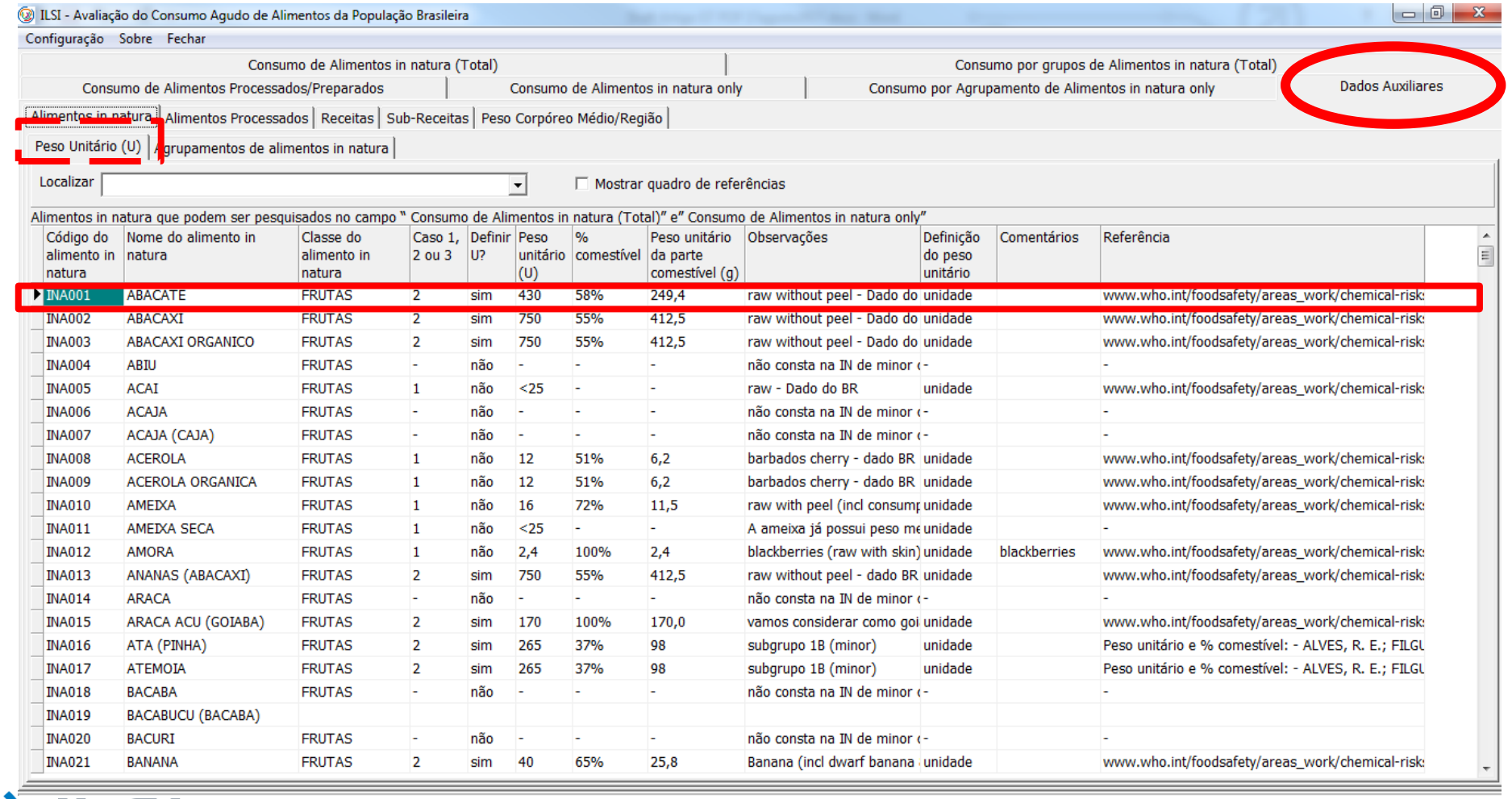
RESULTS

Brazilian mean body weight



RESULTS

Individual food unit weight (U)



Código do alimento in natura	Nome do alimento in natura	Classe do alimento in natura	Caso 1, 2 ou 3	Definir U?	Peso unitário (U)	% comestível	Peso unitário da parte comestível (g)	Observações	Definição do peso unitário	Comentários	Referência
INA001	ABACATE	FRUTAS	2	sim	430	58%	249,4	raw without peel - Dado do	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA002	ABACAXI	FRUTAS	2	sim	750	55%	412,5	raw without peel - Dado do	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA003	ABACAXI ORGANICO	FRUTAS	2	sim	750	55%	412,5	raw without peel - Dado do	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA004	ABIU	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA005	ACAI	FRUTAS	1	não	<25	-	-	raw - Dado do BR	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA006	ACAJA	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA007	ACAJA (CAJA)	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA008	ACEROLA	FRUTAS	1	não	12	51%	6,2	barbados cherry - dado BR	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA009	ACEROLA ORGANICA	FRUTAS	1	não	12	51%	6,2	barbados cherry - dado BR	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA010	AMEIXA	FRUTAS	1	não	16	72%	11,5	raw with peel (incl consump	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA011	AMEIXA SECA	FRUTAS	1	não	<25	-	-	A ameixa já possui peso me	unidade		-
INA012	AMORA	FRUTAS	1	não	2,4	100%	2,4	blackberries (raw with skin)	unidade	blackberries	www.who.int/foodsafety/areas_work/chemical-risk
INA013	ANANAS (ABACAXI)	FRUTAS	2	sim	750	55%	412,5	raw without peel - dado BR	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA014	ARACA	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA015	ARACA ACU (GOIABA)	FRUTAS	2	sim	170	100%	170,0	vamos considerar como goi	unidade		www.who.int/foodsafety/areas_work/chemical-risk
INA016	ATA (PINHA)	FRUTAS	2	sim	265	37%	98	subgrupo 1B (minor)	unidade		Peso unitário e % comestível: - ALVES, R. E.; FILGU
INA017	ATEMOIA	FRUTAS	2	sim	265	37%	98	subgrupo 1B (minor)	unidade		Peso unitário e % comestível: - ALVES, R. E.; FILGU
INA018	BACABA	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA019	BACABUCU (BACABA)										
INA020	BACURI	FRUTAS	-	não	-	-	-	não consta na IN de minor (	-		-
INA021	BANANA	FRUTAS	2	sim	40	65%	25,8	Banana (incl dwarf banana	unidade		www.who.int/foodsafety/areas_work/chemical-risk

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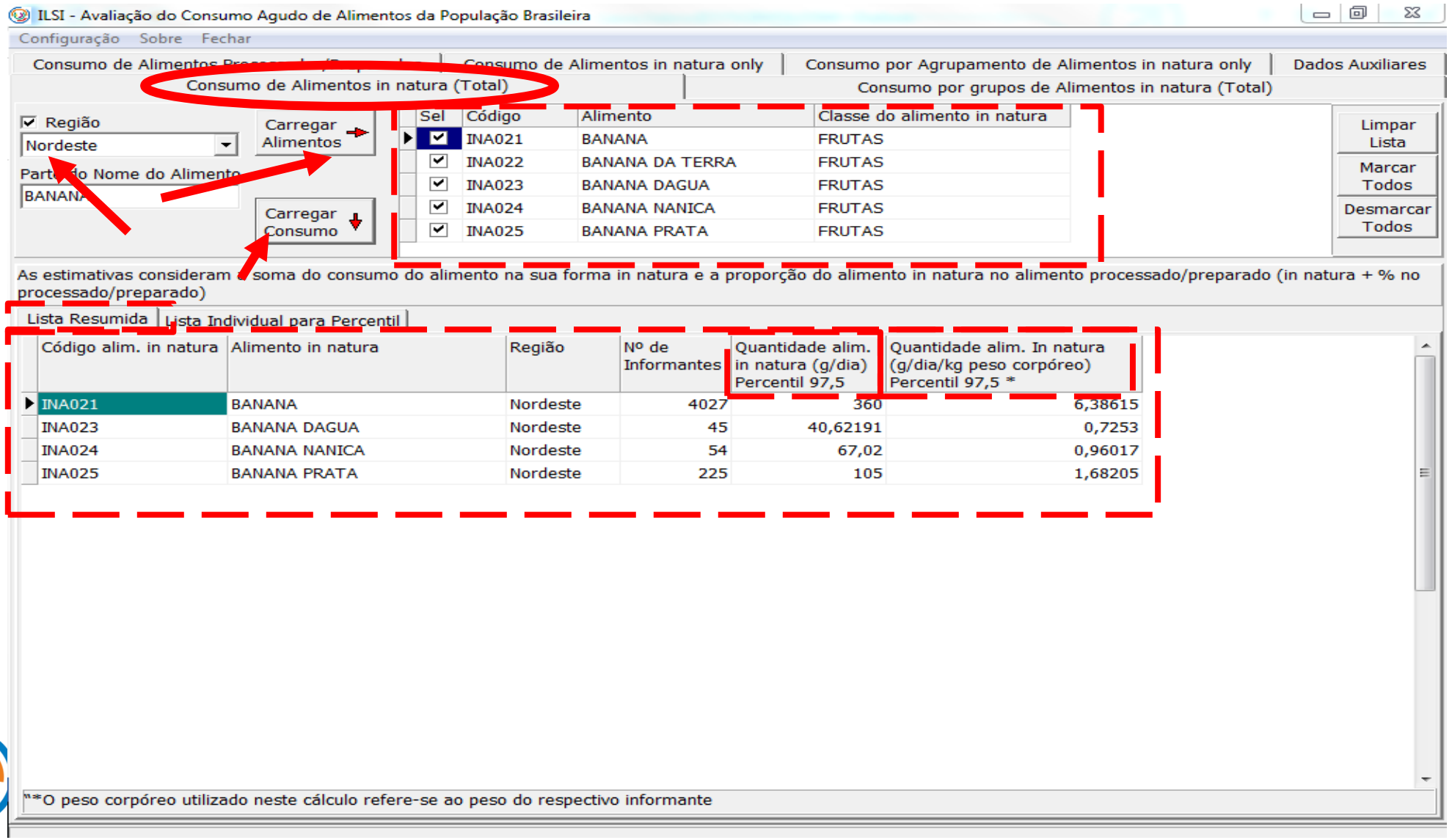
RESULTS

97.5th percentil intake (LP) calculation by Brazilian population



LIMITATIONS AND UPDATE OF THE DATABASE

- Absence of consumption information for children under 10 years old (POF 2008/2009).

- Program update, with new consumption data, can be done whenever new surveys are performed.

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HOW DOES IT SERVE SOCIETY?

Estimate Brazilian Food Cunsumption is of great importance in acute and chronic dietary exposure assessment of food products containing pesticide residues.

For the first time, a public tool was created using national and realistic values of large portion food consumption (LP and LP_{bw}), as well as, a national reference of commodities'unit weight (U), thus contributing to the country's scientific development and enabling the evaluation of acute dietary risk assessment with more current food consumption data for Brazilian population.

The data generated will be used with the goal of assessing pesticide-treated food consumption safety in Brazil.

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NEXT STEPS

Training of program users

Publication in a Scientific Peer Reviewed Journal

Data integration with Brazilian Government (ANVISA)

Meeting with ***Brazilian Institute of Geography and Statistics*** in order to discuss the next surveys/POF and importance of maintaining the same codes.

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WORK GROUP: POF

(Family Budget Surveys)

SPECIAL THANKS TO THE WHOLE TEAM FOR THEIR HARD WORK, DEDICATION AND UNITY.

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Márcia Pala Simone Guimarães

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