

Food Consumption Data: New Applications and Needs for Exposure Assessments

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Outline

- Introduction
- Food consumption data
 - traditional use in nutrition
 - new approaches and needs for food consumption surveys
 - use in dietary exposure and safety assessment
 - special requirement for dietary exposure
- Conclusions



Food consumption data

- which food consumed and type (raw, processed, cooked, preparation practices)
- how much (serving size)
- how often
- by whom (e.g.; age, sex, SES, eating habits, health status etc.)
- Affected by factors such as
 - season
 - region / culture
 - day of the week

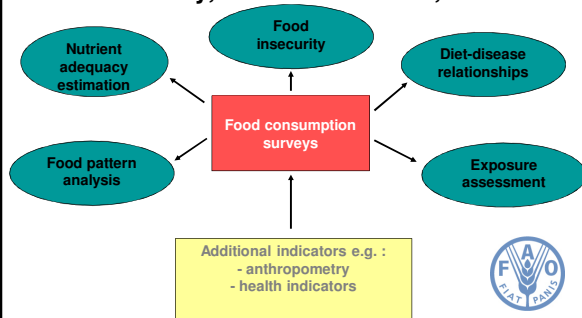
Dietary Assessment data types

- **Global:** FBS, FAOSTAT, GEMS/food cluster diets (-->food supply)
- **National:** foods consumed/available through household or individual consumption surveys
 - **Household:** HBS, HIES
 - **Individual:**
 - FFQ
 - 24-hour recall
 - Duplicate diet
 - Food records
 - Diet history



Potential uses of food consumption surveys

within country, across countries, over time



New approaches/needs for food consumption surveys

Include

- aspects of food biodiversity
- consumption of food supplements and fortified/enriched foods
- harmonize study design and tools
- include aspects needed for food safety



Food biodiversity

Include aspects of food biodiversity in food consumption surveys

- add probing questions/descriptors on variety
- present food consumption data also per ecosystem
- FAO to prepare guidelines



Food Biodiversity

- **Two Nutritional Indicators for Biodiversity** in English, French and Spanish:
 1. on food composition (FAO, 2008) → yearly reporting (in 2010 over 3600 foods reported in FCDB, scientific literate etc)
 2. on food consumption (2010 and 2011) → reporting every second year (in 2010 over 3000 food reported in food consumption surveys on food biodiversity)
- **Food Composition Database on Biodiversity:** first edition in 2010 with 2400 foods, in July 2011 with 3600 foods



Differences in food composition

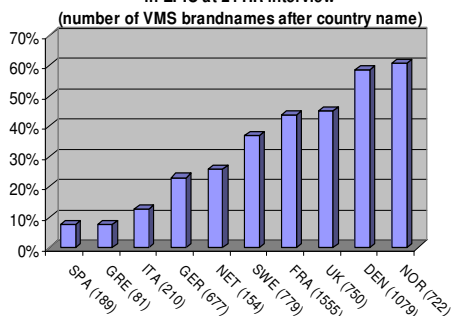
	Protein g	Fibre g	Iron mg	Vitamin C mg	Beta-Carotenes mcg
Rice	5.6 - 14.6		0.7 - 6.4		
Cassava	0.7-6.4	0.9-1.5	0.9-2.5	25-34	<5-790
Potato	1.4-2.9	1-2.23	0.3-2.7	6.4-36.9	1-7.7
Sweet potato	1.3-2.1	0.7-3.9	0.6-14	2.4-35	100-23100
Taro	1.1-3	2.1-3.8	0.6-3.6	0-15	5-2040
Eggplant		9 - 19		50 - 129	
Mango	0.3 - 1.0	1.3-3.8	0.4-2.8	22-110	20 - 4320
GAC					6180 - 13720
Apricot	0.8-1.4	1.7-2.5	0.3-0.9	3.5-16.5	200-6939 (beta carotene equivalent)
Banana			0.1-1.6	2.5-17.5	<1 - 8500

Impact of food biodiversity on dietary adequacy

Protein content	Protein content (g/100 g)	Cassava intake in Congo g/d/p	Part of the RDI for protein covered by cassava intake, in %
Average	3.24	286	20.6
Minimum	0.95	286	6.0
Maximum	6.42	286	40.8

Banana	β-carotene content in mcg/100 g	Banana intake in Philippines in g/d/p	Vitamin A intake through banana in mcg RE/d/p	RDI for vitamin A covered by banana intake, in %
USDA	26	93	4	0.7
Lacatan	360	93	56	9.3
Utin Iap	8508	93	1318.7	219.8


% Vitamin and mineral supplement (VMS) use as reported in EPIC at 24-HR interview



Dietary exposure assessment

- often not done by nutritionists. Only few exposure assessors are available
- Tiered approach is used starting with screening methods and food consumption data are only used when the exposure estimates from the screening methods are above the toxicological thresholds





Dietary vs. exposure assessment		
	Dietary assessment	Exposure assessment
Purpose	To determine -nutritional adequacy -dietary-disease relationship - RDI -dietary guidelines -population groups at risk -basis of nutrition policies and programmes, incl. fortification	To determine - if dietary exposure is below toxicological thresholds - main contributing foods or food group(s) - population groups at risk -basis for risk managers to take action -basis of national regulatory and food control systems
Data needed	- food consumption/supply data - food composition data	- food consumption/supply data - occurrence data
Formula	$I = \sum (W_i C_i) + W_2 C_2 + \dots + W_n C_n$ where: I = intake of the nutrient, W1 = weight consumed of food 1, C1 = content of the nutrient in food 1, i=individual	$E = \sum (W_i C_i) + W_2 C_2 + \dots + W_n C_n$ where: E = Dietary exposure, W1 = weight consumed of food 1, C1 = content of the e.g. contaminant in food 1, i=individual
Expressed in	g/mg/mcg per d	g/mg/mcg per d/week/month per kg bodyweight
Compared to	RDI, UL	MPL, ML, ADI
Concern	< RDI or >UL	> MPL/ML/ADI
Special methodology		Total diet Studies (TDS): selection of foods based on food consumption survey data representing a large portion of a typical diet, preparation of food as consumed and pooling of related foods into distinct food groups before analysis. Model diets: screening methods to assess if 'worse case scenarios' are still under toxicological thresholds, e.g. budget method, model diet for veterinary drug residues: 500 g meat: (300g muscle, 100g liver, 50g kidney, 50g fat) +1.5 liter milk +100g egg per day

Quality of nutrient intake and dietary exposure data

The quality of nutrient intake and dietary assessment depends on the quality of:

- the food consumption data
- the food composition/occurrence data
→ INFOODS is aiming to improve quality and availability of food composition data worldwide
- food matching between food consumption and food composition data.
→ FAO/INFOODS published in 2011 the INFOODS guidelines on food matching





Problems in international exposure assessment (e.g. JECFA, JMPR, EFSA)

Lack of representative and standardized data on

- food consumption
- food composition (nutrients) and occurrence data (e.g. contaminants)

→ Most data from industrialized countries
→ Use of GEMS/food cluster diets



Specific needs on food consumption surveys for foods safety purposes


More food consumption data with information on

- food fortification– and in FCDB (to compare with UL)
- packaging material (to estimate migration into food)
- flavours (to estimate dietary exposure to flavourings)
- brandname (for additives etc)



Food consumption/supply databases

- FAO collects food production and trade data and publish food supply data and food balance sheet data (FAOSTAT)
- FAO collects HBS data
- WHO developed the 5 GEMS/Food regional diets and the 13 cluster diets
- EFSA collected food consumption data from Europe and publish the concise and comprehensive food consumption database
- WHO is intending to develop a global food consumption database



Conclusions

- Food consumption data especially at individual level are **rarely available** especially in developing countries (too costly, time consuming and human resource intense)
- Food **biodiversity** aspects and **supplement** consumption should be included to get a better estimations on nutrient intake and dietary adequacy
- As the **need for more and better** food consumption data are now also expressed for food safety purposes
 - new features could be added to survey instruments
 - governments might be more willing to collect these data
 - more regional efforts emerge to **standardize** and collect food consumption survey methodologies and tools (EFSA, FAO/WHO, ILSI)
 - more regional efforts to collect and publish compiled food consumption survey data (EFSA, WHO/FAO)

