
6th International Workshop on Total Diet Studies

Meeting Introduction and Objectives

10 October 2022

Monitoring nutrition and food safety (MNF)

Department of Nutrition and Food Safety (NFS)



The WHO Nutrition and Food Safety Department

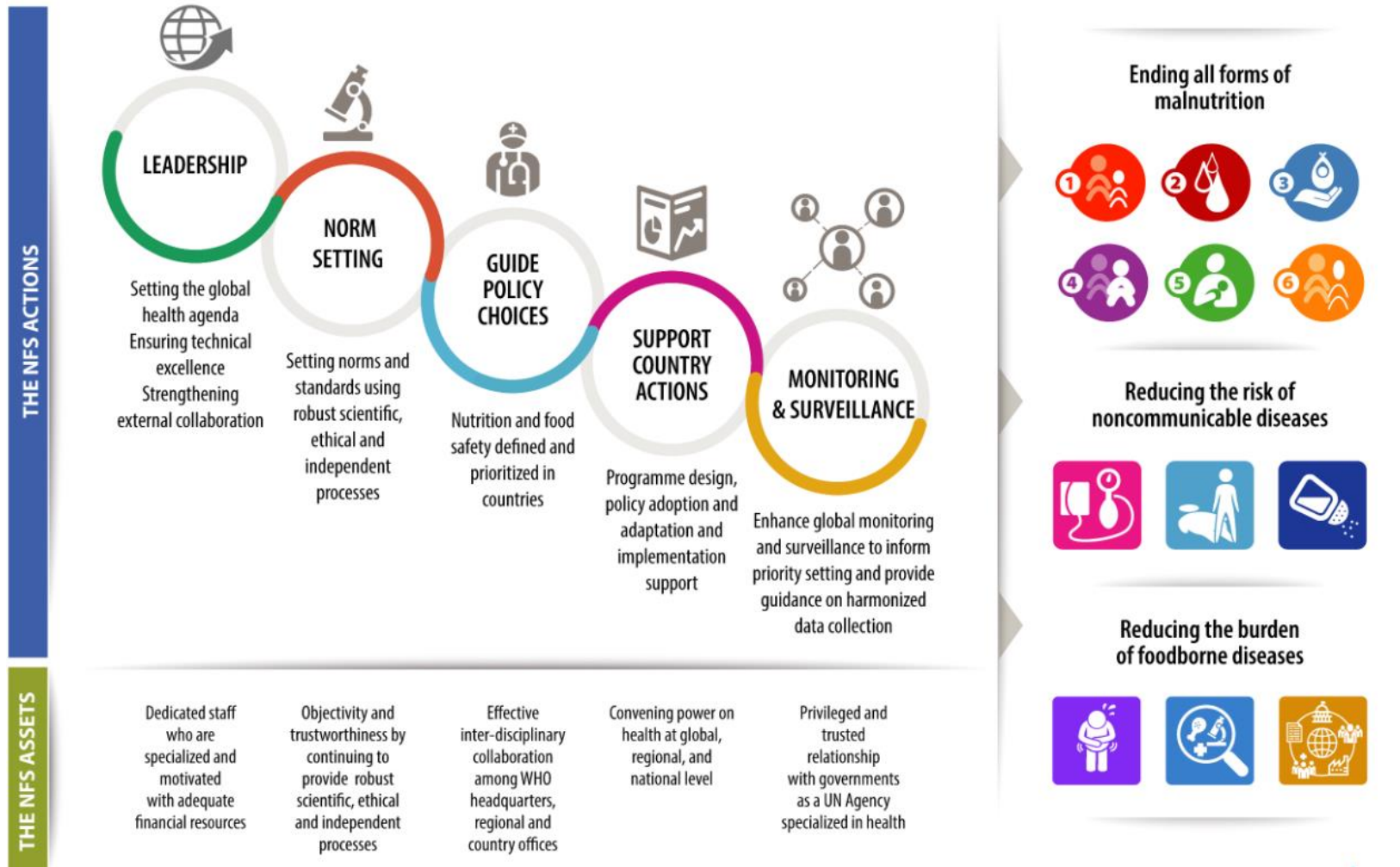
The NFS Vision

A world free from all forms of malnutrition and foodborne diseases, within safe and supportive societies and healthy environments

The NFS Mission

Work with Member States and partners to prioritize, plan, implement, monitor and regularly evaluate multisectoral efforts to ensure universal access to effective nutrition actions, safe food and healthy diets, through strengthening health systems and building forward better food systems which recognize the interdependence of the health of humans, animals and the wider environment

The WHO Nutrition and Food Safety Department



Welcome to the 6th International Workshop on Total Diet Studies

Between 1999 (Kansas City) and 2015 (Seoul), WHO and its partners organized 5 International Workshops on a Total Diet Studies...

The 6th iteration was due to take place in March 2022...

..and here we are!



Previous WHO Officers involved in International Workshops on Total Diet Studies

Now enjoying a well-earned retirement



GEMS/Food programme

Sharing data and methods to support scientific advice

A database to collect data to:

- help the Codex Alimentarius and scientific bodies assessing risk,
- setting food safety standards and
- estimating the burden of foodborne diseases.

1. Food consumption data from 42 countries
2. More than 8 million analytical results for contaminants and pesticides from Member States and private sector
3. A roster of exposure experts to develop international exposure assessment methodologies
4. A network of institutions to share good practices about food chemicals monitoring and food consumption survey

Dietary exposure estimates

Basic equation:

$$\text{Dietary Exposure} = \text{Food consumption} \times \text{Food chemical concentration}$$

Adjusted for body weight

Food consumption data

Need to consider:

- Purpose of assessment?
- Type of food consumption data needed?
- Type of data available?



Lifetime dietary exposure assessment

Chemicals with very long half-life

Chemicals accumulating in the body

Adverse effects occurring after very long exposure (several years)

Dietary exposure to dioxins and PCB (half-life around 40 years)

Dietary exposure to radionuclides after the Fukushima nuclear accident

Apparent food consumption data

Total amount of food available per year and per individual for the whole population (per capita data)

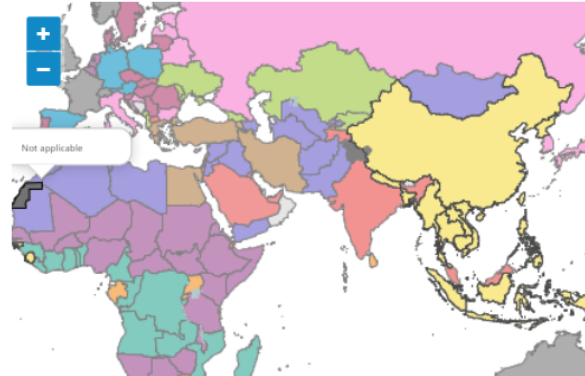
$$= \frac{\text{Food stocks} + \text{Food imports} - \text{Food exports} - \text{Food loss \& waste}}{\text{Total population}}$$

Data submitted by Member States to FAO

17 WHO GEMS/Food cluster diets

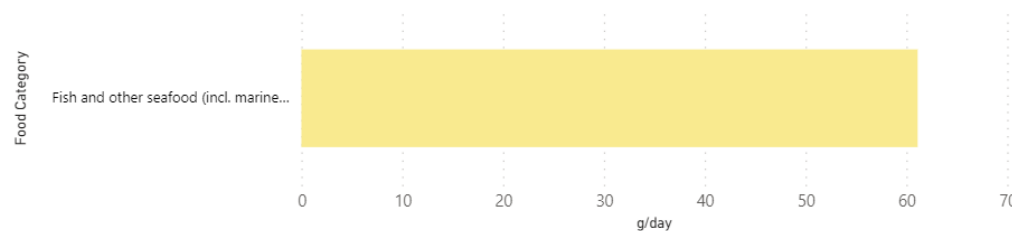
Apparent food consumption data

Clusters and Countries



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. Copyright - WHO 2012. All rights reserved.

Consumption Data



Select Clusters

- G03 Angola, Benin, Burundi, Cameroon, Congo, Côte d'Ivoire, Democratic Republic of t...
- G04 Antigua and Barbuda, Bahamas, Barbados, Brunei Darussalam, French Polynesia, G...
- G05 Argentina, Bolivia Plurinational State of, Brazil, Cape Verde, Chile, Colombia, Cost...
- G06 Armenia, Cuba, Egypt, Greece, Iran Islamic Republic of, Lebanon, Turkey
- G07 Australia, Bermuda, Finland, France, Iceland, Luxembourg, Norway, Switzerland, U...
- G08 Austria, Germany, Poland, Spain
- G09 Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Guinea Biss...**
- G10 Belarus, Bulgaria, Canada, Croatia, Cyprus, Estonia, Italy, Japan, Latvia, Malta, New ...
- G11 Belgium, Netherlands
- G12 Belize, Dominica
- G14 Comoros, Fiji Islands, Kiribati, Papua New Guinea, Solomon Islands, Sri Lanka, Van...
- G13 Ethiopia, Erythrea, South Sudan, Botswana, Burkina Faso, Central African Republic, ...
- G16 Gabon, Rwanda, Uganda
- G17 Samoa, Sao Tome and Principe
- G15 Serbia, Czech Republic, Denmark, Hungary, Ireland, Lithuania, Portugal, Romania, ...

Select Food Categories

- Select all
- Alcoholic beverages
- Drinking water (water without any additives except carbon dioxide; includes water ice for ...
- Eggs and egg products (excl. fish roes)
- Fats from animal or plant origin
- Fish and other seafood (incl. marine mammals)
- Food for infants and small children
- Fruit & vegetable juices and other non alcoholic beverages (Excl milk & stimulant & drinki...
- Fruit and fruit products
- Grains and grain-based products
- Herbs (seasoning and herbal tea), spices, condiments and sauces
- Meat and meat products (including edible offals, snails, reptiles, amphibians and insects)
- Milk and dairy products (excl. milk fat)
- Other
- Pulses, nuts and oilseeds
- Starchy roots and tubers (incl. carrot)
- Stimulant beverages (dry and diluted)
- Sugar and confectionary, cocoa and cola solid products
- Vegetables and vegetable products (incl. mushrooms and fungi)



This dashboard is part of the FOSCOLLAB platform for food safety data and information. Source: GEMS/Food Cluster Diets 2013

Shorter than lifetime dietary exposure assessment

Chemicals with chronic adverse effects (Acceptable Daily Intake)

Adverse effects occurring typically after exposure of several months

Dietary exposure of children to methylmercury

Dietary exposure to arsenic and skin cancer

Individual quantitative food consumption data

Surveys suitable for chronic assessments have the following characteristics :

- Based on 24-hour recalls or food records
- At least 2 non-consecutive days
- Individuals are characterized by their age, sex and body weight
- Ideally, the survey should be nationally representative

Example of deterministic dietary exposure assessment

$$\text{Dietary Exposure} = \sum \text{Mean food consumption} \times \text{Mean or median food chemical concentration}$$

FAO/WHO Chronic Individual Food Consumption summary statistics (CIFOCOss)

Food consumption data – summary statistics available from 42 countries:

20 EU countries + UK

8 countries in Asia (Bangladesh, China, India, Republic of Korea, Lao People's Democratic Republic, Malaysia, Pakistan and Philippines)

7 countries in Africa (Burkina Faso, Democratic Republic of Congo, Ethiopia, Kenya, Mozambique, Uganda, and Zambia)

6 countries in Americas (Argentina, Bolivia, Brazil, Guatemala, Mexico, and USA).

Detailed level of food categorization (about 500 items mapped with FoodEx2)

Distribution parameters: **mean, standard deviation, high and low percentiles for consumer groups**

<http://apps.who.int/foscollab/>

FAO/WHO CIFOCOss visualization



Food Safety Collaborative Platform

Home / Data analysis / Food Consumption

Vegetables and vegetable products including starchy roots and tubers, pulses, fungi and flowers X

Choose one or several food items

(All Vegetables) X

Chart Map

Acknowledgments

Export as PDF

Filter by country

Lao People's Democratic Republic X

Malaysia X

Filter by creation date

From

to

Filter by gender

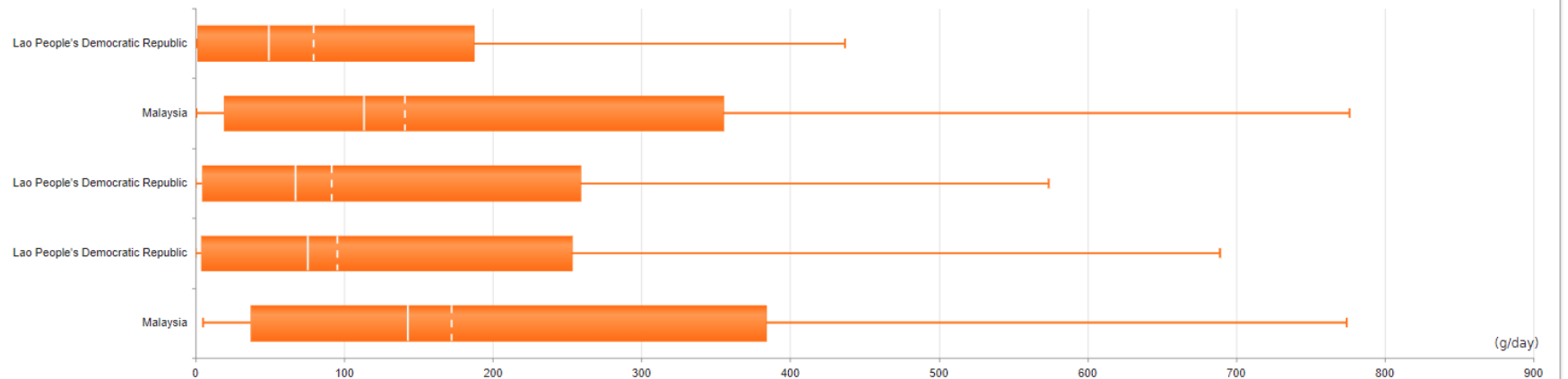
Women Men

Filter by age

Adults and Elderly

Population

All ConsumersOnly



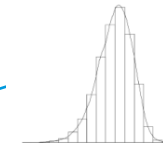
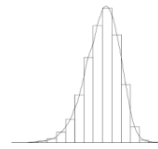
Probabilistic dietary exposure assessment

- For chemicals with either acute or chronic effects
- Resource intensive: to be performed if the deterministic approach is showing an exceedance of the Health Based Guidance Values (i.e., ARfD for acute risk and ADI for chronic risk)
- The raw food consumption data should be available for each food consumed by each individual
- Individual monitoring data on chemical occurrence should be available

Probabilistic dietary exposure assessment

Daily consumed quantity of food a for an individual i

Concentration of pesticide s in food a



Exposure of an individual i to a pesticide s

$$E_{s,i} = \frac{\sum_{a=1}^{A_s} Q_{i,a} C_{s,a}}{bw_i}$$

Body weight

FAO/WHO Global Individual Food consumption data Tool (GIFT)

Microdata available from 35 countries.

All data in GIFT are also in CIFOCCOs except if based only on 1 survey day.

<http://www.fao.org/gift-individual-food-consumption/en/>



FAO/WHO GIFT | Global Individual Food consumption data Tool



Food and Agriculture Organization of the United Nations



World Health Organization

Home	Overview	Data and indicators	Inventory of surveys	Resources	Methodology
------	----------	---------------------	----------------------	-----------	-------------

Explore the available data

Select the survey of interest among the available data in the FAO/WHO GIFT database.

For each survey, you can:

- Visualize ready-to-use indicators in the areas of food consumption, food safety and nutrition;
- Download the microdata of food consumption for further analysis.



Advanced Search: select datasets which contain information according to your criteria

Results

Title	Sample Size	Country	Start Year	End Year	
Italy - INRAN SCAI 2005-2006 - CREA - Alimenti e Nutrizione	3323	Italy	2005	2006	Indicators Download
Food consumption and iron status survey in two provinces of rural Burkina Faso	960	Burkina Faso	2010	2010	Indicators Download
The 2009 Food consumption and Vitamin A status survey in Zambia	867	Zambia	2009	2009	Indicators Download
HarvestPlus Bangladesh Bio-fortified Rice Project - Baseline Dietary Survey	475	Bangladesh	2007	2008	Indicators Download
HarvestPlus Reaching End Users (REU) Orange-Fleshed Sweet Potato (OFSP) Project	452	Uganda	2007	2007	Indicators Download
Bolivia - 2009/2012 - Lund University	155	Bolivia (Plurinational State of)	2009	2012	Indicators Download
National Food Consumption Survey Lao PDR 2016-2017	2045	the Lao People's Democratic Republic	2016	2017	Indicators Download
Philippines - 2003 - FNRI	1205	the Philippines	2003	2003	Indicators Download

Limitations

Cluster diets

- food 'availability' not food consumed
- mean consumption data for whole population only
- no information for different age/sex groups
- limited data for minor commodities

Food consumption data from surveys

- representativeness of sample
- relies on memory of survey participant
- food consumption may be under- or over-reported
- availability of recent survey data
- chemical concentration data limited or inexistent available for some commodities

Key messages

- Determine the purpose of the dietary exposure assessment - guided by nature of HBGV
- Collect relevant information (residue definitions, food consumption and chemical concentration data)
- Choose the approach best suited to your purpose and the data available
- Be aware of assumptions, limitations and uncertainties
- Communicate with risk assessors and risk managers within and across agencies

Total Diet Studies

The specificity of the TDS methodology is to rely on:

1. A representative portion of the diet of a certain population
2. Foods are prepared “as consumed”
3. Samples of food are pooled and then analyzed

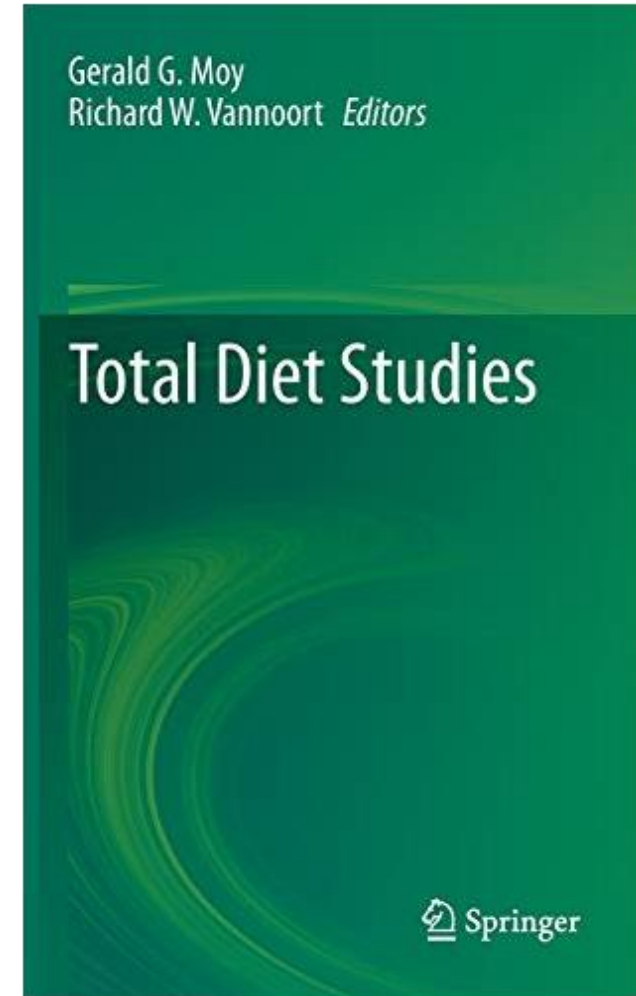
Total Diet Studies

Total Diet Studies (TDS) are tools to assess:

- the dietary intake of beneficial substances (nutrients)
- the exposure to harmful substances (hazards).



Important references



Monday, 10 October 2022 Session 1, Chair: Matthias Greiner

09:15–10:15 am **The role of TDS in the GEMS/Food programme, aims and objectives of the workshop**

Luc Ingenbleek, WHO, Geneva

10:15–10:30 am coffee break

10:30 am –11:15 am **BfR MEAL Study: the first German TDS**

Oliver Lindtner, Irmela Sarvan, BfR, Berlin

11:15 am –12:00 pm **Chinese total diet study and its application on dietary exposure assessment**

Yongning Wu, China National Center for Food Safety Risk Assessment (CFSA), Beijing (China)

12:00–01:45 pm lunch break

Monday, 10 October 2022 Session 2, Chair: Véronique Sirot

01:45–02:30 pm **TDS in Portugal – challenges and results**

Elsa Vasco, Maria da Graça Dias., National Health Institute Doutor Ricardo Jorge (INSA), Lisbon (Portugal)

02:30–03:00 pm coffee break and poster session

03:00–03:45 pm **The Canadian Total Diet Study**

Robert Dabeka, Health Canada, Ottawa (Canada)

03:45–4:15 pm **Poster presentations**

Tuesday, 11 October 2022 Session 3, Chair: Jean-Charles Leblanc

08:45–09:30 am **TDS in Australia** Keith Henderson, *Food Standards Australia New Zealand, Canberra (Australia)*

09:30–10:00 am *coffee break*

10:00–10:45 am **The first multi-centre Sub-Saharan Africa TDS: implementation and preliminary results**
Luc Ingenbleek, WHO, Geneva

10:45–11:30 am **The Italian national TDS: intake of nutrients and exposure to contaminants of the Italian population**

Francesco Cubadda, Italian National Institute of Health (ISS), Rome (Italy)

11:30 am – 12:30 pm *lunch break*

Tuesday, 11 October 2022 Session 4, Chair: Robert Dabeka

12:30 pm–01:15 pm **Total diet studies in France** *Véronique Sirot, ANSES, Maisons-Alfort (France)*

01:15–02:00 pm **TDS in the Republic of Korea: Progress in last 2 decades and a way forward**
Cho-il Kim, Seoul National University, Seoul (Republic of Korea)

02:30 pm–03:15 pm **U.S. Food and Drug Administration's Total Diet Study**
Judith Spungen, Terry Councell, U.S. Food and Drug Administration (FDA), College Park (USA)

03:15 pm –03:35 pm **Methodology and design of the first total diet study in Riyadh, Saudi Arabia**
Lama Almaiman, Riyadh (Saudi Arabia)

Thank you

Please reach out: ingenbleekl@who.int



Thanks



WHO

20, Avenue Appia
1211 Geneva

Switzerland



World Health
Organization