Food and Agriculture Organization of the United Nations

Food selection, nomenclature, classification and identification in databases

Last update : January 2021

U. Ruth Charrondiere, PhD

FAO

Food selection

As no FCDB can include all foods and recipes consumed by the population, choices need to made for inclusion in FCDB:

- include main foods (keyfoods) contributing e.g. to 75% of the nutrient intake
- include raw and 'foods as consumed' (= cooked foods, recipes, manufactured foods) and if possible add varieties/cultivars/breeds, important wild and ethnic foods, supplements
- Data on food consumption/supply can be obtained from national/local food consumption surveys, HBS, FAOSTAT or trade statistics

Many FCDBs include mainly raw foods

Reasons

- higher data quality and cheaper and less time consuming for compiler
- inconvenient for user as
  - obliged to estimate NV
  - risk of error (NV from raw foods taken for cooked foods) as users have in general less knowledge on food composition than compilers

➔ lower quality of nutrient intake estimations

Food and Agriculture Organization of the United Nations

Food nomenclature

includes

- food naming
- food description
- food classification
- food coding

Food and Agriculture Organization of the United Nations

Why is food nomenclature important?

For correct and unambiguous identification of food

➔ important for users and compilers

Frequent errors and consequences

Errors

- insufficient details regarding food name or description (e.g. cooking or processing method)
- whether total food or edible portion
- no description of edible part

Consequences

- use of nutrient data for raw instead of cooked foods
- matching nutritionally-different foods when substituting for missing foods in the tables/database
- Errors in nutrient intake studies

Food name

Where does it starts and where does it ends?

- depends on concept
  - in USDA food name = name + description
  - in New Zealand short food name = name + essential description. Detailed description given separately according to INFOODS descriptors
  - in France food name = name + essential description. Detailed description given separately with LanguaL descriptors and codes

What is the food name

- common name: apple, roast beef, rice, pizza
- Brand name:
  - used to identify foods: Danette, Mars
  - in addition to common name: Yogurt, Danone
- alternative name:
  - golden Syrup (UK) vs. corn syrup (USA) – also creating confusion
  - Satay prawns vs. prawns, satay
  - banana, cooking vs. plantain
- scientific name: *mangifera indica* (=mango)

Food description

Faceted systems:

- FoodEx2 – recommended by FAO/INFOODS
- INFOODS
- LanguaL
- national ones (e.g. UK, USDA)
- COST 99

➔with or without standard thesaurus, scope notes or codes

Food and Agriculture Organization of the United Nations

FoodEx2

- Developed by EFSA for Europe as multi-faceted and multi-functional food classification and description system https://www.efsa.europa.eu/en/data/data-standardisation
- In collaboration with FAO and others, it was further developed to make it more global
- recommended by FAO and INFOODS for food consumption and composition data coding

Food and Agriculture Organization
of the United Nations

INFOODS facets

GENERIC

KIND

STRAIN

PART

PROCESS

GRADE

MATURITY

MESSAGE

GENUS

SPECIES

VARIETY

ALTERNATIVE NAME

Food and Agriculture Organization of the United Nations

LanguaL facets

- A. PRODUCT TYPE [A0361]
- B. FOOD SOURCE [B1564]
- C. PART OF PLANT OR ANIMAL [C0116]
- E. PHYSICAL STATE, SHAPE OR FORM [E0113]
- F. EXTENT OF HEAT TREATMENT [F0011]
- G. COOKING METHOD [G0002]
- H. TREATMENT APPLIED [H0111]
- J. PRESERVATION METHOD [J0107]
- K. PACKING MEDIUM [K0020]
- M. CONTAINER OR WRAPPING [M0100]
- N. FOOD CONTACT SURFACE [N0010]
- P. CONSUMER GROUP/DIETARY USE/LABEL CLAIM [P0032]
- R. GEOGRAPHIC PLACES AND REGIONS [QX]
- Z. ADJUNCT CHARACTERISTICS OF FOOD [Z0005]

Food and Agriculture Organization of the United Nations

COST 99 facets

Manufacturer
Distributor
Food Source
Genetically Modified
Agricultural Production Conditions
Colour
Generic Image
Specific Image
Part of Plant or Animal
Percentage Edible Portion
Nature of Edible Portion
Nature of Waste
Physical State
Shape or Form

Extent of Heat Treatment
Treatment Applied
Cooking Method
Recipe Procedure
Recipe Bibliographic Reference
Final Preparation
Preservation Method
Packing Medium
Food Contact Surface
Container or Wrapping
Storage Conditions
Area of Origin
Area of Processing
Area of Consumption

Food and Agriculture Organization of the United Nations

EPIC-SOFT

- **16 facets, each with a minimum of 3 descriptors including 'undefined'**

- Source (19)
- Physical state (27)
- Cooking method (28)
- Preservation method (13)
- Packing medium (22)
- Flavoured/ added component (27)
- Sugar content(5)
- Fat content (29)
- Type of packing (4)
- Food production (12)
- Enriched/ fortified (5)
- Brandname/ productname (>)
- Skin consumed (3)
- Visible fat consumed (3)
- Type of fat used (>)
- Type of liquid used (9)

Common facets

- cooking method (raw, boiled, fried, grilled)
- part of plant or animal (leaf, pulp, leg, chop, liver, with/without visible fat etc)
- origin (cow, elephant, winter, cultivated)
- edible portion (with or without seeds/skin)
- preservation method (fresh, canned, smoked)
- Packing medium (brine, oil)
- Physical state (whole, dried, diced)
- Colour and form (green, long, big size)
- special descriptors (low fat, unsweetened, coated, flavour added, low alcohol, enriched with calcium)

Food and Agriculture Organization of the United Nations

Why correct food description is so important for NV

A bad food description highly influence NV of foods because it will not inform users about difference in:

- Weight (yield): raw or cooked rice are two very different foods
- Water (e.g. milk: liquid vs. powder)
- Fat (e.g. milk: full fat vs. skimmed)
- Edible portion only vs. whole food (e.g. fish with or without skin)
- Loss of minerals and/or vitamins (retention)

→ A good food description allows users to identify food correctly and make a better nutrient intake estimation

Table 3.3 Principal cooking methods and estimation of cooking factors

Method	*Description*	*Expected yield*	*Expected retention*	*Experimental measurements*
Boiling, simmering in excess water	Cooked by immersion in boiling water and separated by draining	Loss or gain of water, loss of solids	Loss of water-soluble and heat-labile micronutrients	Measure water content before and after cooking
Water absorption	Cooked by immersion in boiling water, which is absorbed completely	Gain of water	Loss of heat-labile micronutrients	Measure water content before and after cooking
Baking	Cooked by dry heat in enclosed oven	Loss of water	Loss of heat-labile micronutrients. Concentration of components	Measure water and fat contents before and after cooking
Earth oven	Food buried in hot solids	Loss of water	Loss of heat-labile micronutrients. Concentration of components	Measure water and fat contents before and after cooking
Deep frying	Immersed in hot fat	Loss of water, gain/loss of fat	Loss of heat-labile and other micronutrients. Concentration of components	Measure water and fat contents of cooked food. Complete analysis. Weigh remaining fat/oil after cooking if possible
Shallow frying	Cooked in shallow fat on hot surface	Loss of water, gain/loss of fat	Loss of heat-labile and other micronutrients. Concentration of components	Measure water and fat contents of cooked food. Complete analysis. Weigh remaining fat/oil after cooking if possible
Steaming	Wrapped or unwrapped, cooked in moist heat, above boiling water or hot quenched stones	Loss or gain of water	Loss of heat-labile micronutrients.	Measure water content before and after cooking
Roasting	Cooked by dry heat with or without addition of fat	Loss of water, loss or gain of fat	Loss of heat-labile and other micronutrients. Concentration of components	Measure water and fat contents of foods before and after cooking. Complete analysis

Source: Greenfield & Southgate, 2003

Refuse (waste) vs. edible portion

- Food = edible part + waste/refuse
- Waste should be part of the food description and part of the FCT and FCDB

- Food as purchased includes edible portion and refuse, mostly in raw form (e.g. raw rice, melon with skin)

- Food as consumed includes only edible part in raw or processed form (e.g. rice in sauce; melon flesh; yoghurt, goat, fortified with vitamin D)

Food	*Inedible portion*	*Edible portion*
Banana	Peel	Flesh
Cabbage	External yellow or wilted leaves, thick stalks	Remaining leaves and stalk
Canned vegetables in brine	Brine	Drained vegetables
Cheese	(Rind)	(Rind), inner part
Chicken	Bones, (skin from back), some fat pads, (tail), connective tissue	Muscle, skin from breast and leg, subcutaneous fat
Fish		
fresh	Bone, viscera, (head), fins, (skin)	Muscle, roe, (head), (skin)
canned in brine or oil	Bones, brine, (oil), (nil)	Flesh/bones, (oil)
dried, small	Nil	All
Fruit, canned in syrup	Nil	All (solids and liquid may be analysed separately)
Insects	Legs, wings, (head)	Flesh, carapace, (head)
Liver	Blood vessels, connective tissue	Remaining tissue
Meat	Bone, gristle, (fat)	Muscle, (fat), connective tissue
Orange	Peel, albedo, central pith	Segments, residual albedo
Passion fruit	Peel, (seeds)	Flesh, (seeds)

Source: Greenfield & Southgate, 2003

Fortified foods

- Should be part of food name/ description but NOT ALWAYS done i.e. if all products are fortified e.g. US breakfast cereals
- Fortified brandname food different level of fortification depending on country
- Not always stated which component is added nor in which amount

Food classification

- hierarchical (food groups and subgroups)
  - for trade, food composition, food consumption, standards
- flat (food groups w/o subgroups)
  - European Food Groups (EFG)
- mixed classification and description
  - FoodEx2: recommended by FAO and INFOODS, https://www.efsa.europa.eu/en/data/data-standardisation
  - Eurocode 2 Food Coding System

Food and Agriculture Organization of the United Nations

Different purposes for classifying foods

Trade
- Harmonized Commodity Description and Coding System (HS)

Food composition
- many national ones

Food consumption/ supply
- FAO food commodities
- many nationals or survey specific ones (DAPHNE, EPIC)

Standards
- Codex classification for pesticide residues
- CIAA Food Categorization System
- Codex Food Categorization System

Different purposes for classifying foods

- depending on purpose the food grouping is different
  - if e.g. for pesticides then all foods can be grouped which do not comprise pesticides
  - for food consumption, food grouping is important if food group intakes are to be compared
  - for food composition less important. Roughly major food groups are similar

Examples of possible groups and sub-groups for compositional databases

Food Group	Possible Sub-Groups	Comments
Cereals and cereal products	Grains and flours, Cereal products (breads, pastas, tortillas, sweet biscuits , savoury biscuits, cakes, doughs, crispbread), Breakfast cereals	Including cereal-based prepared foods
Vegetables and vegetable products	Roots, tubers, stems, corms, plantains Leafy vegetables, Legumes, and their seeds	Including TVP, leaf proteins, soya products, fungi, vegetable juices, algae
Fruits and fruit products	Fresh fruits (berries, citrus fruit, etc) Processed fruits, including juices	
Nuts and seeds		Including oilseeds
Oils and fats	Seed oils, marine oils, margarines	Including ghee, butter, oilseeds
Fish and fish products	Fish and their eggs; Molluscs and their eggs; Crustacea and their eggs; Processed fish (dried, salted, smoked canned)	Including echinoderms, and other marine animals

Source: Greenfield & Southgate, 2003

Food Group	Possible Sub-Groups	Comments
Meat and Meat products	Sub-groups for various meat species Poultry and game Offals Processed meat products	Including amphibians, reptiles, marsupials
Eggs	Sub-groups for various species	Including egg based dishes
Milk and milk products	Sub-grouped by species; creams, yoghurts, cheeses, milk-based cream desserts	Including ice creams
Sugars and syrups	Sugars, syrups, confectionery, desserts, jams jellies, preserves	
Beverages	Teas, coffees, cordials, soft drinks, fruit flavoured drinks	Including carbonated drinks but excluding milk and fruit and vegetable juices
Alcoholic Beverages	Beers, wines, fortified wines, spirits, liqueurs	
Miscellaneous	Herbs, spices, condiments, and leavening agents	

Source: Greenfield & Southgate, 2003

Sub-Groups based on types of use

Food Group	Possible Sub-Groups	Comments
Fast foods	Kebabs, tacos, hamburgers, fried chicken, pizza	
Infant foods	Infant formulas (Prepared infant foods)	
Special dietary foods	Reduced energy foods, diabetic foods, low-sodium foods, etc.	Including parental and enteral feeds, therapeutic meal replacements
Manufactured foods	Processed meals, snack foods, packet mixes, soups, sauces, gravies	
Prepared foods	Institutional meals (restaurant meals), domestic meals, recipe-based meals	
Non-cultivated foods	Plants and animals	

Source: Greenfield & Southgate, 2003

Food and Agriculture Organization of the United Nations

Difficulties with different systems

- Foods are not in same food group
    - problem for searching and retrieving food
    - problem in food group intake comparisons
- Foods are named and described differently
    - ambiguity in identifying food

Solutions:

➔ conversion table between systems

➔ additional use of images

➔ agreement on common features

Food coding

- Each food entry should have one unique food code
- Never use a food code again
- Keep same food code throughout all editions, if still same food
- Fix number of characters

Food Code Numbering

Each food must have an unique food code

- Simple
  - Number consecutively from 001
- Structured
  - Mixed letters and numbers
    - Preferable to use numbers only
  - By food group and sub-group
- Double coding (UK)
  - Database and ‘publication’ numbers

Implications in updating database when:

- Adding extra foods
- Link to a previous code for this food

Food coding systems

- Flat: 1, 2, 3 ….. n
- Within food groups
  - A001…A999, B001…B999, Where the letter indicates the food group and 001 the food number within the food group
  - 01001…01999, 02001…02999, Where the first 2 figures indicates the food group and the last three the food number within the food group
  - 0101001…0101999, 0102001…0102999, Where the first 2 figures indicates the food group, the next two the subgroup, and the last three the food number within the food subgroup

Analyzed foods

Before analyzing foods, a sampling plan was developed and samples were collected accordingly. Food description of these samples are added at different stages:

- At collection points (e.g. sample code and name, location, season, brandname, packing description, part of food, maturity, photo)
- In laboratory (e.g. weight of edible and inedible part, method of preparation in laboratory, normal and composite sample preparation)
- → these descriptions should be kept throughout and be entered into FCDB

Food and Agriculture Organization of the United Nations

Examples of foods found in FCDBs with bad food description

- Rice
- Tea
- Pork
- Cheese
- Breakfast cereal
- Banana
- Milk

Food and Agriculture Organization of the United Nations

Examples of foods found in FCDBs with good food description

- Rice, parboiled, fried in vegetable oil
- Tea, black, leaves
- Pork, bacon, fried
- Cheese, cheddar, 30% fat
- Breakfast cereal, oat meal, fortified (brand xx)
- Banana, dried
- Milk, cow, condensed, non sweetened

For more on food composition, visit www.fao.org/infoods