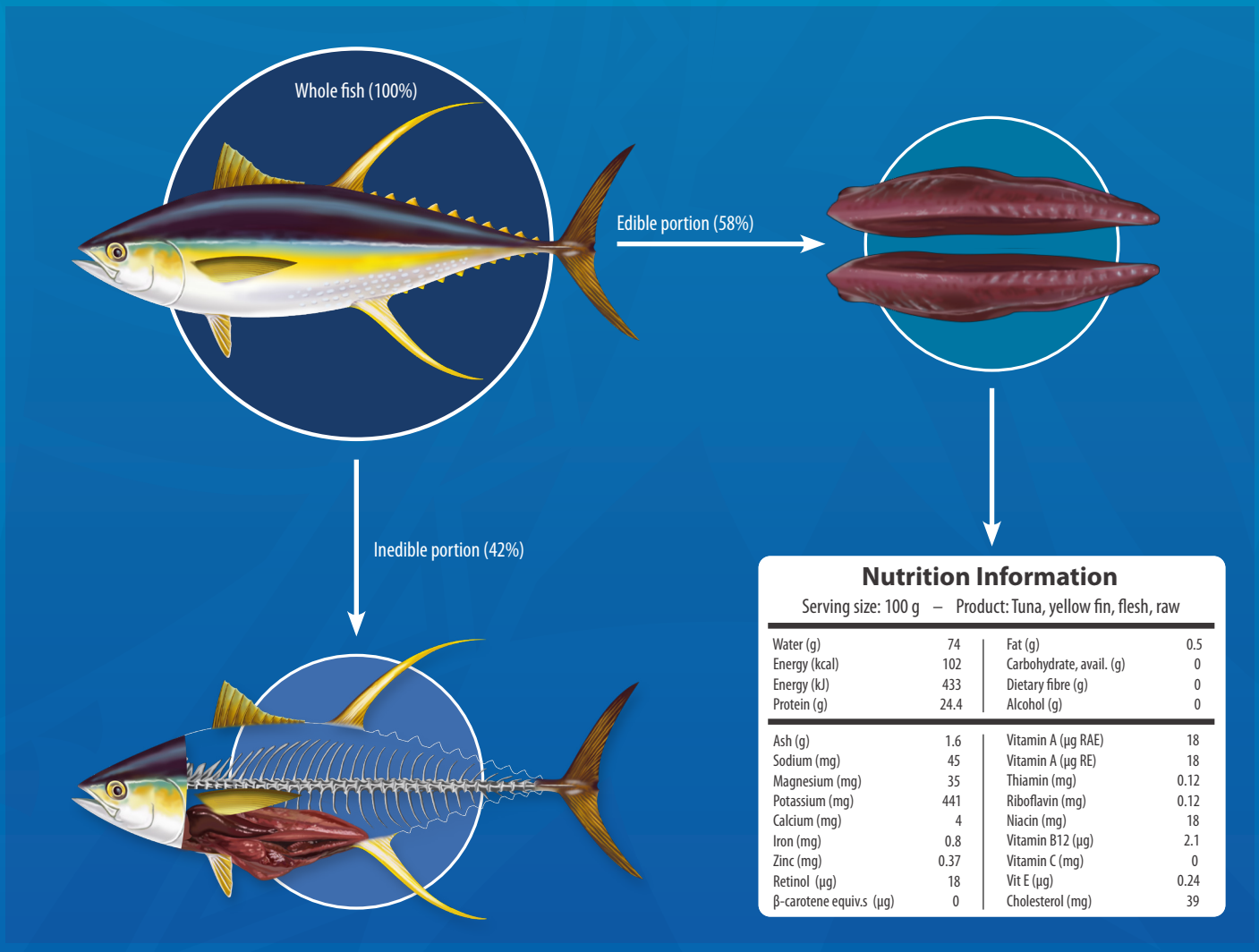
Food and Agriculture Organization of the United Nations

Pacific Community
Communauté du Pacifique

Pacific Nutrient Database User Guide

A tool to facilitate the analysis of poverty, nutrition and food security in the Pacific region



Nutrition Information

Serving size: 100 g – Product: Tuna, yellow fin, flesh, raw

Water (g)	74	Fat (g)	0.5
Energy (kcal)	102	Carbohydrate, avail. (g)	0
Energy (kJ)	433	Dietary fibre (g)	0
Protein (g)	24.4	Alcohol (g)	0
Ash (g)	1.6	Vitamin A (µg RAE)	18
Sodium (mg)	45	Vitamin A (µg RE)	18
Magnesium (mg)	35	Thiamin (mg)	0.12
Potassium (mg)	441	Riboflavin (mg)	0.12
Calcium (mg)	4	Niacin (mg)	18
Iron (mg)	0.8	Vitamin B12 (µg)	2.1
Zinc (mg)	0.37	Vitamin C (mg)	0
Retinol (µg)	18	Vit E (µg)	0.24
β-carotene equiv.s (µg)	0	Cholesterol (mg)	39

UNIVERSITY OF WOLLONGONG AUSTRALIA

Pacific Nutrient Database

User Guide

A tool to facilitate the analysis of poverty, nutrition and food security in the Pacific region

November 2020

F. Grande and N. Troubat
Food and Agriculture Organization of the United Nations

J. Russell, Y. Probst, K.E. Charlton and N.L. Andrew
University of Wollongong

M.K. Sharp and A. Romeo
Pacific Community

Layout by Gaelle Le Gall-Queguineur

Corresponding author: michaels@spc.int

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Abbreviations and acronyms

Abbreviations	Description
β	beta
COICOP	Classification of Individual Consumption According to Purpose
EP	edible portion
FAO	Food and Agriculture Organization of the United Nations
FCDB	Food composition database
FCT	Food composition table
HDDS	Household Dietary Diversity Score
g	grams
HIES	Household Income and Expenditure Survey
INFOODS	International Network of Food Data Systems
kcal	kilocalories
kJ	kilojoules
mg	milligrams
µg	micrograms
PICTs	Pacific Islands countries and territories
PIFCT	Pacific Island Food Composition Tables Second Edition
PNDB	Pacific Nutrient Database
SPC	Pacific Community
UOW	University of Wollongong

Acknowledgements

The Pacific Nutrient Database (PNDB) would not have been possible without input from many sources and existing food composition tables. We acknowledge the hard work and expertise of all those who have been involved in developing food composition tables globally. We are grateful to those involved in developing and publishing earlier editions of food composition tables for the region, particularly the Pacific Islands Food Composition Tables Second Edition (Dignan et al. 2004). We are also grateful to the FAO Global Coordinator, Ruth Charrondière (FAO), and experts from the International Network of Food Data Systems (INFOODS) who have contributed to the development of the guidelines and technical recommendations that have guided this work.

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Finally, we would like to thank Anna Lartey, Director of the FAO Nutrition and Food Systems Division, for clearing the database on behalf of FAO.

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Foreword

We are pleased to introduce the Pacific Nutrient Database (PNDB) User Guide – an outcome of long-term efforts made by the Pacific Community (SPC), the University of Wollongong (UOW) and the Food and Agriculture Organization of the United Nations (FAO). This document provides guidance for users of the PNDB to ensure appropriate use and to provide metadata to the database.

The PNDB is designed to facilitate the use of data primarily derived from Household Income and Expenditure Surveys, but also other data sources, to conduct poverty, nutrition and food security oriented analysis in the Pacific region. Through its concordance with international classification and food groups, the database will facilitate rapid and comparable consumption-oriented analysis. These analyses will guide evidence-driven policy to support vulnerable populations, such as those who are in poverty and those who are food insecure. Analyses using the PNDB will also facilitate reporting against national, regional and global frameworks, such as the Small Island Developing States Accelerated Modalities of Action, or SAMOA Pathway, and the Sustainable Development Goals (SDGs). In reporting against Goal 1 (end poverty; targets 1.1 and 1.2) and Goal 2 (end hunger, achieve food security and improved nutrition; target 2.1) of the SDGs, it is recommended that the PNDB be used to ensure the computation of regionally comparable indicators over time.

At a national and regional level, the PNDB is an instrument that will support the establishment of a baseline to work towards alleviating the triple burden of malnutrition – the coexistence of undernourishment, nutrient deficiencies, and obesity – that is hampering the development of the Pacific people and their economies. It will also support the derivation of an evidence base to alleviate poverty, achieve food security and improve nutrition in all of their dimensions.

The development of the database brought together the comparative advantages of SPC's Statistics for Development Division, which provides technical assistance in the collection and compilation of statistics to its 22 Pacific Island member states, FAO, which plays a lead role in setting the technical standards and methods for food security and nutrition statistics, and UOW as a research institution. This partnership has supported the development of the PNDB, and it is anticipated that the three organisations – among other Pacific and international organisations – will collaborate in its use. We also anticipate that the three organisations will continue to partner in methodological developments to strengthen knowledge for efficient and targeted policy and planning in the Pacific region.

The PNDB is an instrument that complements data analysis and ensures consistency among different data users' statistical outputs. We would like to acknowledge the authors, contributing individuals and organisations, and donors, for the collaboration that has resulted in the production and dissemination of this regional public good.

Stuart Minchin

Director-General
SPC

1. Database version, access and reference

This document is written to guide the users of The Pacific Nutrient Database. The database is accessible via the following website: https://microdata.pacificdata.org/index.php/catalog/755. The database should be cited as: SPC, UOW and FAO. 2020. *The Pacific Nutrient Database*.

Suggested citation for this user guide: FAO and SPC. 2020. *Pacific Nutrient Database User Guide*. Noumea, New Caledonia. 15 pp.

2. Introduction

Household Income and Expenditure Surveys (HIES) are implemented to rebase consumer price indices and estimates of household contribution to national gross domestic product. More recently, HIES data have been used in poverty analyses and to conduct nutrition and food security oriented analyses.

The more recent applications of HIES data – poverty, nutrition and food security – require the use of edible-portion conversion factors to convert the reported acquisition of wholefoods[1] into edible portions so estimates can be made of what people apparently ingest. These data then require the use of food composition tables (FCTs) to convert the edible portion into caloric and nutrient consumption values, so total energy and nutrient consumption can be estimated.

HIES data in the Pacific region are coded using the United Nations Statistics Division's Classification of Individual Consumption According to Purpose (COICOP); however, there is no regionally standardised linkage between COICOP and the Pacific Islands Food Composition Tables Second Edition (PIFCT). Furthermore, the PIFCTs do not have edible-portion conversion factors and are insufficient to cover the full list of foods reported in the HIES.

To address this, the Pacific Nutrient Database (PNDB) was developed to provide the Pacific region with a standard set of conversion factors and food composition data that are mapped to COICOP (1999).[2] To add more value to the database, each food item is also mapped to COICOP 2018,[3] classified into FAO Commodity Groups[4] and food groups to compute Household Dietary Diversity Scores (HDDS).[5] The PNDB includes 26 components plus edible and inedible portions for a total of 822 foods.

Data collection activities of Pacific Island countries and territories (PICTs) have produced abundant data pertaining to the consumption patterns of Pacific people. HIES data, usually gathered by each PICT every five to 10 years, provide important nationally representative insights into the income level, expenditure and housing situation for each household surveyed. The HIES also requires households to complete a food diary over two weeks, where all food commodities purchased, home produced and gifted are recorded; alternatively, households recall their consumption, by source (purchases, home production, gifts), over a seven-day recall period. This provides surveyors with large amounts of practical data. To analyse these data, an effective connection between the food diary/recall data and food composition data needs to be established. This was possible through application of two crucial factors: COICOP codes and edible-portion data.

[1] Wholefoods are foods that are acquired in their whole raw form, such as an orange before it is peeled and ready to eat.

[2] https://unstats.un.org/unsd/iiss/Classification-of-Individual-Consumption-According-to-Purpose-COICOP.ashx

[3] https://unstats.un.org/unsd/classifications/unsdclassifications/COICOP_2018_-_pre-edited_white_cover_version_-_2018-12-26.pdf

[4] http://www.fao.org/waicent/faoinfo/economic/faodef/faodefe.htm

[5] http://www.fao.org/nutrition/assessment/tools/household-dietary-diversity/en/

2.1. Origin and development of the Pacific Nutrient Database

Dignan et al. (2004) summarise the history of estimates of nutrient composition of Pacific foods. Significant milestones in this history came with the publication of nutrient tables as:

South Pacific Commission, Fiji National Food and Nutrition Committee and Fiji School of Medicine 1983. Food composition tables for use in the Pacific Islands. Noumea, New Caledonia: South Pacific Commission.

Dignan C.A., Burlingame B.A., Arthur J.M., Quigley R.J. and Milligan G.C. 1994. The Pacific Islands food composition tables. Palmerston North, New Zealand: South Pacific Commission, New Zealand Institute for Crop & Food Research and INFOODS.

Dignan C., Burlingame B., Kumar S. and Aalbersberg W. 2004. The Pacific Islands food composition tables second edition. Rome, Italy: FAO.

Since 2004 there have been many changes to regional eating patterns due to major shifts in food supply. The 2004 edition of the PIFCT (Dignan et al. 2004) does not include imported food products that are increasingly consumed within the Pacific region. The tables also lack information on edible-portion values and data coding required to create a database capable of analysing food consumption patterns, which is almost always coded in accordance with COICOP. Further, to date, there has been no standardised tool to approximate the nutritional profile of the PICTs using food commodities purchased based on the changes to the food supply. As a consequence of these limitations, many analysts conducting poverty, nutrition and food security analysis use self-derived conversion factors and/or different FCTs. This has resulted in

inconsistency in the calculation of poverty, nutrition and food security indicators, which undermines time series and comparative analyses.

The significant time and effort required to map COICOP to FCTs and to find sources for edible-portion conversion factors can ultimately result in the analyses not being conducted and the data therefore not being used to their full extent. The use of different conversion factors and FCTs may result in conflicting consumption estimates by different users of the same dataset, which undermines data credibility and creates uncertainty in forming policy and planning that is evidence based.

In order to support a series of nutrition analyses in the region, principally based on HIES, researchers from UOW collaborated with SPC to update the nutrient composition tables. This was published in 2017 as:

University of Wollongong 2017. Food composition tables for Pacific Island household income and expenditure surveys: Database development and user guide. Noumea, New Caledonia: The Pacific Community.

The tables and user guide are available on the SPC website digital library at: https://sdd.spc.int/innovation-sdd/matching-consumption-classification-food-composition-tables-facilitate-poverty-and

The current version of the tables, called the PNDB, further updates the UOW (2017) edition after rigorous peer review to ensure conformity with international guidelines, particularly those of FAO and the International Network of Food Data Systems (INFOODS).

This version links consumption classifications with established food composition databases (FCDBs) and edible-portion conversion factors to create a tool to approximate caloric and nutrient intakes of households in the Pacific region. Through the inclusion of COICOP coding, edible portions and FAO food groups, the data collected as part of HIES can now be analysed to provide a household nutrition profile. By applying edible-portion ratios to the acquired food quantities reported in HIES, the calories and nutrients consumed can be approximated. The outputs of PNDB include nutrient profiles (26 components[6]) and edible/inedible coefficients for a total of 822 foods. All values, including those for beverages and other liquids, are presented per 100 g edible portion on a fresh weight basis.

Revisions completed as part of this version of the FCTs mean that analyses using the PNDB may yield different nutrient profiles than those based on earlier tables.

3. Foods groups, foods and codes

3.1. Food groups and codes

Foods in the PNDB have been organised in a nested hierarchical food group structure. The foods have been coded according to COICOP (1999) and the most recent COICOP 2018 revision. This 2018 COICOP revision is an international reference classification of household expenditure, which categorises foods into 23 divisions (Table 1) and further divides them into 166 subclasses. Beside each food item is a COICOP code that has been generated to uniquely identify each food in the database. The food code consists of the COICOP group (e.g. 01.1, 01.2, 02.1, 11.1), COICOP class (e.g. 1, 2, 3, etc.), subclass (e.g. 1.1, 1.2, 2.1, etc.) and the individual food code (e.g. _01, _02, _03, etc.). The code conforms to the COICOP classification system as outlined by the United Nations Statistics Division (United Nations 2018).

[6] Water (g); Energy (kcal); Energy (kJ); Protein (g); Fat (g); Carbohydrate, available (g); Dietary fibre (g); Alcohol (g); Ash (g); Sodium (mg); Magnesium (mg); Potassium (mg); Calcium (mg); Iron (mg); Zinc (mg); Retinol (µg); β-carotene equivalents (µg); Vitamin A (µg RAE); Vitamin A (µg RE); Thiamin (mg); Riboflavin (mg); Niacin (mg); Vitamin B12 (µg); Vitamin C (mg); Vit E (µg); and Cholesterol (mg).

Foods that appeared in two different food groups in UOW (2017) were removed from one food group to ensure that the database use allowed a food to be selected from only one food group. The food group that was retained was selected based on conceptual similarity and professional judgement when considering the main components within each food.

Table 1: COICOP 2018 groups and classes used to categorise foods within the database

COICOP code	Description
01.1	**Food**
01.1.1	Cereals and cereal products
01.1.2	Live animals, meat and other parts of slaughtered land animals
01.1.3	Fish and other seafood
01.1.4	Milk, other dairy products and eggs
01.1.5	Oils and fats
01.1.6	Fruits and nuts
01.1.7	Vegetables, tubers, plantains, cooking bananas and pulses
01.1.8	Sugar, confectionery and desserts
01.1.9	Ready-made food and other food products n.e.c.[7]
01.2	**Non-alcoholic beverages**
01.2.1	Fruit and vegetable juices
01.2.2	Coffee and coffee substitutes
01.2.3	Tea, maté and other plant products for infusion
01.2.4	Cocoa drinks
01.2.5	Water
01.2.6	Soft drinks
01.2.9	Other non-alcoholic beverages

COICOP code	Description
02.1	**Alcoholic beverages**
02.1.1	Spirits and liquors
02.1.2	Wine
02.1.3	Beer
02.1.9	Other alcoholic beverages
11.1	**Food and beverage serving services**
11.1.1	Restaurants, cafés and the like

Additionally, each food entry was categorised according to the FAO commodity definitions (Table 2) and the food group classification from the dietary diversity questionnaire (Table 3). FAO commodity definitions[8] were applied to promote consistency and comparability of information at an international level, while the dietary diversity classification was included to allow the calculation of the HDDS. The HDDS is a qualitative indicator developed to reflect household access to a variety of foods and can be used as a proxy for nutritional adequacy of the diet of individuals or households[9] (FAO 2018, 2010).

[7] Not elsewhere classified.

[8] http://www.fao.org/waicent/faoinfo/economic/faodef/faodefe.htm

[9] It is noted that, in the case of HIES, food consumption is mostly collected at the household level, so HDDS can only be calculated by household using data sources from HIES.

Table 2: Food items by food commodity groups according to FAO

Code	Food commodity group	Foods – examples
1	Cereals and products	Grains as whole grain, meal, flour; pastas, macaroni, spaghetti, etc.; commercially baked goods and other cereal products
2	Roots and tubers and products	Potatoes, sweet potatoes, cassava, yams, roots, tubers and their products
3	Sugars and syrups and products	Sugars, sweeteners, candy, jam, marmalade, etc.
4	Pulses	Dry seeds (beans, peas, chickpeas, lentils, lupins, etc.) and their flours
5	Tree nuts	Nuts and products
6	Oil crops	Soya beans, groundnuts, sunflower seed, rape, mustard seeds, cotton seed, coconut and copra, sesame seed, palm kernels, olives, etc.
7	Vegetables and products	Fresh, frozen and canned vegetables
8	Fruits and products	Fresh, frozen, canned and dried fruits
9	Stimulants	Coffee, tea and cocoa beans
10	Spices and additives	
11	Alcoholic beverages	
12	Meat	Fresh, frozen, canned, processed; birds, insects, game or wild species, etc.
13	Eggs	
14	Fish and fish products	Fresh; frozen, canned; dried; salted; shellfish; alligators, turtles, frogs, etc.
15	Milk and cheese	Milk and products (excluding butter)
16	Vegetable oils and fats	
17	Oils and fats	Animal fats; marine oils; mixed and other oil and fat products
18	Non-alcoholic beverages	Mineral water and soft drinks
19	Purchased food eaten away from home; miscellaneous and prepared food	Food preparations (infant food, chocolate, ice cream, food energy drinks, meals consumed outside home, prepared meals and snacks, etc.)

Table 3: Food group classification to create the HDDS (FAO 2010)

Code	Food group	Products – examples
1	Cereals	Corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + other locally available foods (e.g. ugali, nshima, porridge or paste)
2	White roots and tubers	White potatoes, white yam, white cassava, or other foods made from roots
3	Vitamin A rich vegetables and tubers	Pumpkin, carrot, squash, or sweet potato that are orange inside + other locally available vitamin A rich vegetables (e.g. red sweet pepper)
4	Dark green leafy vegetables	Dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach
5	Other vegetables	Other vegetables (e.g. tomato, onion, eggplant) + other locally available vegetables
6	Vitamin A rich fruits	Ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100% fruit juice made from these + other locally available vitamin A rich fruits
7	Other fruits	Other fruits, including wild fruits and 100% fruit juice made from these
8	Organ meat	Liver, kidney, heart or other organ meats or blood-based foods
9	Flesh meats	Beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects
10	Eggs	Eggs from chicken, duck, guinea fowl or any other egg
11	Fish and seafood	Fresh or dried fish or shellfish
12	Legumes, nuts and seeds	Dried beans, dried peas, lentils, nuts, seeds or foods made from these (e.g. hummus, peanut butter)
13	Milk and milk products	Milk, cheese, yogurt or other milk products
14	Oils and fats	Oil, fats or butter added to food or used for cooking
15	Sweets	Sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes
16	Spices, condiments, beverages	Spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages

3.2. Identification of key foods

FCDBs are translational tools for the analysis of food information. This food information is commonly derived from individual intakes such as those conducted during national nutrition surveys. This information is often based on reporting of consumed foods through diary/retrospective recall of consumed foods. In many PICTs, these diary/retrospective recalls collect food information that includes household intakes based on food items that are purchased, home produced, gifted and prepared. Such surveys therefore need to consider not only the food purchased or acquired for members of the household but also food items produced by the household and/or received as gifts. The database underpinning this user guide relates to household food data, specifically the HIES, for which food diaries/retrospective recall are implemented to collect consumption, as outlined previously.

Due to an increase in access to imported foods in the Pacific region, the list of entries in the database was created through categorisation of HIES food diary data[10] into COICOP codes, which ensured that imported and/or branded foods are included.

[10] Using HIES data from the following surveys: FSM 2014 HIES, PLW 2014 HIES, NRU 2012 HIES, TKL 2015 HIES, WSM 2013 HIES, SLB 2012 HIES, VUV 2010 HIES.

4. Data sources

Both nutrient profiles and edible-portion values included in the PNDB are assigned to their respective source code. The different data sources are listed in Table 4 with an alphanumeric code.

Table 4: Data sources and respective codes included in the PNDB

Code	Source
A1	Institute of Nutrition, Mahidol University 2014. ASEAN food composition database. Electronic version 1, February 2014. Bangkok, Thailand: ASEAN Network of Food Data System (ASEANFOODS). Available at: http://www.inmu.mahidol.ac.th/aseanfoods/composition_data.html
A2	Food Standards Australia New Zealand 2014. AUSNUT 2011–13 – Australian food composition database. Canberra, Australia: FSANZ. Available at: https://www.foodstandards.gov.au
A4	Food Standards Australia New Zealand 2019. Australian food composition database. Canberra, Australia: FSANZ. Available at: https://www.foodstandards.gov.au
B1	Institute of Nutrition and Food Science, Centre for Advanced Research in Sciences 2013. Food composition table for Bangladesh. Dhaka, Bangladesh: University of Dhaka. Available at: http://www.fao.org/fileadmin/templates/food_composition/documents/FCT_10_2_14_final_version.pdf
B2	FAO 2017. FAO/INFOODS food composition database for biodiversity version 4.0 – BioFoodComp4.0. Rome, Italy: FAO. Available at: http://www.fao.org/infoods/infoods/tables-and-databases/faoinfoods-databases
F1	FAO 2016. FAO/INFOODS global food composition database for fish and shellfish version 1.0 – uFiSh1.0. Rome, Italy: FAO. Available at: http://www.fao.org/infoods/infoods/tables-and-databases/faoinfoods-databases/en/
F2	U.S. Department of Health, Education, and Welfare and FAO 1972. Food composition table for use in East Asia. Rome, Italy: FAO. 334 pp. Available at: http://www.fao.org/3/X6878E/X6878E00.htm#ch1
F6	FAO 1989. Yield and nutritional value of the commercially more important fish species. Rome, Italy: FAO. Available at: http://www.fao.org/3/T0219E/T0219E00.htm
H1	Institute of Nutrition and Food Safety 2002. China food composition – Book 1 (2nd ed.). Beijing, China: Peking University Medical Press.
I1	Longvah T., Ananthan R., Bhaskarachary K. and Venkaiah K. 2017. Indian food composition tables. Hyderabad, India: National Institute of Nutrition. Available at: http://www.ifct2017.com/frame.php?page=home
J1	MEXT 2015. The standard tables of food composition in Japan 2015 (7th rev. ed.). Japan: Official Gazette Co-operation of Japan. Available at: https://www.mext.go.jp/en/policy/science_technology/policy/title01/detail01/1374030.htm
K1	National Institute of Agricultural Sciences 2009. Standard food composition table (9th ed.). Republic of Korea: National Institute of Agricultural Sciences. Available at: http://koreanfood.rda.go.kr/eng/fctFoodSrchEng/list
K2	FAO/Government of Kenya 2018. Kenya food composition tables. Nairobi, Kenya: FAO/Government of Kenya. Available at: http://www.kilimo.go.ke/wp-content/uploads/2018/10/KENYA-FOOD-COMPOSITION-TABLES-2018.pdf
N1	The New Zealand Institute for Plant and Food Research Limited and Ministry of Health 2018. New Zealand food composition database. New Zealand FOODfiles. Palmerston North, New Zealand: NZIPFR. Available at: https://www.foodcomposition.co.nz/foodfiles
N3	Siong T.E., Shahid S.M., Kuladevan R., Ing Y.S. and Choo K.S. 1987. Nutrient composition of Malaysian marine fishes. Asean Food Journal, 3(2):67–71.
P1	Dignan C., Burlingame B., Kumar S. and Aalbersberg W. 2004. The Pacific Islands food composition tables second edition. Rome, Italy: FAO. Available at: http://www.fao.org/3/y5432e/y5432e00.htm
O1	Omobuwajo T.O. 2003. Compositional characteristics and sensory quality of biscuits, prawn crackers and fried chips produced from breadfruit. Innovative Food Science & Emerging Technologies, 4(2):219–225. DOI: 10.1016/S1466-8564(03)00006-7

Code	Source
S1	Health Promotion Board 2011. Energy and nutrient composition of food. Last modified 14.03.2011. Tanjong Pagar, Singapore: HPB. Available at: https://focos.hpb.gov.sg/eservices/ENCF/
U1	U.S. Department of Agriculture, Agricultural Research Service (USDA) 2015. USDA national nutrient database for standard reference, release 28. Washington, DC, USA: USDA. Available at: http://ndb.nal.usda.gov/
U2	U.S. Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory 2018. USDA branded food products database. Version current: July 2018. Washington, DC, USA: USDA. Available at: http://www.ars.usda.gov/nutrientdata
W1	FAO 2012. West African food composition table. Rome, Italy: FAO. Available at: http://www.fao.org/infoods/infoods/tables-and-databases/faoinfoods-databases
Y1	Matthews R.H. and Garrison Y.J. 1975. Food yields summarized by different stages of preparation. Agriculture Handbook No. 102. Washington, DC, USA: U.S. Department of Agriculture. Available at: http://www.ars.usda.gov/SP2UserFiles/Place/80400525/Data/Classics/ah102.pdf

The PIFCT Second Edition was selected as the preferred source of data to provide the most accurate values for the Pacific region. However, when the nutrient profile reported for a certain food in the PIFCT was borrowed from another FCT or database, the original source was used to provide the most up-to-date values. In addition, to achieve the primary goal of creating a comprehensive database and incorporating edible portions of foods with current nutrient data, international tables from different countries and regions were sourced to borrow data, as a complete dataset is required for a database that will be used to analyse intake data. The international databases were selected according to their regional relevance, validity of data and whether the data was up to date, thereby creating a tiered selection system (Table 5).

Table 5: Selection criteria of food composition data and edible-portion coefficients according to the data source

Priority of use	Database
Primary	The Pacific Islands Food Composition Table Second Edition (P1)
Secondary	AUSNUT 2011–13 (A2), Australian Food Composition Database 2019 (A4), NZ Food Files 2018 (N1)
Complementary	All other sources

Any component data from primary or secondary sources was scrutinised prior to its incorporation in the database, which involved checking the food component identification as well as the standardisation of units and denominators according to FAO/INFOODS guidelines (FAO/INFOODS 2012a, 2012b). This step was crucial to avoid the use of different definitions and modes of expression for certain components (further details are provided in section 7: Components).

5. Food matching and compilation criteria

Food matching refers to the linking of food consumption/supply data with food composition data. This step is critical as it directly affects the quality of the nutrient intake estimates. The food matching criteria for the PNDB was undertaken with reference to the FAO/INFOODS Guidelines for Food Matching to select the most appropriate foods during this step (FAO/INFOODS 2012b). This involved ensuring the correct species or variety was matched by scientific name, where possible, with relevance to the Pacific region and whether it underwent a similar preparation method to that reported in the PIFCT.

Mainly, two different approaches were used to compile the nutrient profile of foods included in the PNDB: the complete nutrient profile was copied directly from other sources, or they were calculated as an average value based on several different foods. A limited number of nutrient profiles were calculated based on recipes by applying appropriate yield and retention factors (Vásquez-Caicedo et al. 2008).

5.1. "Composite" foods

Foods described as "composite" in the PNDB database are a result of an average of several similar foods, which are specified under the column "assumption"; for example, an arithmetic mean of several types of bread or different varieties of squash or different cooking methods. Weighting factors were not applied to account for different market share or consumption patterns. These data are useful in HIES when the specific variety or type of food is not known or recorded.

In some cases, "composite" foods include a large number of foods due to the lack of details in the description of the food information collected in the HIES. It is important to note that more detailed consumption data should be obtained in order to facilitate a more appropriate food match (FAO/INFOODS 2012b).

5.2. Cooked foods

Food description data sourced from HIES is insufficiently precise in its description of many cooked foods, including the cooking method applied and/or the addition of other ingredients. For relevant food entries, these were standardised to match them with the composition of the cooked food without the addition of any other ingredient, such as fat or salt. For easy identification, these foods were tagged with the symbol ◆ at the end of the food description in the database.

5.3. Fortified foods

Due to the lack of information regarding fortification practices in PICTs, fortified foods were not included in the PNDB, except for breakfast cereals (added nutrients are mentioned in the food description). Therefore, care was taken when borrowing other countries' data; unfortified versions were always selected to perform the matching.

6. Food description

Two distinct food descriptions are presented in the PNDB:

1. **Food description in the HIES.** The description presented in the second column, namely "Food description in the HIES", corresponds to the data as coded in the HIES. This information was included as a reference, as it represents the data that were used to perform the food matching. However, detailed information for a precise food identification was often not available. As a result, in many cases it was necessary to match the food described in the HIES with an average of different nutrient profiles available in the FCTs.
2. **Food description in the PNDB.** The description presented in the third column, namely "Food description in the PNDB", corresponds to the description of the food selected in the data sources to match the nutrient profile. The food name presented in this column is as comprehensive as possible, including all characteristics that influence the nutrient contents, based on the information available in the original sources. The scientific name was also associated to each food in a separate column, if appropriate.

6.1. Terms used for the food description in the Pacific Nutrient Database

- "Raw" was used to describe fresh or uncooked foods.
- "Cooked" was used to describe foods presented in which the final nutrient profile was an average of different cooking methods.
- Terms used with meat: "lean" refers to fully trimmed cuts (separable fat removed); "regular" refers to untrimmed meat (includes lean meat and separable fat).

7. Components

There are 26 components in the database along with edible and inedible portions for each item. All data, including liquids, are expressed per 100 g edible portion on fresh weight basis. The values per nutrient have been standardised and are expressed in fixed maximal number of significant digits and decimal places. Table 6 provides a list of components, units of expression and component identifier, namely tag names and relevant comments.

Table 6: Units, decimal places, significant digits and INFOODS tag names for all components included in the PNDB

Component	INFOODS tag name	Unit	Sig. digits	Decimal places	Comment
Edible portion	EDIBLE	%	2	0	Calculated as the edible portion of the total food as purchased
Inedible portion		%	2	0	Calculated as the inedible portion of the total food as purchased
Energy	ENERC_kJ	kJ	3	0	Calculated from energy-yielding components (fat, protein, available carbohydrate, dietary fibre and alcohol) (Equations 1 & 2)
	ENERC_kcal	kcal	3	0	
Water	WATER	g	3	1	
Protein, total	PROTCNT	g	3	1	Protein, total; calculated from total nitrogen
Fat, total	FAT	g	3	1	Determined by mixed solvent extraction (preferred method)
	FATCE	g	3	1	Derived by analysis using continuous extraction
Carbohydrate available	CHOALV	g	3	1	Carbohydrate, available by weight (preferred method)
	CHOAVLDF	g	3	1	Calculated by difference (Equation 3)
Fibre, total dietary	FIBTG	g	3	1	Enzymatic gravimetric method
Alcohol	ALC	g	3	1	
Ash	ASH	g	3	1	
Sodium	NA	mg	3	0	
Magnesium	MG	mg	3	0	
Potassium	K	mg	3	0	
Calcium	CA	mg	3	0	
Iron	FE	mg	3	1	
Zinc	ZN	mg	3	2	
Retinol	RETOL	µg	3	0	
Beta-carotene equivalent	CARTBEQ	µg	3	0	Calculated as β-carotene + ½ other provitamin A carotenoids
Vitamin A (RAE)	VITA_RAE	µg	3	0	Expressed in retinol activity equivalents (Equation 4)
Vitamin A (RE)	VITA	µg	3	0	Expressed in retinol equivalents (Equation 5)
Thiamin	THIA	mg	2	2	
Riboflavin	RIBF	mg	2	2	
Niacin	NIA	mg	2	1	Preformed niacin only
Vitamin B12	VITB12	µg	2	2	
Vitamin C	VITC	mg	3	0	
Vitamin E	VITE	µg	2	2	Alpha-tocopherol equivalents
	TOCPHA	µg	2	2	Tocopherol only
Cholesterol	CHOLE	mg	3	0	

7.1. Edible/inedible portion

Data collected through HIES on food quantities acquired by households include not only the edible portion of foods but also the refuse or nonedible portions such as bones, seeds, peels, etc. Nutrient profiles of foods included in the PNDB represent the edible portion only. Thus, transformation of the "as purchased" quantities into edible quantities was required to estimate the nutrient amounts by applying the appropriate edible/inedible portion for each recorded food.[11] To build upon PIFCT Second Edition, emphasis was placed on collecting data regarding edible and inedible portions of foods, expressed as a percentage (%), to allow for dietary analysis of whole foods "as purchased" and also as consumed. For example, chicken thighs have an edible portion of 68% as they are purchased with bones but consumed without them, resulting in 32% of loss (bones and dissection loss). In most records, the edible part and/or refuse are described. For a few foods, this information is not provided because it was unavailable from the source data. Where the data did not exist for edible portions, assumptions were made based upon similar foods, and how it is commonly consumed in the region or the state in which it is purchased. These assumptions are documented in the column "assumptions". It is important to note that if the assumptions made are different from the local practices, it is important to adapt the information to better reflect the eating habits in the population. Some of the main assumptions that were made are listed below:

- **Poultry:** breast is purchased without bones and with skin and consumed with skin; quarters/thighs/wings are purchased with bones and skin and consumed with skin.
- **Fish:** purchased as whole fish and only flesh and skin is consumed. Sardine was the only fish assumed as consumed whole.
- **Oyster, scallop and sea snail/trochus:** purchased with a shell.
- **Shrimp, prawn, crayfish and lobster:** purchased as whole body.

[11] In the PNDB, nutrient values are given per 100 g of edible product; therefore, before using PNDB, the volumetric units need to be converted into grams using density factors. These can be found in FAO/INFOODS Density Database Version 2.0: http://www.fao.org/3/ap815e/ap815e.pdf

- **Canned foods:** assumptions were made according to the preservation mean – canned in brine or oil, preservation mean is discarded; canned in tomato sauce or syrup, preservation mean is consumed.
- **Ground coffee and tea bags/leaves:** as these foods are not directly consumed but used to brew the beverage, 95% refuse was attributed to them based on the assumption that only 1/20 of nutrient is present in the liquid; however, this is not true for dietary fibre. These edible/inedible portions were labelled with the symbol * since it is recommended that countries presenting a high consumption of coffee/tea should convert ground coffee/tea leaves to brewed beverage/infusion and match this quantity to the composition of ready-to-drink beverage in order to avoid an overestimation of the dietary fibre intakes.
- **Cooked foods:** except for meat, 100% of edible portion was assumed for most of the cooked foods.

7.2. Energy

The metabolisable energy values of all foods are presented in both kilojoules (kJ) and kilocalories (kcal). These values have been calculated based on protein, fat, available carbohydrates, fibre and alcohol by applying the energy conversion factors as given in Table 7.

Table 7: Metabolisable energy conversion factors – general Atwater factors (FAO 2003)

Component	kJ/g	kcal/g
Protein	17	4
Fat	37	9
Available carbohydrates	17	4
Dietary fibre	8	2
Alcohol	29	7

Equation 1. *Energy (kJ/100 g EP) = total protein (g/100 g EP) x 17 + total fat (g/100 g EP) x 37 + available carbohydrates (g/100 g EP) x 17 + dietary fibre (g/100 g EP) x 8 + alcohol (g/100 g EP) x 29*

Equation 2. *Energy (kcal/100 g EP) = total protein (g/100 g EP) x 4 + total fat (g/100 g EP) x 9 + available carbohydrates (g/100 g EP) x 4 + dietary fibre (g/100 g EP) x 2 + alcohol (g/100 g EP) x 7*

7.3. Water

Water (moisture) is measured as the loss of weight after drying the food sample to constant weight. Water may derive from distinct drying methods across the different data sources used.

7.4. Protein, total

The main analytical method used to determine total nitrogen is the Kjeldahl method. The protein content is then estimated from the total amount of nitrogen in the food sample by applying a nitrogen conversion factor. Total protein values were directly taken from the original data sources.

7.5. Fat, total

Total fat refers to triglycerides, phospholipids, sterols and related compounds. Values in the PNDB were derived by mixed solvent extraction (preferred method) or by continuous extraction (Soxhlet method).

7.6. Carbohydrates, available

In most foods, available carbohydrates are expressed as the weight of the carbohydrate (preferred method) by the sum of analytical values of total sugar, starch and glycogen. Food records from sources presenting

only values for total carbohydrate by difference (e.g. data from the United States Department of Agriculture) were recalculated according to Equation 3 to represent available carbohydrate by difference.

Equation 3. *Available carbohydrates by difference (g/100 g EP) = 100 - water (g/100 g EP) - total fat (g/100 g EP) - total protein (g/100 g EP) - total dietary fibre (g/100 g EP) - ash (g/100 g EP)*

7.7. Fibre, total dietary

The majority of data compiled for the PNDB were analysed using the total dietary fibre Prosky method (AOAC 991.43). This is a mixture of non-starch polysaccharides, lignin, a part of resistant starch and resistant oligosaccharides.

7.8. Ash

The ash content of foods is determined by gravimetric methods. Nutrient profiles from PIFCT Second Edition are lacking this component. Therefore, ash values were borrowed from other FCTs whenever possible to fill these gaps.

7.9. Minerals

The following minerals are included in the PNDB: calcium, iron, potassium, magnesium, sodium and zinc. Several analytical methods for minerals were reported by the original sources.

7.10. Vitamin A and beta-carotene equivalents

Beta-carotene equivalents are calculated as the sum of β-carotene and one-half the sum of other provitamin A carotenoids. Vitamin A is presented in the database as both retinol activity equivalent (RAE) and retinol equivalent (RE), calculated according to the following equations:

Equation 4. *Total vitamin A expressed as RAE (µg/100 g EP) = retinol (µg/100 g EP) + 1/12 β-carotene equivalents (µg/100 g EP)*

Equation 5. *Total vitamin A expressed as RE (µg/100 g EP) = retinol (µg/100 g EP) + 1/6 β-carotene equivalents (µg/100 g EP)*

7.11. Niacin

Niacin values refer to preformed niacin only, not niacin equivalent values.

7.12. Vitamin C

Vitamin C values include both ascorbic acid and dehydroascorbic acid.

7.13. Vitamin E

Alpha-tocopherol equivalents, calculated based on individual tocopherol and tocotrienols, were the preferred data for inclusion in the PNDB. Only alpha-tocopherol data were available for some foods; these values where therefore included in the PNDB to avoid missing values.

7.14. Cholesterol

Cholesterol values were determined by enzymatic or chromatographic methods.

8. Data documentation

Data documentation was performed at food level. For each food included in the PNDB, the sources used in the nutrient profile are indicated, with the respective source code and food code in the original source between parentheses. In addition, the sources for the edible/inedible portion are given separately. The approaches used to compile the nutrient profile of foods included in the database were also documented using the codes listed in Table 8.

Table 8: Type of data and respective code used in the documentation at food level

Code	Type of data
O	Original data borrowed from a food composition table/database
C1	Calculated from average
C2	Calculated from recipe (applying yield and retention factors)

9. Quality considerations

The proximate values of all foods within the database were confirmed prior to the release of this version of the PNDB. As this database was based on other existing databases, the same foods were included as original values or to compose average nutrient profiles. The sum of proximates was checked as part of the data quality checks. The sum of proximates was calculated by summing the following components: water, protein, fat, available carbohydrates, dietary fibre, alcohol and ash. The acceptable range for the sum of proximate components is 95–105 g (FAO/INFOODS 2012a).

For some food records, the sum is outside of this range. Explanations for this situation in the original data sources include the presence of high levels of unusual constituents not measured in the proximate analyses and analytical error, especially in FCTs/FCDBs where the carbohydrate data were obtained by analysis rather than calculated by difference. For some food records it was not possible to perform this check as data for ash were not available.

The PNDB is a result of research in available FCTs/FCDBs to match the information collected in HIES with food composition data. Data should be used while taking into account that many assumptions were made due to the lack of detailed food descriptions in the HIES. Thus, it is important to consider that adaptations may be required to appropriately reflect foods consumed and eating habits in different countries/regions. This might include edible/inedible portions, cooking and food fortification practices.

10. Recommendations for future work

High-quality and country-specific food composition data are needed for many different areas of work, including assessment of nutrient intake. The current PIFCT, published in 2004, needed to be updated and expanded regarding the number of components (including edible portion) and type of foods (e.g. processed/imported foods, traditional/local foods, recipes and takeaway foods) included in the database to better reflect the foods consumed in the PICTs.

In addition, improving the level of details collected in the HIES will significantly improve the quality and accuracy of the nutrient intake estimations. Activities may include collecting a more detailed food description and market/restaurant surveys to collect pictures and weights of prepared foods.

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Pacific Community (SPC)
B. P. D5 – 98848 Noumea Cedex, New Caledonia
Telephone: + 687 26 20 00
Email: sdd@spc.int
Website: http://www.spc.int – https://sdd.spc.int