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FOOD CONSUMPTION IN SOLOMON ISLANDS

BASED ON THE ANALYSIS OF THE 2012/13 HOUSEHOLD INCOME AND EXPENDITURE SURVEY

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CONTENTS

Annexes

List of figures

List of tables

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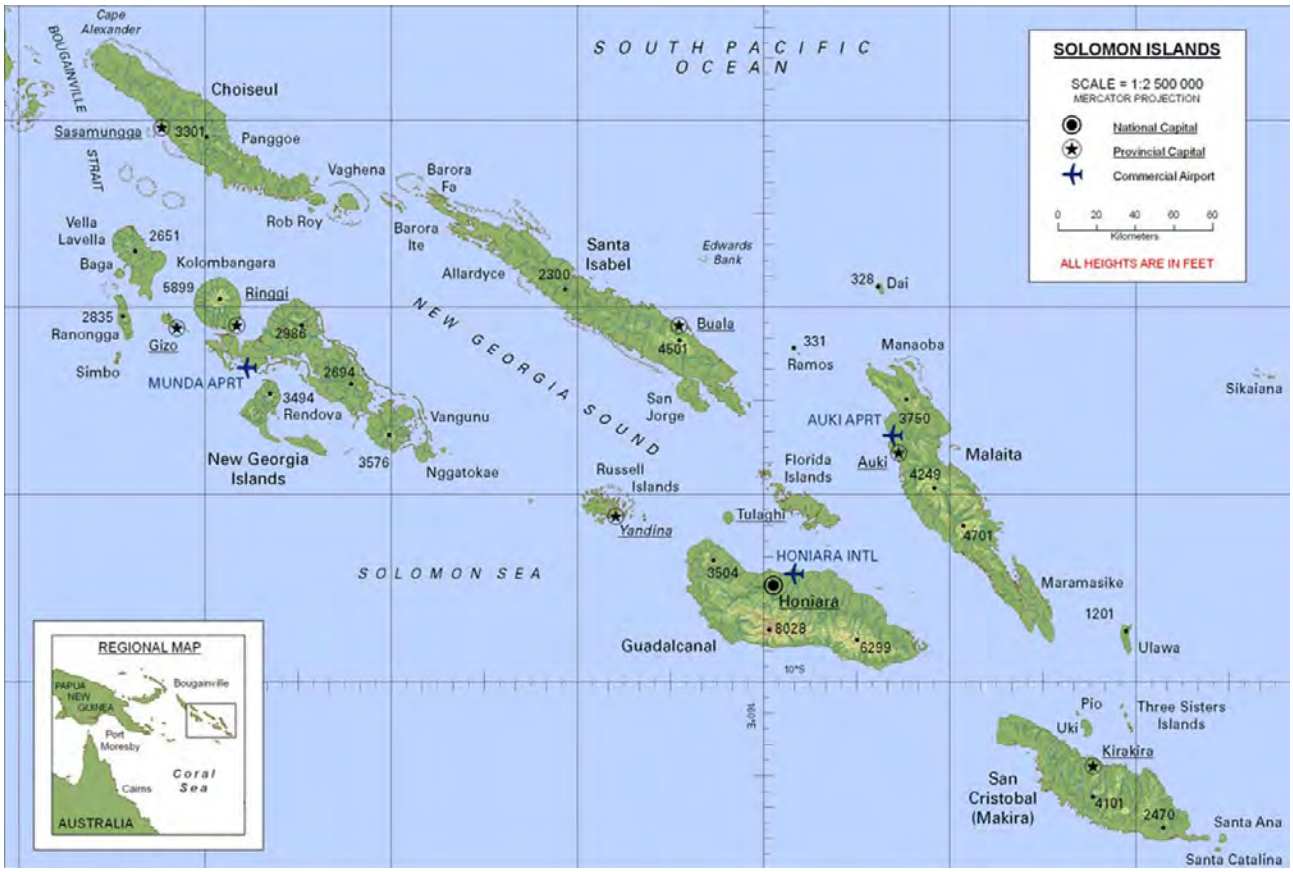
Abbreviations and acronyms

DEC	dietary energy consumption
FAO	Food and Agriculture Organization of the United Nations
HIES	Household Income and Expenditure Survey
MDER	minimum dietary energy requirement
PoU	prevalence of undernourishment
SBD	Solomon Islands dollar
SDG	Sustainable Development Goal
SINSO	Solomon Islands National Statistics Office
SPC	The Pacific Community
WB	The World Bank
WHO	World Health Organization

SUMMARY OF MAIN FINDINGS



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Around one person in ten is undernourished in Solomon Islands. That is, their habitual food consumption is insufficient to provide, on average, the amount of dietary energy required to maintain a normal, active, healthy life. This result is not surprising in a country where 13 percent of the population is living in poverty, more than 30 percent of children younger than five are stunted, 41 percent of women are anaemic and 70 percent of the population do not have access to safe sanitation. In contrast, 47 percent of women and 30 percent of men are overweight or obese. Together, these patterns characterise a population experiencing a triple burden of malnutrition.

The Food and Agriculture Organization of the United Nations used ADePT-FSM software to analyse food data collected in the 2012/13 Household Income and Expenditure Survey (2012/13 HIES). It was found that on average a Solomon Islander consumes around 2 600 kcal/day. Thus, many individuals are likely to be consuming in excess of their daily energy requirements. Food expenditures contribute to around 52 percent of household budgets, and more than 50 percent of dietary energy consumed is own produced (accounting for around 45 percent of total food consumption "expenditure"). Gifts are also an important source of dietary energy, accounting for 6.7 percent of total dietary energy consumption (DEC).

Just five food groups (roots/tubers/plantain, cereals, pulses/seeds/nuts, fish and sweets) contribute 90 percent of total dietary energy and only 13 different food products were consumed by more than 50 percent of the households during the previous two weeks.

Energy-dense foods like rice, coconut, cassava and kumara account for 60 percent of total DEC.. Foods to limit or avoid contribute to more than one third of the total amount spent to acquire food. Protective foods – fruit and vegetables that are low in energy, high in micronutrients – contribute less than 4 percent of calories consumed, which corresponds to around 180 g/capita/day, which falls far short of the World Health Organization (WHO) recommended level of 400 g/capita/day.

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Rice is the main source of dietary energy, followed by brown coconut (95 g/capita/day, or 15 percent of total energy consumed) and cassava (230 g/capita/day, or 13 percent of total energy consumed). Around 90 percent of the dietary energy sourced from cereals is purchased, while 75 percent of the dietary energy sourced from roots/tubers/plantains or from nuts is own produced. Less than 23 percent of the dietary energy sourced from fish and seafood is purchased, with the remaining majority coming from own production or gifts.

Rice is the largest single household food expenditure item, accounting for 16 percent of expenditure. Most rice acquired is purchased, so even a slight increase in price could have dramatic consequences on access to dietary energy for Solomon Islands households, particularly those residing in the capital, Honiara, where rice contributes 34 percent of total DEC. Kumara is second to rice in food consumption expenditure but most is own produced.

Although betel nut, kava and tobacco are not generally considered as food, they collectively contribute to 7 percent of the overall budget devoted to "food" (and around 3 percent of the total household expenditure). The significance of these products in overall consumption of Solomon Islanders warrants concern, as they are considered to be toxic and their consumption should be reduced or avoided.

Coconut is the least expensive source of energy with less than SBD 1 required to acquire 1 000 kcal. The cost of acquiring 1 000 kcal from energetic foods like rice, cassava or kumara is one sixth of that from body building foods like chicken or eggs. Fresh fish remains a relatively affordable source of energy compared to meats: the cost of acquiring 1 000 kcal from fish is one third of that for meat. Sugar and confectionery are low-cost sources of energy: it costs the same to acquire 1 000 kcal from sugar as 1 000 kcal from kumara. While the latter is part of the recommended sources of energy, the former is to be avoided. Among protective foods, breadfruit is the least expensive source of energy.

At a national level, the contribution of proteins, fats and carbohydrates are all within WHO recommended norms for a balanced diet.[1] However, not all households have access to a balanced diet, as fewer than one household in five reach adequate amounts of proteins, fats and carbohydrates. Fish represents almost 30 percent of the total proteins consumed; however, proteins from pulses/seeds/nuts are a more affordable source of protein than fish, while proteins from beef were four times as expensive as those from fish. Roots/tubers and plantains provide >50 percent of the carbohydrates consumed, followed by cereals (30 percent). Two thirds of fats consumed is of vegetable origin, principally from brown coconuts. The average fibre

[1] Based on WHO norms, proteins should contribute 10–15 percent of total dietary energy consumed, fats to 15–30 percent and carbohydrates to 55–75 percent.

consumption is higher than the recommended 25 grams per capita per day.

Estimated adequacy[2] of micronutrient provision is reached for vitamin A (mainly coming from vegetables, and particularly cabbage), vitamin B1 (mainly from roots/tubers/plantain through the consumption of cooking banana, and bread in particular), and vitamin B12 (mainly from fish and fish products). The average diet, however, is low in vitamin B2 because of insufficient consumption of dairy products. The diet is relatively low in vitamin C, despite the consumption of cabbage and pawpaw, which are very rich in vitamin C. The limited consumption of meat, and meat offal in particular, results in low consumption of iron, which likely contributes to the observed high prevalence of anaemia among children younger than five years old (39 percent) and among women, particularly pregnant women (54 percent of pregnant women in Solomon Islands are anaemic).[3]

Some differences can be observed among regions and population groups. Food consumption patterns at disaggregated levels show that 20 percent of households access less than 2 000 kcal/capita/day, well below the national average. Yet the top 20 percent of the population by wealth access more than 1.7 times the total energy of the least wealthy group. More than 80 percent of these least wealthy households were identified as poor[4] by the World Bank (WB). These households allocate around 70 percent of their budget to food, and 67 percent of the dietary energy they consume come from their own production. Food received as gifts represents about 10 percent of total food consumption expenditure.

Disparities are observed among provinces. Honiara has the lowest level of DEC;[5] however, the region of Makira contains half of the poor.

Note from the authors: Although the analysis presented is broadly consistent with current understanding of the food security status of Solomon Islanders, results need to be interpreted with caution. The survey was not designed to enable in-depth analysis of food and nutrient consumption. The survey collected household data not per capita estimates of acquisition and consumption. Levels or indicators of individual consumption need to be interpreted as reflecting a trend rather than quantified estimates. Anthropometric and individual dietary intake surveys are needed to fully estimate the nutritional status of individuals.

2 Defined in terms of quantity of vitamins apparently available for consumption over average requirements.

3 Based on results of the 2015 DHS.

4 According to the WB, about 12.7 percent of the population in Solomon Islands live below the poverty line and are classified as "poor". This estimate is based on the distribution of real expenditure in adult equivalent.

5 Low levels of dietary energy consumed in Honiara may be a result of underreporting, particularly of food away from home.

INTRODUCTION

With a population of more than 712 000 people, Solomon Islands consists of six large islands and over 900 smaller islands in Oceania, lying to the east of Papua New Guinea and north-west of Vanuatu. The country covers an area of 28 400 square kilometres and is divided into nine provinces. The national capital, Honiara, is located on the island of Guadalcanal and has only 11 percent of the population;[6] it is separately governed as the islands' Capital Territory. The provinces of Malaita and Guadalcanal alone host 46 percent of the population, while only 1 percent of the population lives in the rural province of Rennell and Bellona.[7]

With a per capita gross domestic product (constant 2010 US$) of $1 482, Solomon Islands belongs to the group of lowest developed countries and ranks 153 out of 185 based on a Human Development Index of 0.557.[8]

Over 80 percent of Solomon Islanders live in rural areas, and domestic agriculture is the main source of food and income, with more than 75 percent of the labour force engaged in subsistence agriculture and fishing. Forests cover more than 78 percent of the territory and only 3.9 percent of the area of the islands are used for agriculture, which is mostly confined to coastal areas. About 91 percent of Solomon Islanders live within 5 km of the coast.[9] The main subsistence crops are sweet potato (kumara), cassava, banana, taro, yam, beans, cabbage, watercress, and watermelon. Other important staples include breadfruit, nuts and edible leaves. Agricultural commercialisation in the Solomon Islands is challenging because of the lack of infrastructure. Boats are the main means of internal transport.

Despite the importance of agriculture for food and its significant contribution to the macro economy, Solomon Islands is highly dependent on imported foods. Agricultural export is a major source of export earnings and food exports alone, mainly in the form of processed fish, non-fillet frozen fish and palm oil, contributed in 2018 to 20 percent of the total value of products exported.[10] With a total value of imports of $600 million compared to $570 million[11] of exports, Solomon Islands was a net importer in 2018, with food contributing to 23 percent of total imports, and rice alone representing 32 percent of total food imported.

The Solomon Island population is experiencing a triple burden of malnutrition where 47 percent and 30 percent respectively of adult women and men are co-existing with overweight and obesity, yet with 10 percent of people unable to access the amount of dietary energy required to be in good health and socially/economically active, 41 percent of women anaemic, 32 percent of children younger than five years old stunted, 8 percent wasted and 16 percent underweight.[12] Social conditions are no better as one person in eight is living below the national poverty line,[13] less than 30 percent of households have access to improved sanitation facilities and around 18 percent of rural households still do not have sustainable access to an improved water source.

Considering the overall economic, environmental and nutritional context of the Solomon Islands, meeting the 2030 Agenda for Sustainable Development and achieving Goals 1, 2 and 6 on ending poverty, hunger and ensuring access to safe water and sanitation for all presents a significant challenge for Solomon Islands.

6 Based on 2020 Population Census.
7 Other provinces are Western (15 percent), Temotu (4 percent), Makira (9 percent), Choiseul (5 percent), Isabel (4 percent) and Central (5 percent).
8 Human Development report, 2019. UNDP.
9 Andrew et al. (2019). Coastal proximity of populations in 22 PICTs. PLoS ONE 14(9): e0223249
10 See Observatory of Economic Complexity: https://oec.world/en/profile/country/slb
11 UN Comtrade database: https://comtrade.un.org/
12 Based on the Solomon Islands 2015 Demographic and Health Survey. SINSO, SIMoHMS, SPC. June 2017.
13 World Development Indicator, World Bank 2018.

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To develop the policies that will be needed to guide the country through the achievement of these goals, data are needed. In 2012 Solomon Island Statistics Office (SINSO) of the Ministry of Finance and Treasury started data collection for the third nationwide survey. The 2012/13 HIES is a key data source for updating core official statistical indicators, such as the Consumer Price Index (CPI), GDP, poverty or the country's balance of payments. In addition, the 2012/13 HIES implemented the most comprehensive food consumption module ever adopted in such a large-scale survey. The survey was experimental to some extent and was aimed at capturing food data that could not only be used to inform poverty research but also be further used for food security analysis.

This report presents the main results derived from the analysis of the food data collected in the 2012/13 HIES to inform current patterns on food and nutrient consumption in Solomon Islands. Whenever possible, indicators are given at national level and for sub-groups of the population. The analysis was performed using ADePT-FSM,[14] free software developed jointly by the World Bank and FAO to analyse food data collected in Household Income and Expenditure Surveys and estimate the SDG 2.1.1 indicator on the prevalence of undernourishment (PoU).

The first part of the report presents the survey and food consumption module, and limitations of the analysis. The prevalence of undernourishment will be briefly discussed in the second section of the report, as this is the first time this indicator has been estimated for Solomon Islands using food data collected in an HIES. The third section of the report presents the main patterns in food consumption for Solomon Islands as a whole and for targeted population groups. This section is followed by an in-depth discussion on the nutritional status of the population in terms of diet composition and consumption of essential nutrients. The last section looks at regional disparities, and a food consumption profile of income-deprived populations is provided, as these population groups are more at risk of being food insecure and are the priority target of any policies aiming at reducing hunger and food insecurity.

[14] For more information on ADePT-FSM refer to http://www.fao.org/economic/ess/ess-fs/fs-methods/adept-fsn/en/

CHAPTER 1
DESCRIPTION OF THE SURVEY AND DATA PROCESSING

The survey was conducted over a period of one year from October 2012 to October 2013, to capture seasonal effects in consumption and is based on a sample stratified by urban and rural areas of all 10 provinces, except for the province of Rennell and Bellona, which only has rural clusters, and Honiara, which only has urban clusters. The sample frame came from the 2009 census and just under 4 500 households were surveyed.[15]

1.1 Food consumption module and food data processing

A diary was administered to one member of each of the sampled households to be filled over a period of 14 days. Respondents were asked to report on the quantity of food acquired from cash purchases, own production and gifts. The amount spent to purchase the food was also reported and, for each quantity of food item received for free or consumed from own production, households were also asked to estimate the amount that would be spent to purchase this quantity of food at the market.[16] The Solomon Islands 2012/13 HIES is one of the few surveys conducted worldwide that collected beginning and ending stocks of non-perishable products at the start and end of the diary period.

Quantities of food consumed from own production reported in local units of measurement (28 different units of measurement were identified) were converted to grams. Enumerators were provided with scales to weigh the food whenever possible and this information was further used to convert other non-standard reporting in the diary to grams. Whenever a conversion from local unit of measurement into grams was not available, the median price of one gram of product by region was used to impute an estimate.

The survey collected information for more than 16 000 food items that, after proper coding, collapsed to about 300 specific food products.[17] Despite being considered toxic products, tobacco, betel nut and kava were included in the consumption analysis due to their importance in the overall household food consumption budget. The nutrient contribution to the overall diet is negligible but their contribution in terms of expenditures can be significant.

Quantities of food purchased and food consumed from own production or received for free (gifted) were further reconciled with information on stocks to obtain an estimate of food consumed by the households over the 14-day reference period of the diary.

The conversion of quantities in grams into dietary energy was performed using the Pacific Nutrient Database.[18] This database provides the nutrient composition of more than 1 000 food products mainly consumed in Pacific Island countries and territories, linking these products to the Classification of Individual Consumption According to Purpose (COICOP). This database has been developed under the initiative of SPC with the aim to further facilitate allocation of nutrient values to the food products collected in HIES. All the four essential macronutrients (proteins, fats, carbohydrates and

[15] More details can be found in the 2012/13 HIES analytical report: http://www.statistics.gov.sb/statistics/demographic-statistics/household-income-and-expenditure-surveys and at the Pacific Data Hub – Microdata Library: https://microdata.pacificdata.org/index.php/catalog/731

[16] These values were further checked for consistency and corrected as appropriate.

[17] The questionnaires were completed in English, which was not the first language of interviewers or respondents. This resulted in differences in communication and interpretation of technical questions in some cases and therefore the same product may be reported in many different ways in the diary.

[18] SPC, UOW and FAO (2020). The Pacific Nutrient Database User Guide: A tool to facilitate the analysis of poverty, nutrition and food security in the Pacific region. Pacific Community, University of Wollongong and the Food and Agriculture Organization of the United Nations. 15 pp. See database at (https://microdata.pacificdata.org/index.php/catalog/755/study-description)

fibre), as well as essential micronutrients or minerals, such as vitamin A, vitamin C, vitamin B1, vitamin B2, vitamin B12, calcium and iron, were allocated to the quantities collected. Refuse factors were also allocated to each food collected to convert quantities as "purchased" into edible quantities.[19]

1.2 Limitations of the analysis

The 2012/13 HIES of Solomon Islands was not designed to underpin food security analysis and because of the limitations observed in the food data collected, there is uncertainty in resulting estimates. Some of the main limitations are described below.

- Coding of each food product reported by the respondent was checked. Overall coding was properly performed during the cleaning stage of the food data; however, some cases of mismatches were found and further corrected for nutrient analysis because it is important that the food reported corresponds to the food product consumed.[20]
- Conversion of quantities into grams was challenging. About 300 different products were collected in the survey and quantities were collected in about 18 different units of measurement. Only 15 percent of the quantities were collected in standard units, leading to about 370 combinations of products and non-standard units that needed to be converted into grams.[21] To convert the remaining quantities into grams we refer to ad hoc conversion factors and the median cost of one gram estimated from the quantities of food product that could be converted into grams and the respective amount spent to acquire this quantity (value).
- It is believed that food consumed away from home in urban areas was not comprehensively captured in the survey. Conversely, it is believed that consumption of staple foods in rural areas was slightly over-reported, as some households may have reported the quantity harvested rather than the quantity consumed. These errors of estimation may partially cancel each other out at the national scale, but disaggregated analysis by sub-region and/or by population groups might suffer from overestimation or underestimation.
- Inclusion of stocks was important, as we had 3 715 cases (corresponding to 161 different products) for which the households did not acquire the food during the previous 14 days but consumed exclusively from stocks. Not accounting for this consumption would underestimate the quantities consumed of these products. In contrast, we had 4 028 cases (corresponding to 101 products) for which the households acquired the food during the previous 14 days but did not consume all of the quantities acquired as some of these quantities were stored. Not accounting for the quantities stored would overestimate the overall quantity consumed in the last 14 days.[22] Therefore the inclusion of stocks was important, but the reconciliation of this information with that from purchases and consumption reported in the diary was quite difficult and required proper re-coding of the food products to allow the match with the products reported in the diary, conversion of the quantities reported into grams and allocation of source of acquisition. In addition, some inconsistencies could be found between stocks reported and quantities acquired during the reference period, leading to 650 cases for which the total quantity consumed was negative. These quantities were further corrected during the data cleaning stage (see below).
- Outstanding quantities were further identified using the Tukey interquartile range (IQR)[23] method applied to the logarithm of the distribution of per capita quantities in grams of each product in urban and rural areas. Because of the systematic over-reporting in rural areas and misreporting in stocks, we used a multiplier of 1 instead of 1.5 as recommended by Tukey to capture and correct as many low and high outstanding quantities as possible. In doing so we identified around 6.5 percent of the quantities in grams as outliers.[24] Outliers were replaced with the median of the product acquired in respective areas. This outlier

[19] Edible quantities refer to the quantities after the non-edible portion has been removed (i.e. seeds, skin, bones, etc.).

[20] The check of the food coding was performed on the exact description of the food item for each of the 16 000 different descriptions.

[21] The gram is the reference unit of all the Food Composition Tables that provide the nutrient values for 100 grams of edible product.

[22] Note that the over- and under-estimation of quantities consumed do not cancel out, as stock variations (ending stocks minus beginning stocks) are negative for 163 products, positive for 10 food products and null for only one product.

[23] The interquartile range corresponds to the difference between the 75th and 25th percentile of the distribution.

[24] Around 27 percent of the outliers refer to tobacco products and odd patterns observed in stocks, such as ending stocks higher than beginning stocks plus acquisition during the reference period, or high stocks reported at the beginning of the reference period which households did not consume; these stocks could correspond to quantities harvested and to be consumed beyond the 14 days of the diary.

detection and correction method significantly reduced the skewness and the spread in the DEC and resulted in a decrease in the average DEC by 200 kcal/capita/day (mainly in rural areas), which is more in line with the Dietary Energy Supply (DES) estimated from the Food Balance Sheets (FBS).[25]

- The diary also reported amounts given to children as pocket money, mainly to acquire food at school. Given that what was acquired with this money was not reported, these expenditures were treated as food consumed away from home and the amount of dietary energy estimated using the cost of one calorie consumed in the house.
- Data on alcoholic beverages were collected both in the expenditure section of the questionnaire and in the diary. To avoid double counting, only alcoholic beverages reported in the diary were used, but this information was underreported.
- The exact number of people who partook in meals was not collected in the survey and this information was therefore approximated in summing the number of household members present during the reference period and the number of visitors.

1.3 Level of analysis

The analysis was performed using ADePT-FSM software. In addition to the food data file, a file containing information on the household geographical or socioeconomic characteristics was created to allow for the analysis at sub-national level. Of the 4 478 households for which food data was collected, 114 households were dropped from the analysis to be consistent with the sample used for the poverty analysis.[26] Whenever the analysis refers to *poor* people, it is the *poor* as defined by the WB and as reported in the poverty report.

The following categories[27] of the population were analysed in this report (see Annex 1 for a brief summary of the characteristics of each population group):

- national;
- quintile of per capita total expenditure;
- gender of the head of the household;
- composition of the household in terms of number of children present in the household;
- whether the household has been identified as poor according to the World Bank methodology;
- education level of the head of the household;
- whether the household had a vegetable garden;
- whether the household was engaged in agriculture activities;
- whether the household was engaged in fishing activities;
- whether the household was engaged in any livestock activities;
- whether the household was receiving remittances from another household;
- province/region.

Indicators are also provided at the level of the food product and by food groups following the FAO/WHO Global Individual Food consumption data (GIFT) Tool.[28] Household Income and Expenditure Surveys are designed to collect information at the level of the household and therefore only the total amount of food consumed by the household is reported, from which it is not possible to infer intra-household food allocation without forming assumptions about food allocation. For this reason, all indicators are expressed as per capita per day and do not consider the age and sex of the individuals. Only for DEC, for which it can be assumed that the dietary energy is allocated

[25] Current FAO estimates give a Dietary Energy Supply of around 2 400 kcal/capita/day in 2013. DES and DEC are estimated from different sources: DES comes from administrative data and DEC from household data and we therefore expect some slight differences in both estimates. In the FBS, cereals seem to be slightly overestimated by 200 kcal/capita/day and roots, fish and oil crops underestimated by 500 kcal/capita/day, resulting in around 200 kcal/capita/day difference between DES and DEC.

[26] Solomon Islands Poverty Profile based on the 2012/13 Household Income and Expenditure Survey. World Bank. 2015.

[27] Categories were selected based on their relevancy and possibility of being disaggregated at a level allowing for reliable estimates. Further detail on the composition of the categories or groups is presented in Annex 1.

[28] The food products were grouped according to FAO nutrition experts who developed the GIFT platform: http://www.fao.org/gift-individual-food-consumption/data-and-indicator/en/ adapted from FoodEx2 classification. FoodEx2 is a comprehensive food classification and description system aimed at satisfying the need to describe food in data collections across different food safety domains (https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/sp.efsa.2015.EN-804).

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according to the dietary energy requirements of the individuals, statistics are given in both per capita and adult male equivalent. And it is possible to form such assumptions because dietary energy requirements are correlated with dietary energy intake. Such correlation does not hold in case of other nutrients and therefore it is important to understand that expressing micronutrient consumption per nutrient-based adult male equivalent (AME) factor does not remove the differences that exist between households due to the characteristics that define the micronutrient requirements of the household members. In other words, there is no advantage in expressing micronutrient consumption in adult male equivalent based on nutrient requirements compared to per capita estimates; they are just two different units.

The units of measurement in which all the indicators will be expressed are mainly kcal, grams, SBD,[29] or percentage.

More than 50 output tables were produced by ADePT-FSM,[30] with disaggregation levels going up to the tenth percentile. Since not all indicators or disaggregation levels are relevant, only the most meaningful trends are analysed. All the output tables are provided as a companion document[31] in the form of an Excel spreadsheet and the table number to which the analysis refers is provided when appropriate.

[29] Nominal value of 2012/13 SBD and not corrected for price fluctuation over year but corrected for fluctuation of price that occurred within the survey period.

[30] For more information on output tables see Analyzing food security using household survey data, FAO/WB 2014 (http://www.fao.org/economic/ess/ess-fs/fs-methods/householdsurvey/en/#.XtTC3W5uI2w) and "Optimizing the use of ADePT-FSM for nutrient analysis" – ADePT-FSM V3. FAO. 2018. http://www.fao.org/fileadmin/templates/ess/foodsecurity/Optimizing_the_use_of_ADePT_FSM_for_nutrient_analysis.pdf

[31] The ADePT-FSM tables can be downloaded at https://microdata.pacificdata.org/index.php/catalog/731/related-materials

CHAPTER 2
UNDERNOURISHMENT IN SOLOMON ISLANDS

The PoU, or the proportion of the population whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life, has been regularly monitored by FAO and reported yearly in the State of Food Security and Nutrition in the World.[32] The PoU has been used to monitor and report on global hunger since 2000 with the Millennium Development Goals and has been endorsed in September 2015 as Sustainable Development Goal 2.1.1. To provide a comparable estimate over time and across countries, for global monitoring, the PoU is based on the Dietary Energy Supply compiled by FAO in the Food Balance Sheets.[33]

However, whenever food data are collected in a large-scale representative national survey, such as the 2012/13 HIES in Solomon Islands, it is possible to derive the average amount of energy consumed together with the indicator of dispersion of the DEC within the population (see methodological Annex 2).

Based on the food consumption data collected in the 2012/13 HIES, it was found that around one person out of ten was undernourished in Solomon Islands.[34] This equates to around 56 000 people in Solomon Islands experiencing hunger in 2013.[35]

Because of data limitation, the PoU could not be disaggregated by area of residence or region.

[32] The FAO State of Food Security and nutrition in the world: http://www.fao.org/publications/sofi/en

[33] FAO Food Balance Sheets: http://www.fao.org/economic/ess/fbs/en/

[34] This estimate is based on a DEC excluding the 40 kcal/capita/day brought from the chewing of betel nuts; since these calories are considered as toxic, they are not included in the estimation of the PoU.

[35] This estimate is slightly lower than the 12.6 percent for 2012–2014 based on the Food Balance Sheets and reported in the 2020 State of Food Security and Nutrition. This higher value is mainly due to the lower value of dietary energy supply of 2 400 kcal/capita/day.

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CHAPTER 3
NATIONAL AND SUB-NATIONAL FOOD CONSUMPTION PATTERNS

Based on the analysis of the food data collected in the 2012/13 HIES, a Solomon Islander consumes around 2 640 kcal per day,[36, 37] (see Table 1.3). This relatively high level of average DEC seems consistent with the prevalence of overweight adults that reflects access to an excessive amount of dietary energy for some Solomon Islanders. On the other hand, there are inequalities in the DEC that can be observed within the population, with wealthier households (those in the top 20 percent of total per capita expenditure) accessing 1.7 times more dietary energy than the least wealthy households (those in the bottom 20 percent of total expenditure).[38] These latter households consumed, on average, a number of calories close to the minimum amount of energy needed to be in good health and perform a certain level of activities, which means that the probability that most of the people living in the least wealthy households are undernourished is quite high.[39]

This also points to the apparent lack of access to the amount of dietary energy needed to be healthy and socially/economically active among some Solomon Islanders. Therefore, high amounts of dietary energy available for consumption among some populations coexists with inadequate physical or economic access to the required dietary energy among other populations.

Inequalities can be observed between wealthy and less wealthy households, but also within other population groups (see regression analysis of the impact of household socioeconomic, demographic and regional characteristics on average DEC in Annex 3). Female-headed households tend to consume more than male-headed households, which can be because households headed by a woman are on average composed of fewer people than those headed by a male (4.8 versus 5.8 people, respectively, and 28 percent of male-headed households have at least four children compared to 17 percent of female-headed households).

Households engaged in agriculture, livestock or fishing activities, have higher average dietary energy consumed than those not engaged in these activities. Almost 90 percent of Solomon Islands' households have a vegetable garden, which gives them access to an additional 400 kcal/capita/day compared to households without a garden.[40] One household out of four receives remittances from another household, but this does not seem to affect the overall amount of dietary energy consumed even if, as discussed below, the calories accessed by these households are of lower quality. The level of education of the head of the household does not significantly affect dietary energy consumed as reflected by the regression analysis (parameters are not significant).

[36] Refers to the amount of dietary energy of an individual representative of the population of Solomon Islands.

[37] Food consumption indicators computed from household level and expressed in terms of dietary energy, macronutrients and micronutrients data are usually labelled "apparent consumption" (See Fiedler, J.L. (2013). Towards overcoming the food consumption information gap: strengthening household and consumption expenditure surveys for food and nutrition policy making. Global Food Security 2, 56-63). These indicators are usually based on food quantities (edible amounts) available for consumption, not on actual intake, and in most cases, they refer to the raw form before preparation. An analysis using Household Consumption and Expenditure Surveys could under- or over-estimate actual food intake as compared with an individual-level survey.

[38] The household per capita total expenditure is used as proxy of the household income.

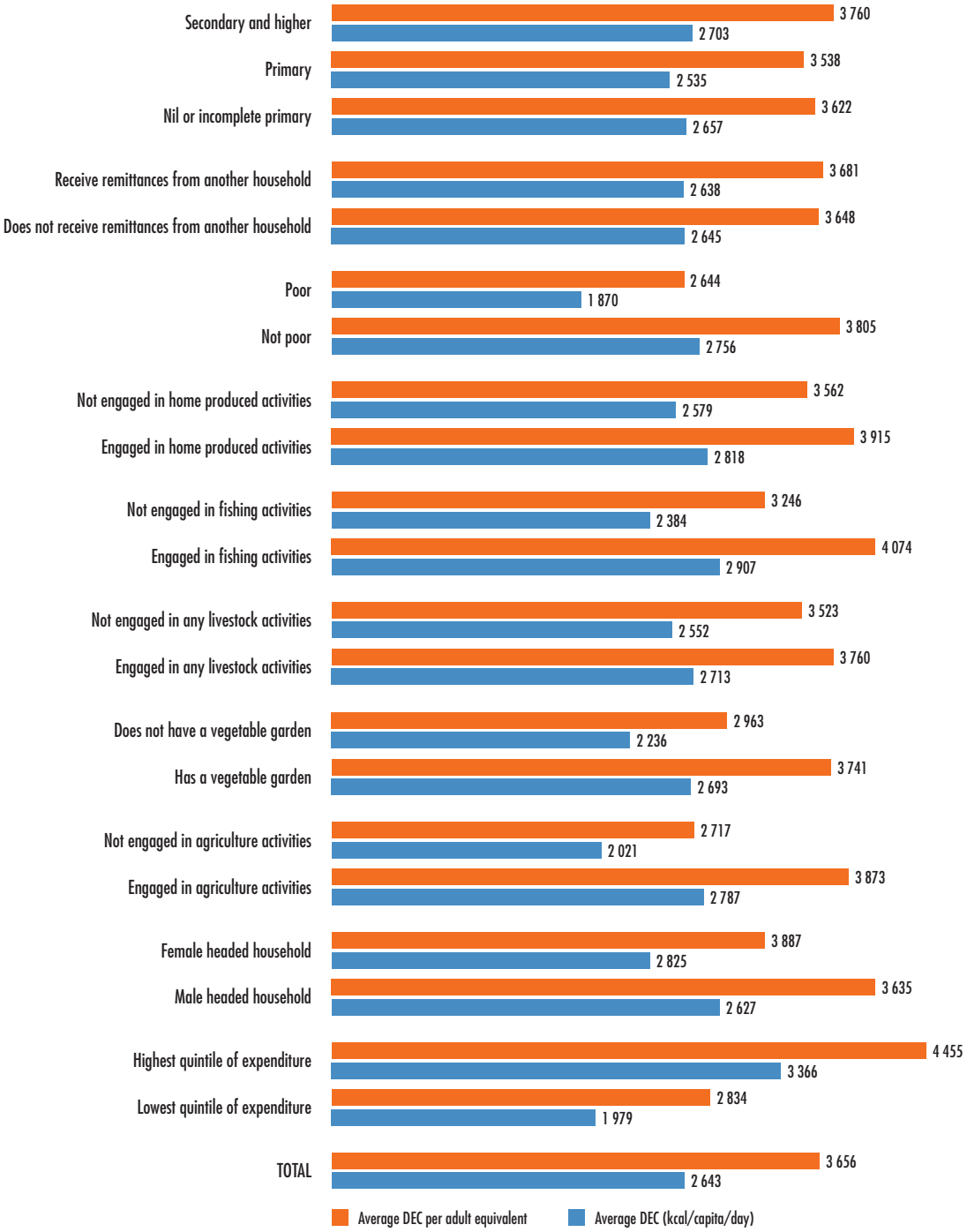
[39] The FAO methodology is not based on a headcount approach and therefore it is not possible to determine with certainty if individuals living in poor households are undernourished.

[40] Note that 90 percent of the households who do not possess a garden live in urban areas and therefore the statistics on average consumption for these households may be slightly biased by the underreporting of dietary energy consumed in urban areas.

FIGURE 1

Distribution of average DEC by reference sub-populations

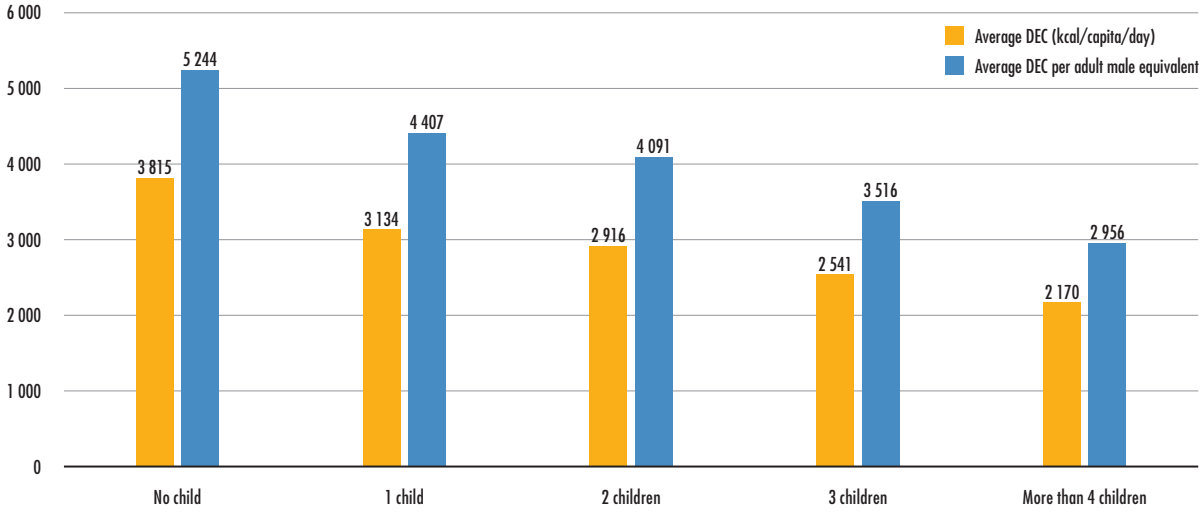
Average daily Dietary Energy Consumption in per capita and Adult Male Equivalent (kcal/day)



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 2
Distribution of DEC by size of the household

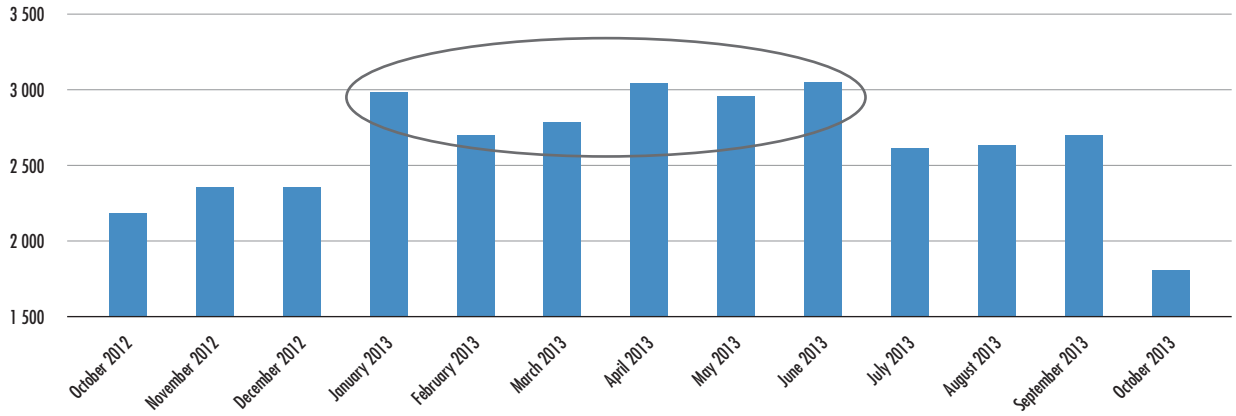
Average DEC by composition of the household expressed in per capita and adult male equivalent



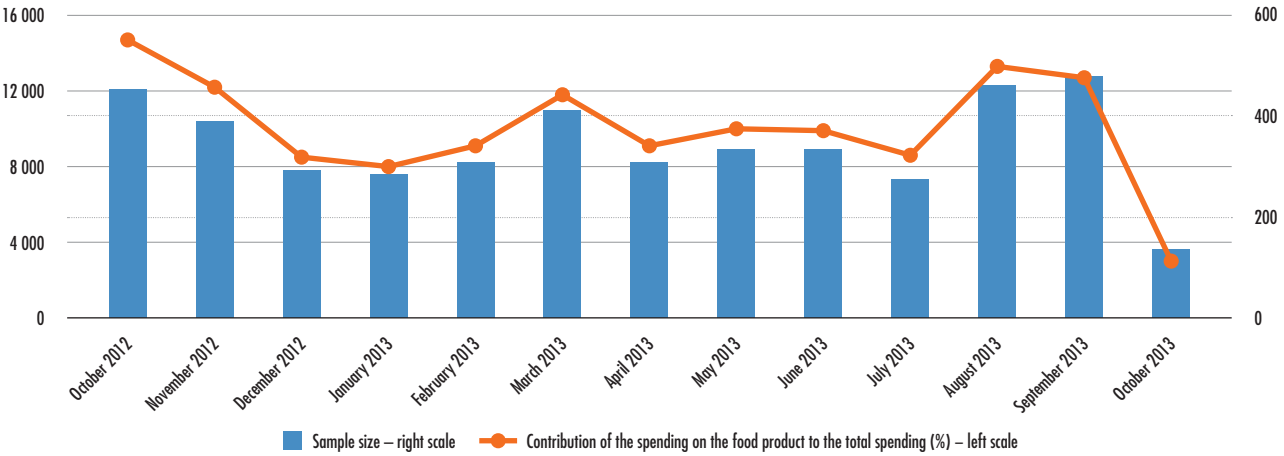
SOURCE: Solomon Islands 2012/13 HIES

FIGURE 3
Seasonal variation of the food consumption

Seasonal variations of the average DEC (kcal/capita/day)

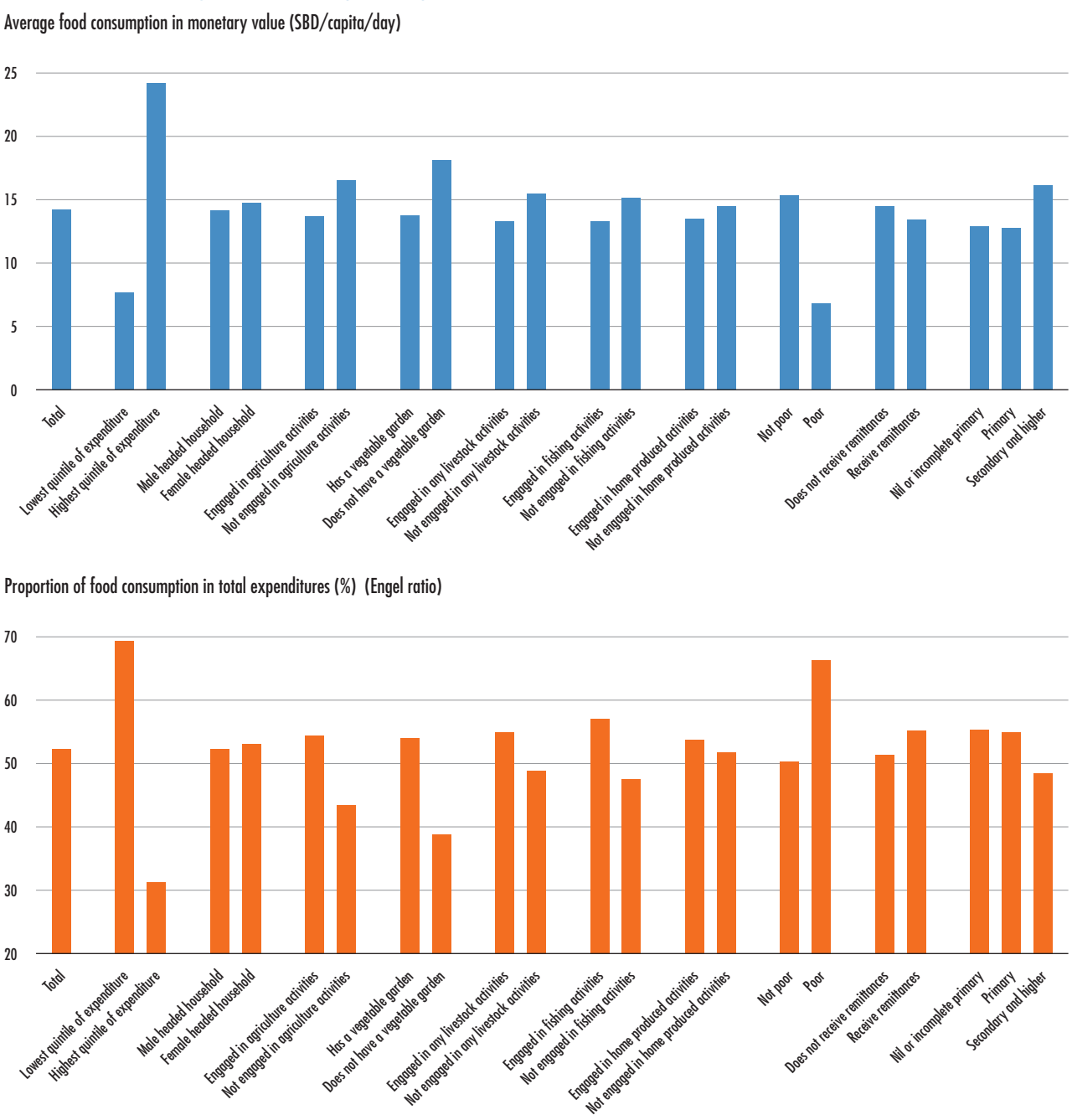


Size of the sample



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 4
Distribution of average food consumption expenditures



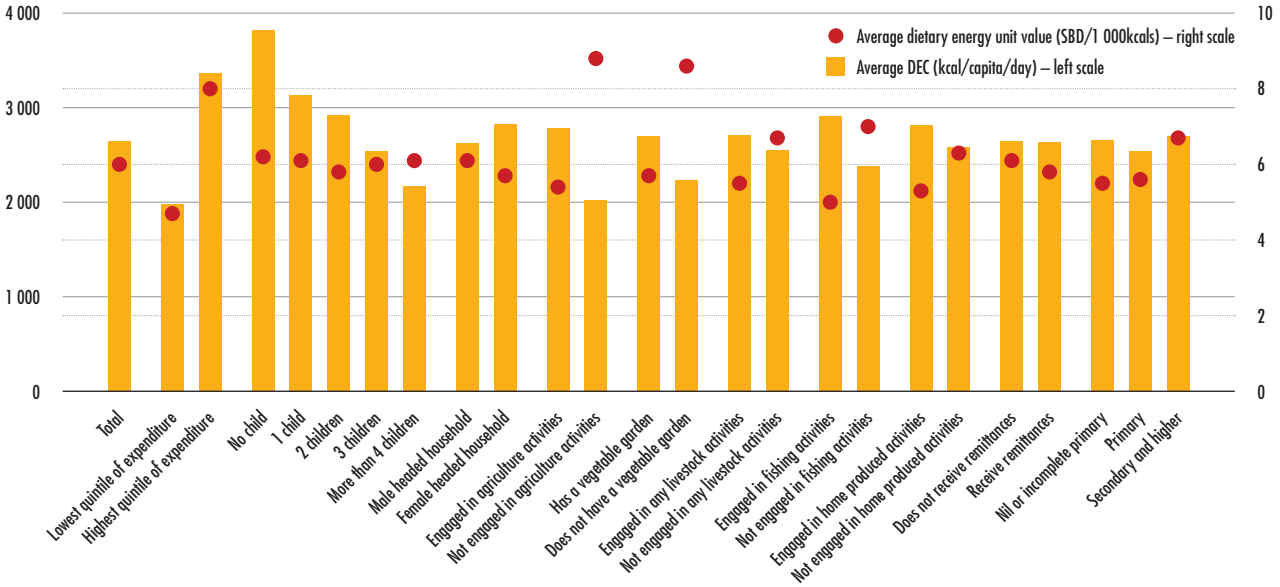
SOURCE: Solomon Islands 2012/13 HIES

Households living below the poverty line have the least access to dietary energy. Households are quite large in Solomon Islands – there are an average of 5.7 people per household and 27 percent of households have more than four children. Results from the analysis of the 2012/13 HIES show that the presence of more children is correlated with a lower number of calories consume per capita. Households with more than four children consumed, on average, 2 300 kcal/capita/day less than those with no children when the total amount of dietary energy in the household is converted to adult male equivalent (children consume less calories than adults).[41]

[41] On a per capita basis, the total amount of energy consumed in the household is divided by the number of people present in the household. In adult male equivalent, it is assumed that dietary energy is distributed within the household based on the dietary energy requirements of the household members (children require less dietary energy than a male adult). A household composed of two adults and two children will have a lower DEC when expressed on per capita basis than per male adult equivalent basis.

FIGURE 5
Distribution of the average cost of 1 000 kcal

Average dietary energy consumed with respect to the cost of 1 000 kcal



SOURCE: Solomon Islands 2012/13 HIES

Some variability of DEC can also be observed throughout the year, with an average of 2 900 kcal/capita/day from January to June and a slightly lower consumption of 2 400 kcal/capita/day from July to December. The drop observed in October 2013 was the result of a tsunami that disrupted survey operations, and needs to be considered with respect to the lower size of the sample and lower number of entries in the diary.

Households spend on average SBD 14.2 to acquire food,[42] corresponding to 52 percent of the total household consumption expenditure (see Table 1.7). Households belonging to the first quintile of expenditure, or least wealthy households, spend on average one third the amount spent by wealthy households to acquire food, but they would also allocate 70 percent of their total budget to food (see Tables 1.3 and 1.7).

All those households engaged in agriculture, fishing and livestock activities spend less on food than others; however, this expenditure still represents a larger proportion of their overall budget than for households not engaged in agriculture-related activities (i.e. they spend less on food, but what they spend corresponded to a larger proportion of their total budget). Households receiving remittances from another household also spend less to acquire food, but the ratio of food consumption over total expenditure is still higher than that of the households who do not receive remittances. Lower levels of education of the household head corresponded to a lower amount spent on food but a higher share of the household budget being devoted to food.

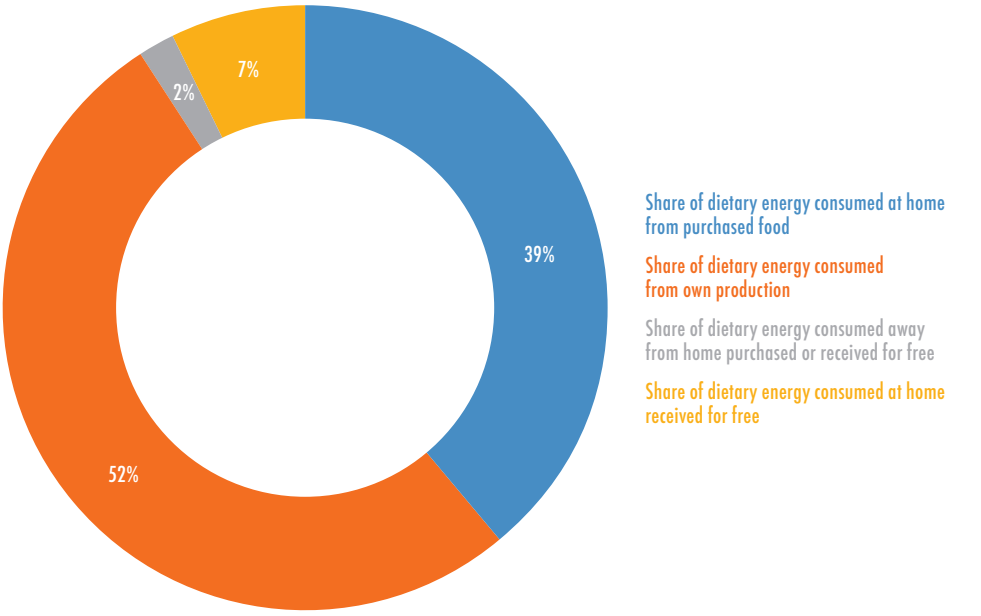
It costs an average of SBD 6 to acquire 1 000 kcal, but these calories do not cost the same between population groups (see Table 1.3). Households belonging to the first expenditure quintile are consuming calories that are on average approximately half the cost of those consumed by the wealthiest households, which means that they consume less expensive but more energy-dense foods. All households that engaged in agriculture, fishing and livestock activities, and households with a vegetable garden, spent less to acquire 1 000 calories compared to other households. The same trend is observed between male- and female-headed households: those headed by a female consume on average 200 kcal more than male-headed households but female-headed households spent SBD 5.7 to acquire 1 000 calories while male-headed households spend SBD 0.40 more. Finally, for the same number of calories consumed, households who receive remittances are also acquiring less expensive and more energy-dense foods than households not receiving remittances.

[42] Refers to the sum of the amount spent to purchase the food and the value that would be spent to purchase the food that was received for free as a gift or consumed from own production.

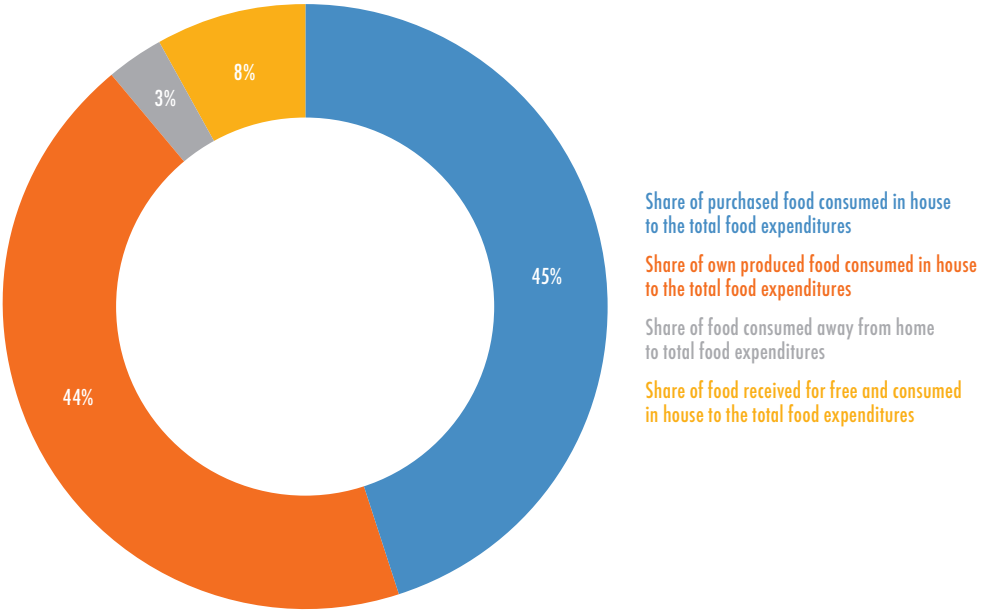
FIGURE 6

Contribution of each food source of acquisition

Contribution of each source of acquisition to the average DEC (%)



Contribution of each source of acquisition to total amount spent on food (%)

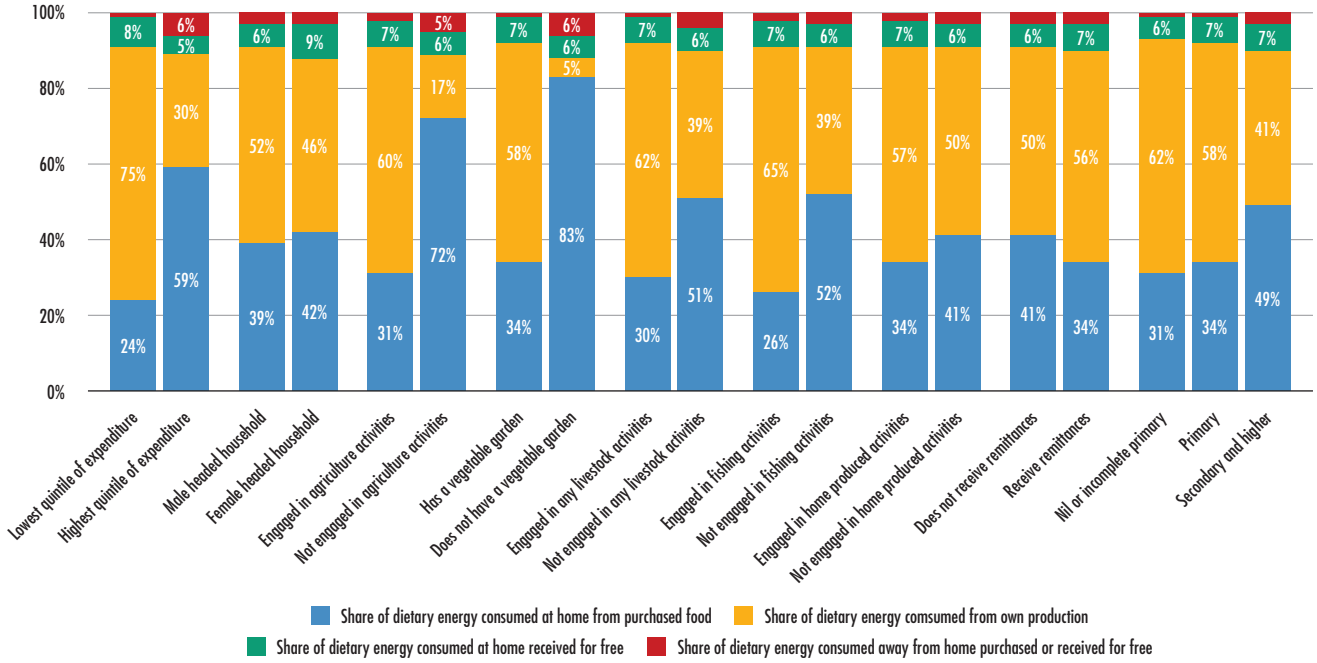


SOURCE: Solomon Islands 2012/13 HIES

FIGURE 7

Contribution of each food source of acquisition to total DEC by population groups

Contribution of sources of consumption to the average dietary energy consumed by population groups (%)



SOURCE: Solomon Islands 2012/13 HIES

More than half of the 2 640 kcal/capita/day consumed on average in Solomon Islands is coming from own production and 40 percent is coming from purchased food. Reliance on food in kind in the form of a gift from other households is quite strong and represents 7 percent of the average dietary energy consumed, that is around 170 kcal/capita/day (see Table 1.5 and Figure 6). However, this pattern is slightly different when we split food expenditures by sources of acquisition instead of dietary energy. Purchases contribute to 45 percent of the SBD 14.2 spent on average per day on food, while own production contributes 44 percent. This means that own produced foods are a cheaper source of dietary energy than purchased foods.

On average, more than 60 percent of the dietary energy consumed by households having a vegetable garden, or those involved in agriculture, fishing or livestock activities, comes from own production. Male-headed households rely more on their own production than female-headed households, which is the same for households with low level of education. Households receiving remittances also rely more on own production, but food received as a gift also represents a higher contribution to total energy consumption than households that do not receive remittances. The 11 percent of households that do not have a vegetable garden purchase most of the calories they are consuming.

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CHAPTER 4
COMPOSITION OF THE DIET

4.1 Contribution of the major food groups to the diet

To provide a broad overview of the main categories of food products consumed, products were categorised according to 19 food groups defined on the basis of their nutritional relevance and following the classifications used in the FAO/WHO Global Individual Food consumption data Tool (GIFT; see the groups and their content in Annex 4). In the case of Solomon Islands, only 17 of 19 food groups were covered[43] and instead the group of "tobacco/betel nut/kava" was added because of the important consumption of these products in Solomon Islands and their negative impact on health. A total of 296 food products were reported in the diary which means at least one household consumed[44] these specific products during the previous 14 days. The categories "fish", "meat", "fruits" and "vegetables" contained the most variety of products with more than 28 products reported per food group. But not all these products were consumed by all the households that filled in the diary. For instance, out of the 33 fish and fish products reported, only three were consumed by at least one third of the households during the 14-day diary period. The same pattern appeared for fruits where only one fruit was consumed by at least one third of the households. Less than a third of households consumed eggs or milk and milk products.

Five food groups alone (roots/tubers/plantain, cereals and products, pulses/seeds/nuts,[45] fish and products, and sweets/sugar) contribute more than 90 percent of the total dietary energy consumed (see Table 2.1 from companion document).

The group of energy-dense foods like cereals, roots and nuts alone contribute to 85 percent of total DEC. Protective foods like fruits and vegetable contribute to around 3 percent of the calories consumed because these foods are of low energy density.

For the same quantity of two products consumed, the more energy-dense the food, the higher its contribution to the total DEC. Therefore, in terms of edible quantity consumed, the ranking of some food groups differed. For instance, fruits and vegetables together contribute only 3 percent of dietary energy consumed (ranked sixth in terms of contribution to total dietary energy) but the total edible quantity consumed is ranked third, at around 180 grams per day. Despite its relatively high ranking in terms of grams consumed, the consumption of fruit and vegetables is far less than the WHO-recommended level of 400 g/capita/day.

The quantity of meat and meat products is relatively small when compared to the quantity of fish and fish products consumed. Of concern is the very low quantity of milk and milk products.

[43] None of the food products belonging to the groups of "insects, grubs and their products" and "food for particular nutritional uses" were reported in the diary.

[44] As stocks were collected in the survey, if a food product was reported in the diary by a household, it is considered as consumed over the 14-day period unless all the quantity of that product reaching the household during the 14 days corresponded to the quantity reported in the final stocks. It is important to remember that the term "consumption" does not refer to food intake, but to the quantity of food that reached the household to be consumed over the reference period. Part of this food may not have been consumed but have been thrown away or given to pets.

[45] This group includes brown coconut and dried coconut while the group of fruits and products includes green coconut.

TABLE 1

Number of products consumed by at least one surveyed household over the 14 days, by food groups

Food groups	Number of products reported in each food group	Number of products aqcuired by at least one third of the households
Cereals and their products	19	2
Roots, tubers, plantains and their products	8	4
Fruits and their products	28	1
Vegetables and their products	28	3
Meat and meat products	29	0
Milk and milk products	11	0
Eggs and their products	2	0
Fish, shellfish and their products	33	3
Pulses, seeds and nuts and their products	11	1
Fats and oils	7	0
Beverages	27	1
Composite dishes	31	0
Spices and condiments	18	1
Food additives	3	0
Food not classified	2	0
Savoury snacks	4	0
Sweets and sugars	30	3
Narcotic*	5	2

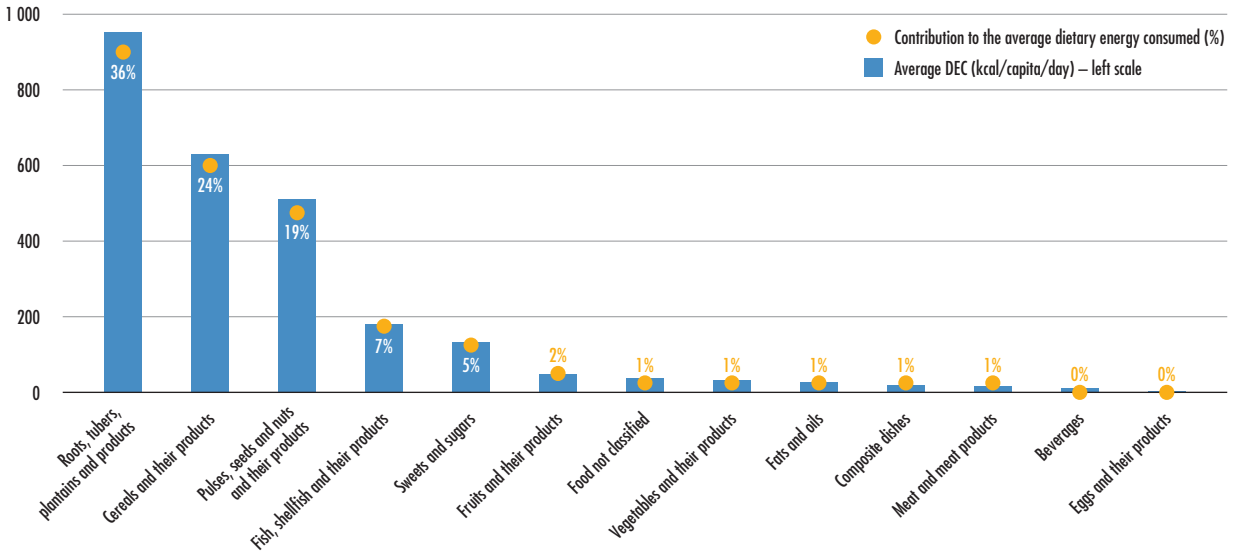
* Even if betel nuts bring energy they are not considered as food. Tobacco does not bring energy and is not considered as food either. Both are considered as toxic items.

SOURCE: Solomon Islands 2012/13 HIES

FIGURE 8

Average DEC by food groups

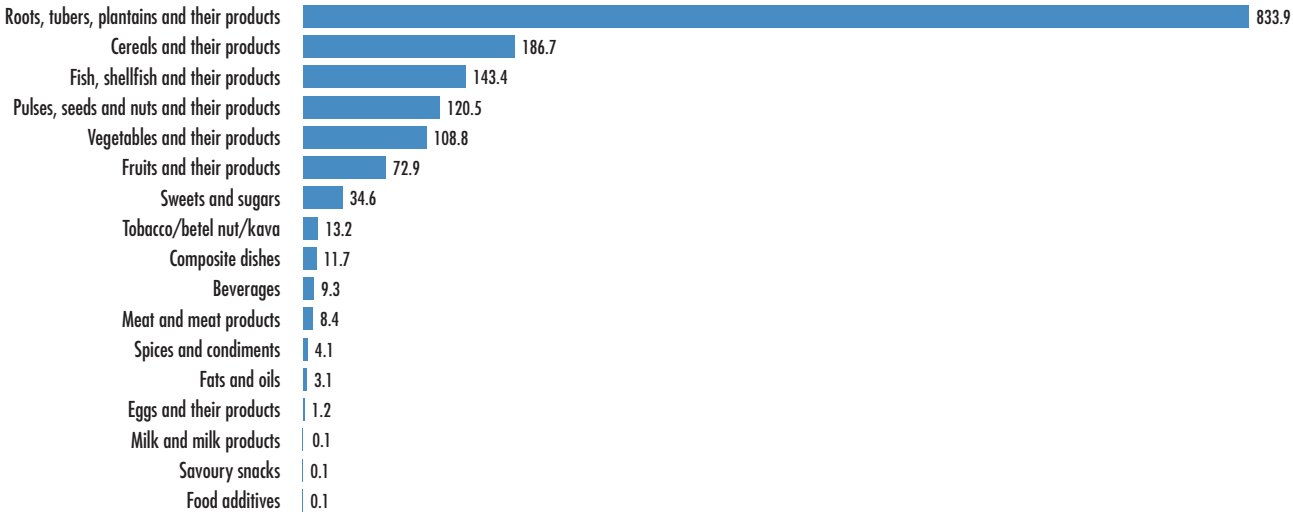
Contribution of food groups to the average dietary energy consumed



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 9
Average quantity by food group

Average edible quantity by food groups (g/capita/day)



Edible quantities: Food quantities adjusted by edible portions (e.g. 88 percent of an egg is edible). The edible quantities are not expressed in grams of primary commodities (e.g. the primary commodity of flour rice is grain rice); they correspond to the amount of edible quantity as consumed by households.

Population intake goal of fruits and vegetables: At least 400 grams per person per day.

SOURCE: Solomon Islands 2012/13 HIES

4.2 Main food products consumed

Of the 296 food products reported in the survey, 22 contribute 90 percent of average DEC (see Table 2 below and Table 3.1 from companion document) and only 13 food products[46] contribute to 80 percent of the average dietary energy and were consumed by more than 50 percent of the households during the previous two weeks.

With an average edible quantity consumed of 150 grams per capita per day, rice is the main source of energy (19 percent of the total amount of dietary energy consumed), followed by brown coconut (95 g/capita/day that translates to 15 percent of total energy consumed) and cassava (230 g/capita/day, which translates to 13 percent of total energy consumed).

4.3 Main types of acquisition of food

More than 70 percent of the dietary energy coming from roots/tubers/plantain, pulses/seeds/nuts and fruits and vegetables were own produced, while more than 80 percent of dietary energy coming from cereals, sweets/sugar, fats/oil are purchased (see Table 3, and Table 2.9 from companion document for more details). Purchases and own production contribute equally to the average DEC of fish, and 10 percent of the dietary energy consumed from fish is received for free as a gift. With more than one household in two involved in livestock activities, own production contributes only to 15 percent of the dietary energy consumed from meat, and 20 percent is received for free – this is indicative of the importance of livestock for cultural purposes, including wealth accumulation and for ceremonies.

[46] Excluding cigarette and betel nuts that were also acquired by more than 50 percent of the households during the 14 days they filled in the diary.

TABLE 2
Average quantities by food products

Food groups	Average quantity as purchased (g/capita/day)	Average edible quantity (g/capita/day)	Contribution to the average DEC (%)
Rice, white, uncooked	150	150	19
Coconut, brown	197	95	15
Cassava/tapioca/manioc	242	227	13
Kumara/sweet potato	358	326	12
Banana, cooking, raw	117	76	4
Taro, giant (taamu)	95	80	3
Coconut, dried	12	12	3
Fish, not further specified	77	51	2
Sugar, white	12	12	2
Flour, not further specified	14	14	2
Fish, reef, not further specified	60	43	2
Betel nuts	13	13	2
Noodles, instant (Maggi-type), dry	9	9	2
Cake, not further specified	12	12	2
Potato, not further specified	64	54	2
Yam, not further specified	47	41	1
Taro, not further specified	35	30	1
Mixed dried fruit	9	9	1
Breadfruit	30	23	1
Biscuits, not further specified	4	4	1
Bread, loaf, not further specified	8	8	1
Tuna canned, not further specified	12	10	1
Oil, not further specified	2	2	1

SOURCE: Solomon Islands 2012/13 HIES

The percentage of households that reported acquiring a certain food product in the diary is a good proxy indicator of access to this food product. This indicator alone does not say anything about the contribution of the food to the total diet nor the frequency of consumption. However, when the food contributes a large component of total DEC and is acquired by most households, it can be considered as an essential food in the overall diet of the country, either because of consumer preference, availability, affordability and/or physical ease of access.

Only fifteen products were reported as being acquired at least once by more than 50 percent of households over the two weeks that they filled in the diary. Rice and noodles were reported by almost all households, followed by kumara and cabbages (90 percent of the households). Despite the relatively low quantity consumed (around 11 grams per capita per day), canned tuna is the fifth most acquired food product. Pawpaw is the most acquired fruit but is only acquired by one household out of three. Sugar is also a significant part of the habitual diet as 70 percent of the households acquired it during the two weeks they filled in the diary.

Most of the rice and noodles are purchased but gifting remains an important source of food acquisition for many households, with 24 percent of the households who consumed the rice during the diary period having reported receiving rice for free. The same for kumara and fish that were received for free by 16 percent and 22 percent of households, respectively.

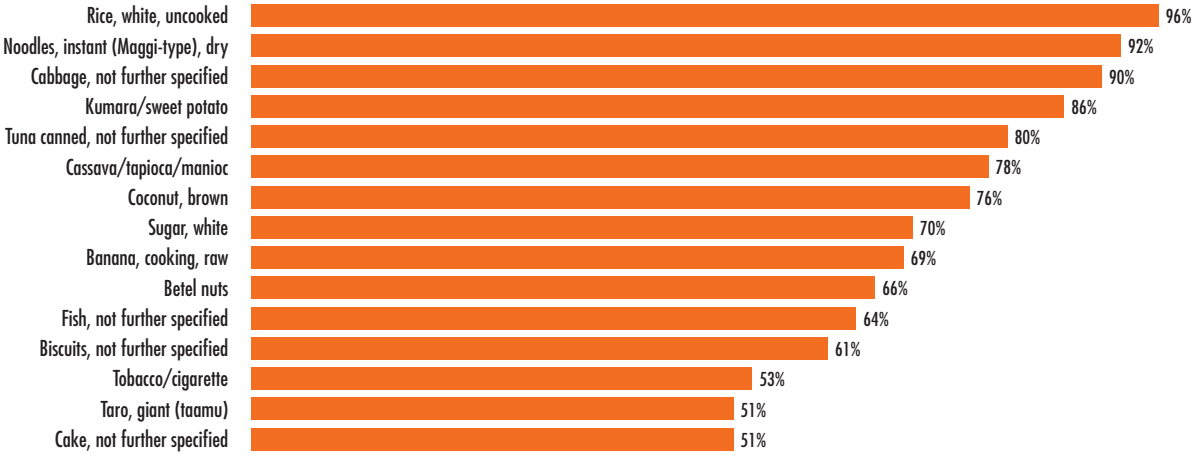
TABLE 3
Main types of acquisition by food groups

Food groups	Average DEC (kcal/capita/day)	Share in food commodity group's total consumption (%)			
		Purchases	Own Production	Food consumed away from home purchased or received for free	Other sources
Roots, tubers, plantains and their products	952	16	76	0	7
Cereals and their products	631	88	0	1	11
Pulses, seeds and nuts and their products	511	23	73	0	4
Fish, shellfish and their products	180	44	45	0	10
Sweets and sugars	132	89	2	0	9
Fruits and their products	49	22	70	0	9
Tobacco/betel nuts/drugs	43	45	46	0	9
Food not classified	37	0	0	100	0
Vegetables and their products	32	25	70	0	6
Fats and oils	27	98	0	0	2
Composite dishes	21	1	0	99	0
Meat and meat products	16	64	15	0	21
Beverages	10	93	2	0	5
Eggs and their products	2	54	36	0	10
Spices and condiments	1	95	3	0	2
Savoury snacks	0	96	0	0	4
Milk and milk products	0	99	0	0	1

SOURCE: Solomon Islands 2012/13 HIES

FIGURE 10
Food products acquired at least once during the 14-day diary

Food products consumed by at least 50 percent of the households



SOURCE: Solomon Islands 2012/13 HIES

TABLE 4
Main sources of acquisition of the food products that are acquired by at least 30 percent of households

Food groups	Description of the food	Percentage of households who acquired the food over the last two weeks			
		Total	Own production	Purchase	Received as gift
Cereals and their products	Rice, white, uncooked	96		75	24
	Noodles, instant (Maggi-type), dry	92		88	12
Roots, tubers, plantains and their products	Cassava/tapioca/manioc	78	72	17	11
	Kumara/sweet potato	86	64	20	16
	Banana, cooking, raw	69	67	18	15
	Taro, giant (taamu)	51	71	12	17
Pulses, seeds and nuts	Coconut, brown	76	71	23	6
Sweets and sugars	Sugar, white	70		92	8
	Biscuits, not further specified	61		91	9
	Cake, not further specified	51	0	75	24
Fish, shellfish and their products	Tuna canned, not further specified	80	1	87	12
	Fish, not further specified	64	40	36	22
	Fish, reef, not further specified	37	60	21	1
Vegetables and their products	Cabbage, not further specified	90	62	27	11
	Beans, green	45	69	21	9
	Tomato, common	35	58	38	3
Fruits and their products	Paw paw	35	82	11	7
Beverages	Coffee, mix (e.g. 3in1)	49		93	7
Spices and condiments	Salt	44		97	3
Narcotic	Betel nuts	66	38	43	19
	tobacco/cigarette	53	2	80	18

SOURCE: Solomon Islands 2012/13 HIES

4.4 Cost of food

The group of "pulses/seeds/nuts" namely from brown and dried coconut, is the most affordable source of dietary energy. It costs almost seven times as much to get 1 000 kcal from cereals and 40 times as much to get 1 000 kcal from vegetables than from pulses/seeds/nuts (elaboration from Table 2.8).

It costs double the amount to get 1 000 kcal from meat than from fish and their products. Fats and oils are the second most affordable source of dietary energy. In comparison to fruits, "free sugars"[47] sourced from the products belonging to the group "sugar and sweets" are a less expensive source of dietary energy.

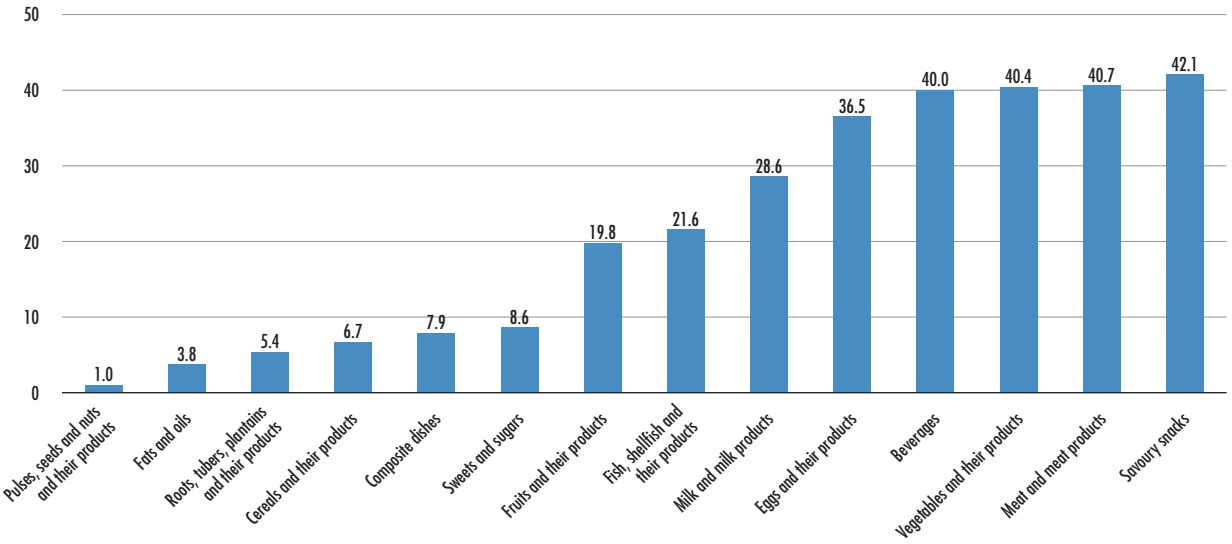
Of the 23 products contributing to 90 percent of the dietary energy consumed, canned tuna contributes to 3 percent of household food consumption expenditure and is the most expensive source of energy followed by fish,[48] which represents 5 percent of the total amount spent on food (see Table 3.1 from companion document). Households spend the highest proportion of their food budget on rice, allocating 16 percent of food expenditure to acquire rice. The cost of 1 000 kcal from rice is almost the same as the cost to acquire 1 000 kcal of kumara; kumara accounts for 11 percent of total food expenditure. The amount spent on alcoholic and non-alcoholic beverages is relatively marginal and represents only 3 percent of the total food expenditure. Beer is the beverage contributing the

[47] The term is used to distinguish between the sugars that are naturally present in fully unrefined carbohydrates such as brown rice, whole wheat pasta, fruit, etc. and those sugars (or carbohydrates) that have been, to some extent, refined (normally by humans but sometimes by animals, such as the sugars in honey).

[48] Excluding betel nut.

FIGURE 11
Median unit price differential of 1 000 kcal by food groups

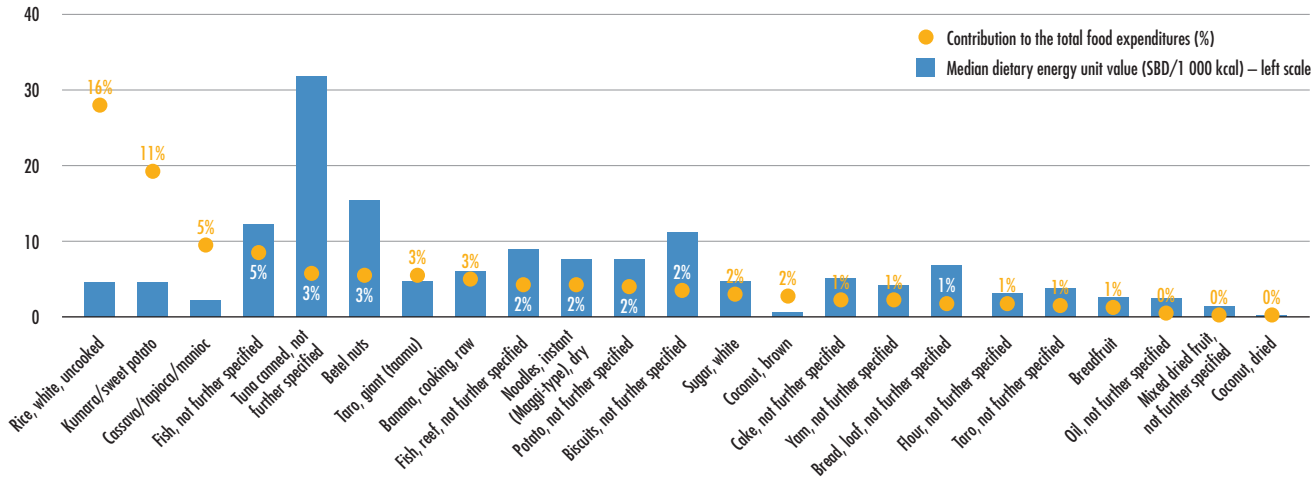
Cost differential of the median unit value of 1 000 kcal (using unit value of pulses, seeds and nuts as reference)



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 12
Share of food expenditures in total expenditures

Proportion of food consumption expenditures in total expenditure (%) (Engel ratio)

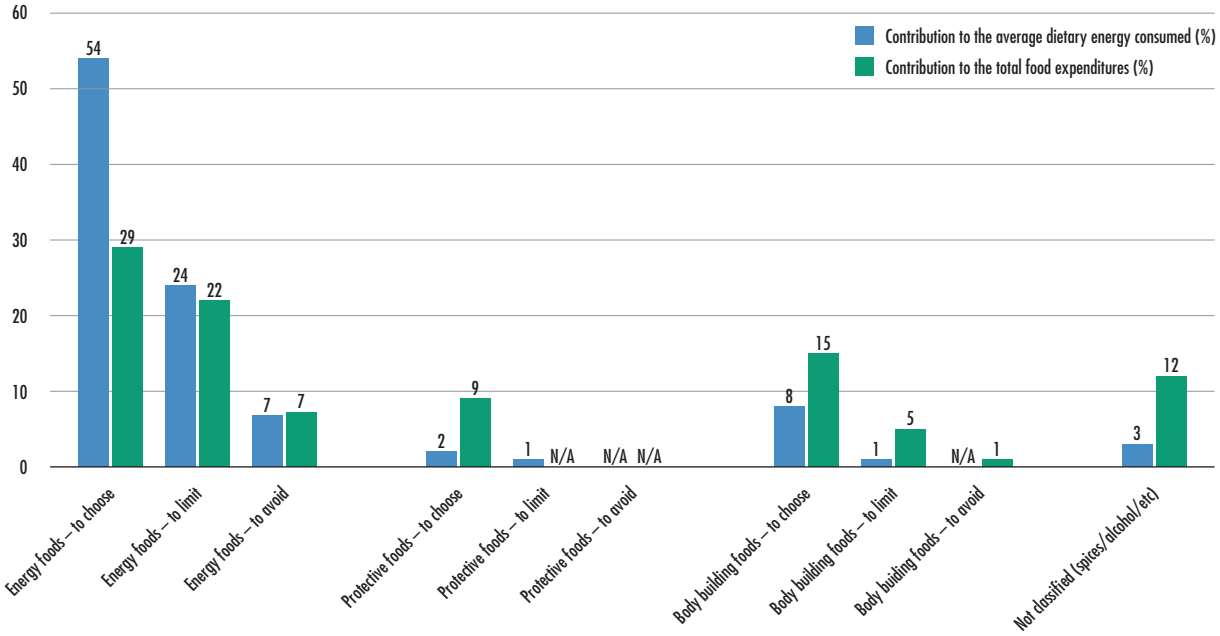


SOURCE: Solomon Islands 2012/13 HIES

most to the total food expenditures (1 percent), followed by "three in one" coffee mix (a mixture of coffee, dried milk/creamer and sugar) (0.6 percent) and followed well behind by Milo-type drinks and soft drinks (0.26 percent and 0.23 percent respectively) (see Table 3.1 and Annex 5). Beer is a more expensive source of dietary energy than soft drink, as it costs 1.5 times more to get 1 000 kcal from beer than from a soft drink. The overall low contribution of alcoholic beverages in total DEC can be due to an underreporting of these products in the diary, as quite often these products are consumed away from home by only a few household members.

FIGURE 13
Contribution of healthy food to total energy consumption and amount spent

Contribution of energy-dense, protective and body building foods to the average DEC and to the food expenditures (%)



N/A: Very low or no nutrient content or no consumption

SOURCE: Solomon Islands 2012/13 HIES

4.5 Healthy diet

When products are further aggregated into groups of energetic, protective or body-building foods[49] it can be seen that energy foods contribute to 85 percent of total DEC, and out of these, 30 percent are energy foods that need to be limited or avoided (for instance, white rice and vegetable oil are energy-dense foods to limit, and pastries, butter, soft drinks and sugar are classified as energy-dense foods to avoid). Protective foods represent less than 3 percent of the total dietary energy consumed, while body building foods represent 9 percent mainly coming from fresh fish and lean meat. In terms of contribution to the overall food budget, the foods to limit or avoid contribute to more than one third of the total amount spent to acquire food.

Table 5 shows the number of kcal from each food product that could be acquired with SBD 1. The idea behind this table is to illustrate the options Solomon Islanders would face if they had SBD 1 to spend and the decisions they could make to reach a healthy diet while getting the same amount of dietary energy. Only products acquired by at least 10 percent of the households are shown[50] and they are classified according to the Pacific guidelines for foods to choose, to limit or to avoid. The table can be interpreted as follows:

- Within energy-dense foods, with SBD 1 it is possible to get around 2.8 times the energy from cassava than from cooking banana. While both products are bringing almost the same dietary energy for 100 grams, cooking banana brings more vitamin A and cassava brings more vitamin C and fibre. To promote the consumption of cooking banana in a population deficient in vitamin A but which has reached vitamin C and fibre adequacy, it would be necessary to reduce the cost of cooking banana by a factor of three, so that with SBD 1, households can reach the same amount of dietary energy with cooking banana as with cassava and so access more vitamin A. With SBD 1 it is also possible to get the same energy from white rice as from locally grown roots like kumara or taro. While white rice is consumed by more than 96 percent of the households it is also less nutritious than kumara or taro and therefore its consumption should be lower than that of kumara and taro.

[49] Following the recommendations from the Pacific guidelines for a healthy living – a handbook for health professionals and educators. SPC, 2018.
[50] The threshold was set to 10 percent of the households because a percentage lower than that would mean that either the availability of the food is limited, or the food is not easily accessible and therefore cannot be seen as a potential food substitute.

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- Within protective foods, pawpaw is a richer source of vitamin A, vitamin C and calcium than pineapple for the same dietary energy content. But pawpaw is also a more affordable source of dietary energy, because with SBD 1 it is possible to acquire twice the calories from pawpaw than from pineapple. Therefore, a Solomon Islander deficient in dietary energy and in vitamin A with only SBD 1 should consume pawpaw rather than pineapple to increase the amount of dietary energy consumed as well as the amount of vitamin A and C.

- Within body building foods, it is possible with SBD 1 to get almost the same calorie intake from processed luncheon meat as from chicken quarters, and while it is highly recommended to avoid consumption of the former, consumption of the latter is recommended. Finally if a Solomon Islander had SBD 1 to spend, they will get almost the same amount of dietary energy through “baked fish with rice”, a recommended body building food, as through “deep fish fried with potatoes”, which is a source of dietary energy to avoid.

TABLE 5
Amount of dietary energy that can be obtained from one of these products with SBD 1

Food groups	Food product	Number of kcal from the products with SBD 1 (kcal)	Percentage of households that acquired the food in the previous 14 days
ENERGY FOODS	Coconut, brown	1585	76
	Cassava/tapioca/manioc	460	78
	Breadfruit	392	10
	Yam, not further specified	240	22
	Kumara/sweet potato	219	86
	Banana, cooking, raw	166	69
	Potato, not further specified	131	31
	Flour, not further specified	323	14
	Rice, white, uncooked	222	96
	Cake, not further specified	195	51
	Doughnut, not further specified	152	15
	Bread, loaf, not further specified	147	23
	Noodles, instant (Maggi-type), dry	131	92
	Oil, not further specified	407	18
	Sugar, not further specified	242	12
	Sugar, white	214	70
	Takeaway, fish, battered, deep fried and potato chips	177	16
	Beverage, chocolate flavour, from base (Milo)	31	16
	Sweets, jelly lollies	29	16
	Soft drink, not further specified	10	15
PROTECTIVE FOODS	Pawpaw	104	35
	Coconut, green	59	29
	Pineapple	49	17
	Cabbage, not further specified	34	90
	Beans, green	32	45
	Onion, shallot	20	27
	Tomato, common	14	35
	Mixed dried fruit	737	18
BODY BUILDING FOODS	Fish, reef, not further specified	112	37
	Mussels	102	15
	Fish, pelagic/ocean, not further specified	89	12
	Tuna, skip jack	86	24
	Fish, not further specified	82	64
	Chicken, quarters	33	17
	Fish, baked, with rice, boiled	131	11
	Tuna canned, not further specified	31	80
	Devon/fritz, processed luncheon meat, beef and pork	48	18

Foods to choose Foods to limit Food to avoid

SOURCE: Solomon Islands 2012/13 HIES

CHAPTER 5
CONSUMPTION PATTERN OF ESSENTIAL NUTRIENTS

Essential nutrients are composites that the body cannot produce or cannot produce in sufficient quantity to survive, grow, and reproduce. While there are many essential nutrients, they can be broken into two categories: macronutrients and micronutrients.

Macronutrients (protein, carbohydrates, fibre and fats) are eaten in large amounts and include the primary building blocks of the diet and provide the body with energy. Vitamins and minerals are micronutrients, and small doses usually are sufficient.

For a healthy diet it is important to eat a variety of foods rich in these essential nutrients and for a balanced diet it is important to eat quantities of each of these foods within acceptable limits.

5.1 Macronutrients contribution to the Solomon Islands diet

In terms of contribution of macronutrients to the average dietary energy consumed, the diet appears relatively balanced at national level (Table 1.10 from companion document). At that scale, the average amount of proteins, fats and carbohydrates available are within WHO/FAO/UNU[51] norms in terms of their contribution to the average DEC. However, only 17 percent of Solomon Islanders can get access to a sufficient quantity of these proteins, fats and carbohydrates to reach all three recommended norms for a balanced diet (see Box 1).

Proteins contribute 11 percent of the total dietary energy consumed, of which more than 40 percent comes from fish and fish products. More than half of the carbohydrates consumed come from roots and tubers and one third from cereals. Two thirds of the fats consumed are of vegetable origin, mainly from brown coconut and dried coconut consumption.

The contribution of macronutrients to the average dietary energy consumed is relatively homogeneous among the population but some differences can be observed between high- and low-wealth households. In the latter households, the contribution of proteins to the total DEC is lower and that of carbohydrates higher. Only one person in ten living in households of the first expenditure quintile has access to a balanced diet in terms of reaching the three recommended goals for energy supplying macronutrients compared to one person out of three belonging to the highest quintile of expenditures (Table 1.11 from companion document). The share of fats is higher among households engaged in livestock activities (while we would expect a higher contribution of proteins), and, not surprisingly, the shares of proteins and fat for households engaged in fishing activities are also much higher than those of households not engaged in fishing activities.

Diets rich in fibre support digestive health, and lower the risk of diabetes, heart disease and some forms of cancer. There are no determined average requirements for fibre, only population intake goals or adequate intake. And only when the mean consumption of fibre is higher than the adequate intake can it be said that the risk of fibre inadequacy is low. Most authoritative institutions[52] suggest a daily intake of 25 grams of dietary fibre per day. On average a Solomon Islander consumes 31 grams of fibre a day. But not all population groups have access to the same amount of fibre. The poorest households, or households without a garden or not engaged in agriculture have access to less than 25 grams of dietary fibre a day.

[51] WHO (2003). Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. WHO Technical Report Series 916. Geneva.

[52] Such as European Food Safety Authority (EFSA), United States Health and Medicine Division, World Cancer Research Fund International (WCRF).

BOX 1
Essential macronutrients

Carbohydrates are critical to the function of the body. They are broken down into glucose, which is the primary source of fuel for the body and brain. Whole grains, fruits and starchy vegetables are considered as quality carbohydrates. Excess carbohydrates, especially from refined sugars, noodles and cereals, can increase blood sugar levels associated with type 2 diabetes risk and progression.

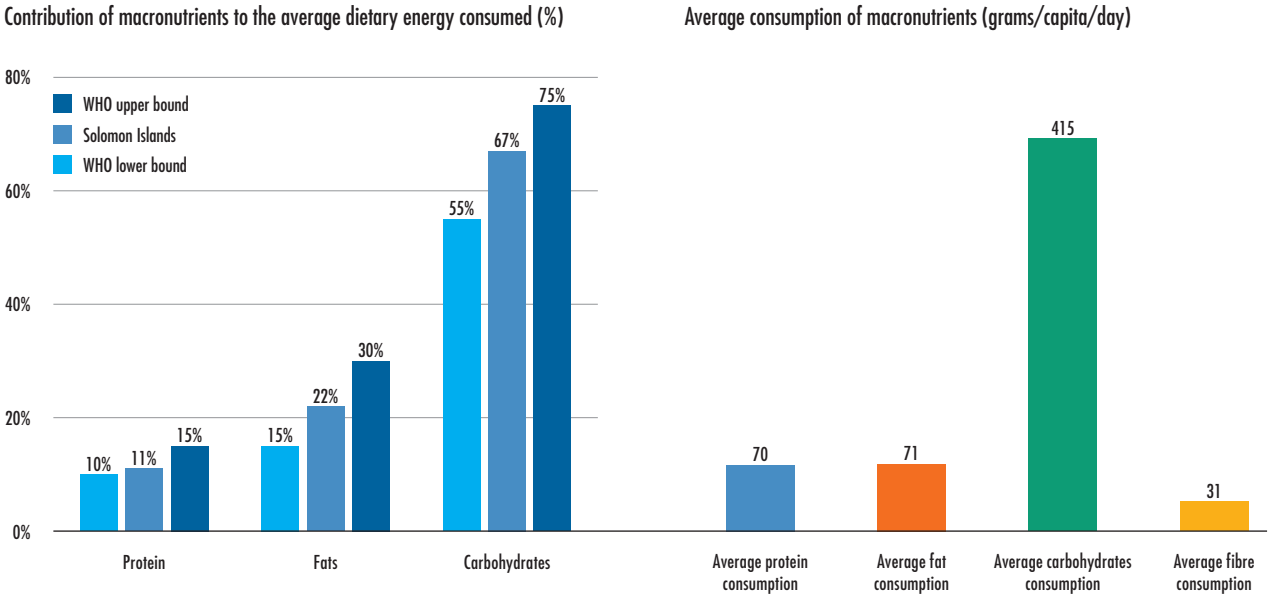
Fibre is an indigestible form of carbohydrate important for digestive health. Diets high in fibre have shown decreased risk for obesity, high cholesterol, and heart disease. Fruits, vegetables, and whole grain products all contain high amounts of fibre.

Proteins are critical to good health. From forming muscle to creating new enzymes and hormones, getting enough protein into the diet is key. Proteins are made up of building blocks called amino acids. There are 20 types of amino acids, all of which are important. While animal proteins provide adequate amounts of all essential amino acids, plant-based proteins are typically lacking in one or more, so a variety of plant proteins, such as grains, legumes and nuts, is required to provide all amino acids. The best way to ensure adequate protein intake is to include a variety of protein foods in the diet, such as fish, meat, eggs, dairy, nuts and legumes/beans.

Fat provides the most energy per gram, aids absorption of certain vitamins and is stored around your organs to help protect them from damage. Some types of fat are better than others, however. Saturated fats, for example, are a type of fat found in red meat, dairy foods, coconut oil, and many commercially prepared baked goods and other foods. Excess saturated fats can increase the risk of heart disease and should be limited to less than 10 percent of the calories each day. Unsaturated fats, on the other hand, can actually help protect the heart and aid in the prevention of heart disease. Healthy sources of fat include nuts, avocados, salmon, olive oil, flaxseed and nut butters.

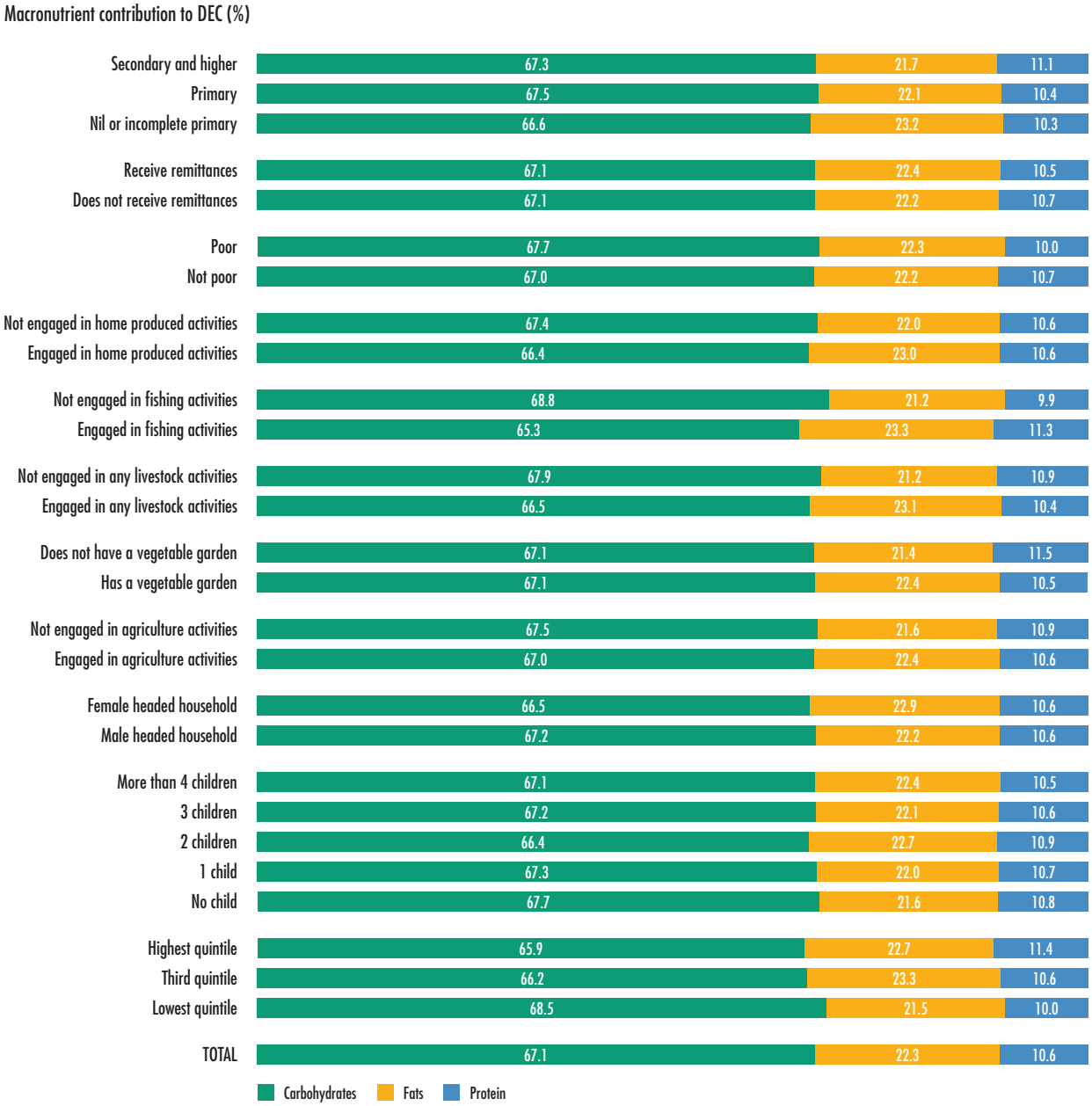
To reach a balanced diet, WHO recommends that on average, proteins contribute 10 percent to 15 percent of total dietary energy consumed, fats contribute 15 percent to 30 percent and carbohydrates contribute 55 percent to 75 percent.

FIGURE 14
Overall diet is balanced



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 15
Contribution of macronutrients to the average DEC by population groups



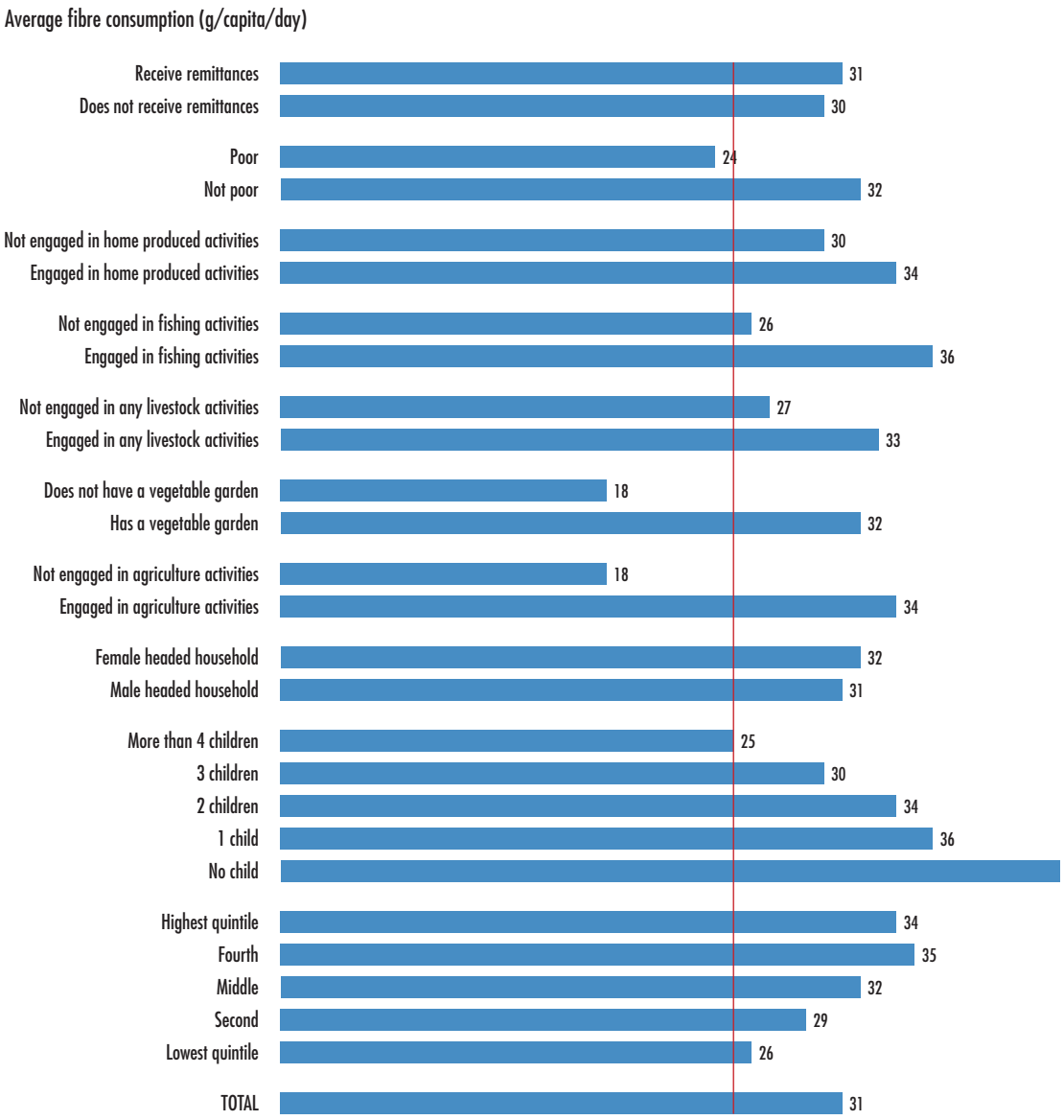
SOURCE: Solomon Islands 2012/13 HIES

5.2 Apparent consumption of vitamins[53]

Vitamins and minerals help the body grow and function the way it should. They have different jobs in the body, from helping resist infections to keeping the nerves healthy, and helping the body get energy from food. Vitamins are divided into fat-soluble and water-soluble. Fat-soluble vitamins (such as vitamin A) are found in foods containing fats; they can be stored in the body for long periods of time, while water-soluble vitamins such as vitamin C, vitamin B1 and vitamin B2 cannot be stored (although vitamin B12 can be stored a short time in the liver).

[53] Here we refer to the amount of vitamins available for consumption by the household. Note that the content and quality of the vitamin is affected by the way the food is stored, prepared, processed, held warm or reheated and cooked and therefore there may be a considerable difference between the amount and quality of vitamins available for consumption and amount and quality of vitamins ingested.

FIGURE 16
Average dietary fibre consumption by population groups



SOURCE: Solomon Islands 2012/13 HIES

5.2.1 Vitamin A

The quantity of vitamin A available in the average Solomon Islands diet is around 600 µg/capita/day,[54] which is well above the estimated average requirements[55] of 280 µg/day. Vegetables and their products are the main source of vitamin A (through the high consumption of cabbage) bringing 63 percent of vitamin A followed by the group of fish and their products (through the high consumption of fresh fish) (see Table 5.1). Even if not so dense in vitamin A, roots/tubers/plantain represent the third source of vitamin A through their high consumption (mainly cooking banana).

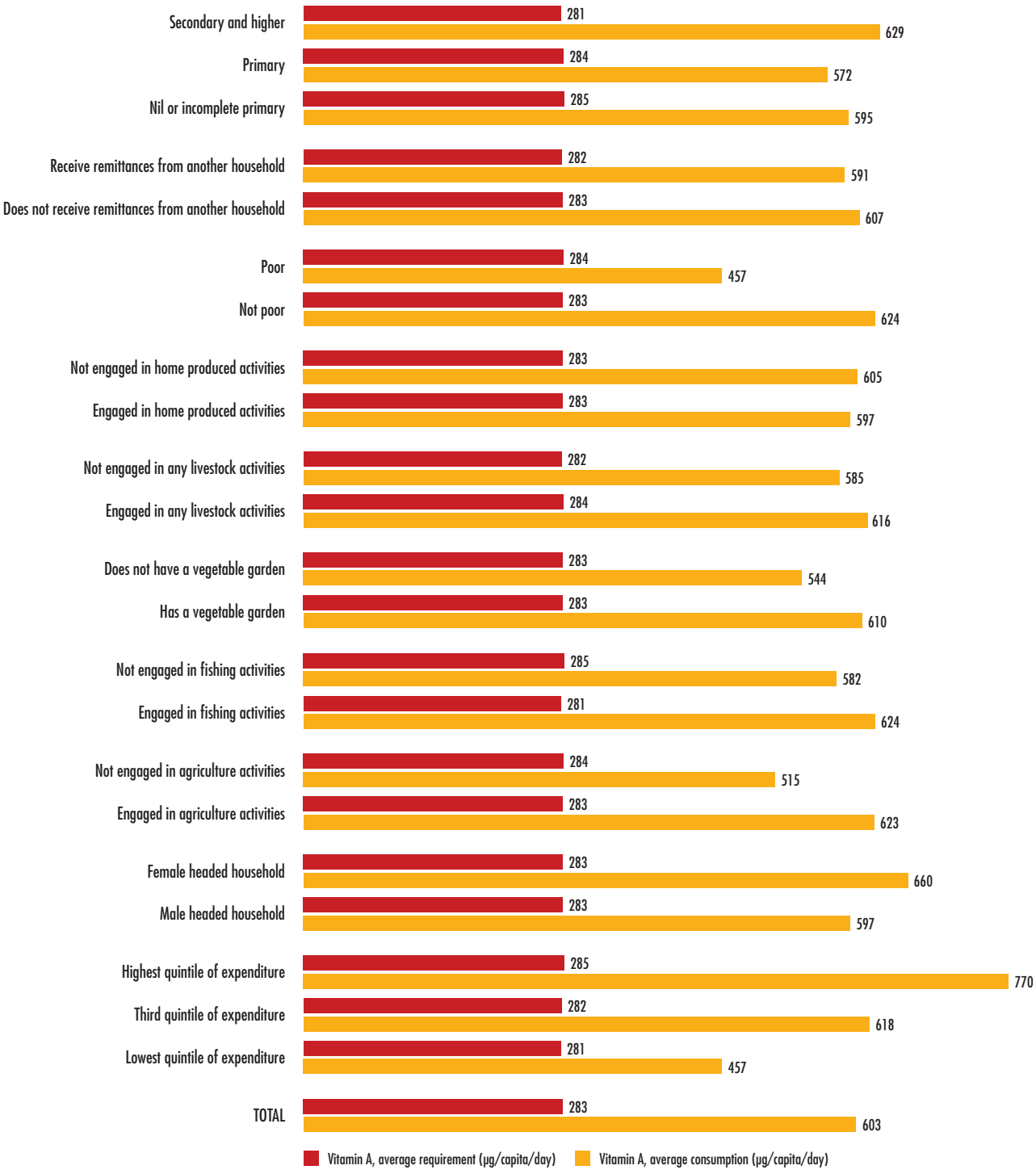
Adequacy as measured by the ratio of quantity of vitamin A available to the average requirements is reached for all population groups, but some disparities in the amount of vitamin A available can still be observed at national and regional levels.[56]

Thus, the quantity of vitamin A consumed by households in the lower expenditure quintile is nearly two thirds of that for households belonging to the highest quintile. As such, individuals within these groups may not be consuming adequate amounts of vitamin A to meet their requirements. As expected, households that have a vegetable garden, as well as

[54] Vitamin A consumption and average requirements are expressed in retinol equivalents.
[55] The source of the estimated average requirement used for vitamin A was FAO/WHO expert consultation on human vitamin and mineral requirements in human nutrition. Second Edition (2004).
[56] Adequacy for a population group does not mean that each individual belonging to that group receives an adequate amount of nutrient.

FIGURE 17
Vitamin A consumption by population groups

Average quantity of vitamin A available for consumpiton and average requirements (µg/capita/day)



SOURCE: Solomon Islands 2012/13 HIES

those engaged in agriculture or fishing activities, also present a higher consumption of vitamin A. Households with a female head also tend to have access to more vitamin A than households with a male head, with a respective average of 660 µg/capita/day compared to 597 µg/capita/day. Being engaged or not in home produced activities and receiving remittances does not seem to have much impact on the amount of vitamin A available.

BOX 2

Vitamin A

Vitamin A is fat soluble and is essential for health, supporting cell growth, immune function, foetal development and vision. According to the WHO, vitamin A deficiency is the leading cause of preventable blindness in children worldwide; deficiency also increases the severity and risk of dying from infections like measles and diarrhoea, raises the risk of anaemia and death in pregnant women and negatively impacts the foetus by slowing growth and development.

There are two forms of vitamin A found in food. The two primary forms of vitamin A obtained from foods are beta-carotene (found in certain plant foods, especially those that are orange, red and yellow, such as sweet potatoes, kale and cabbage) and retinol (found in certain animal foods like egg yolks, salmon and offal).

5.2.2 Vitamin B group

The average daily per capita quantities of vitamins B1, B2 and B12 are respectively 1.15 mg, 0.76 mg and 4.77 µg and, compared to the average requirements,[57] supply adequacy is met for vitamin B1 and B12; however, consumption of vitamin B2 is far below the average requirements with a ratio of consumption to requirements of 88 percent (with 100 percent or more being the target). More than half of the vitamin B1 consumed comes from the group of roots, tubers and plantain (mainly through the consumption of cooking banana and kumara) followed by a much lower contribution of 16 percent from cereals (mainly through the consumption of dry noodles and bread). Fish is the main provider of vitamin B12, which also explains why households engaged in fishing activities are also those presenting the higher levels of vitamin B12 consumption. Meat and dairy products are the main source of vitamin B2, but the very low consumption of these products in Solomon Islands results in a very low level of vitamin B2 consumption. Adequacy is reached at the level of the population group only among high-wealth households, those engaged in fishing activities and households with fewer than two children. Households involved in livestock activities consume more vitamin B2 than those not involved, but still not enough to reach adequacy.

BOX 3

B Vitamins

B vitamins are water-soluble and therefore do not stay long in the body. After the body uses these vitamins, amounts left over leave the body in the urine. B vitamins are important for the metabolism of proteins. They offer the following health benefits:

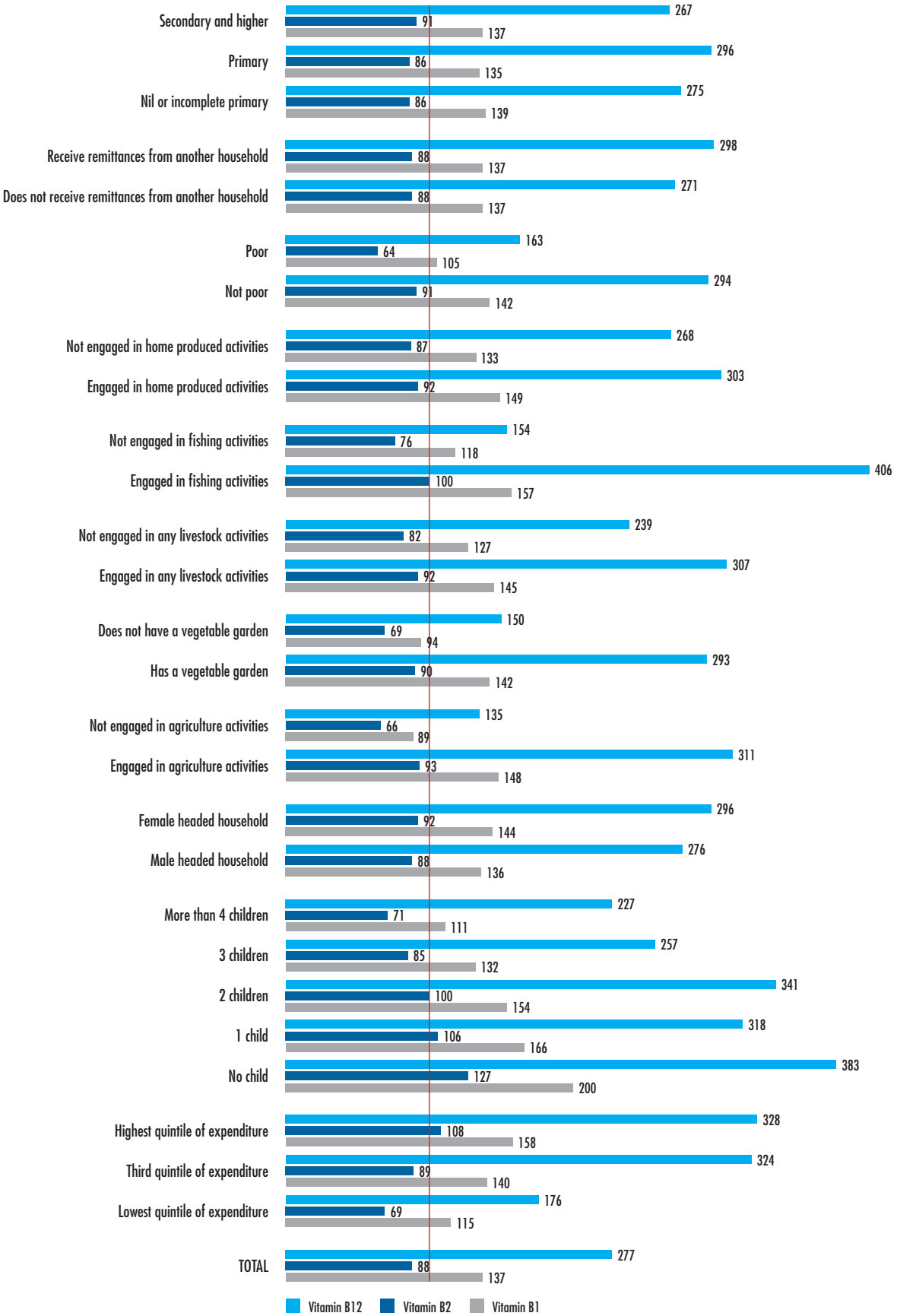
- vitamin B1 (thiamine) helps to release energy from foods and is important in maintaining nervous system function;
- vitamin B2 (riboflavin) helps to promote good vision and healthy skin and is also important in converting the amino acid tryptophan into niacin;
- vitamin B12 helps in the formation of red blood cells and in the maintenance of the central nervous system.

Apart from vitamin B12, the body cannot store these vitamins for long periods, so they have to be replenished regularly through food. Foods rich in B vitamins are meat, poultry, seafood, eggs, dairy products and fortified cereals.

[57] The source of the estimated average requirement used for vitamins B1, B2 and B12 is the FAO/WHO expert consultation on human vitamin and mineral requirements in human nutrition. Second Edition (2004).

FIGURE 18
Vitamin B consumption by population groups

Ratio of vitamin B1, B2 and B12 consumption to average requirements (%)



SOURCE: Solomon Islands 2012/13 HIES

5.2.3 Vitamin C

BOX 4
Vitamin C

Vitamin C or ascorbic acid is a water-soluble vitamin. It is central to iron absorption and synthesis of collagen. It aids in wound healing and bone formation while also improving overall immune function (e.g. important for defence against infections such as common colds). Vitamin C stimulates system immunisation, it is an anti-allergic and antioxidant, it is a "cement" for connective tissues, heals wounds, maintains teeth and gum health, facilitates iron absorption and is necessary for eye health.

The richest natural sources of vitamin C are fruits and vegetables.

With an average daily consumption of 227 grams of cassava, more than 50 grams of cabbage and 16 grams of pawpaw, vitamin C consumption does not seem to be an issue in Solomon Islands, where the average quantity available for consumption is almost eight times the average requirement.[58] Vitamin C supply adequacy is reached for all population groups, and no major disparities between population groups can be observed except between households who have a garden and those who do not, those who are engaged or not in agriculture, and those with few children and those with more than four children. But at regional level, disparities are more noticeable, with the urban region of Honiara showing a level of available vitamin C around half that of other regions, even if this quantity is still higher than the average requirement.

5.3 Apparent consumption of essential minerals

Calcium and iron are two of the essential minerals, and both are found in many different types of plant- and animal-based foods. Calcium is a macro-mineral that is required in great amounts while iron is a trace mineral.

5.3.1 Calcium

BOX 5
Calcium

Most of the calcium in the body is found in the bones and its primary role is to promote healthy bones and teeth. The main foods rich in calcium are dairy products like milk, cheese and yoghurt. However, many non-dairy sources such as seafood, leafy greens, legumes, dried fruit, and tofu are also high in calcium. Foods such as cereal and flour can also be fortified in calcium.

Overall, the average quantity of calcium available for consumption in Solomon Islands is low, with around 440 mg/capita/day, which is half the average requirement.

The highest density of calcium is usually observed in dairy products and fish like sardines and mackerel. Among dairy products, milk reconstituted from powder is one of the available dairy products that is richest in calcium, yet this product is accessed only by 1 percent of households, and consumption remains relatively small. In addition, roots/tubers/plantain (through the important consumption of kumara and vegetables) and the consumption of cabbage provide the main sources of calcium. All population groups have inadequate levels of calcium consumption. The amount of calcium consumed differs among population groups (having no children is the group with the highest calcium consumption); however, none meet their calcium requirements. Households involved in agriculture or fishing activities, as well as those who have a garden, also tend to present a higher level of calcium consumption. The level of education or the gender of the head does not seem to have an impact on calcium consumption.

5.3.2 Iron

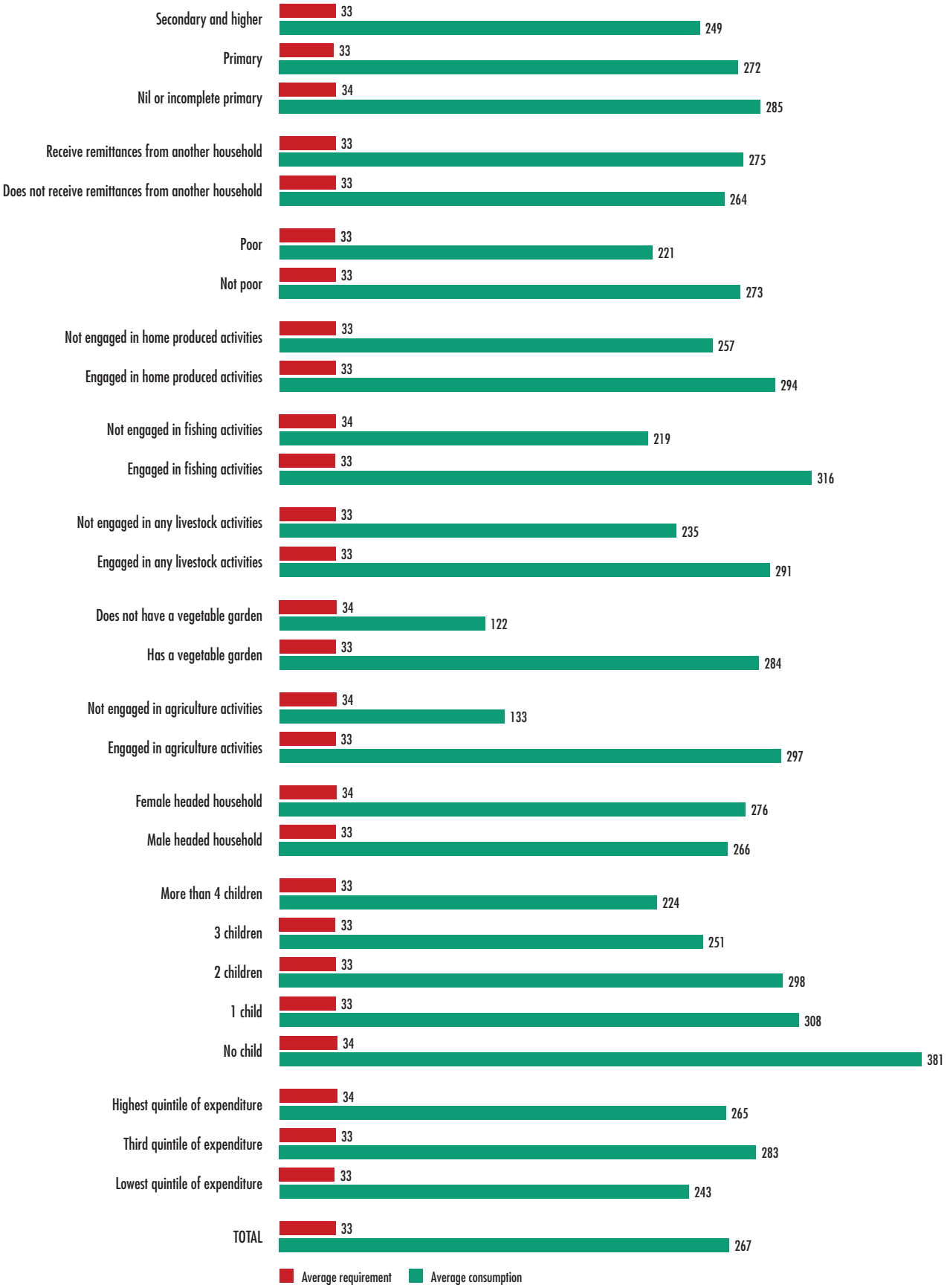
Iron consumption is relatively low in Solomon Islands with a total of less than 12 mg/capita/day mainly provided by products of non-animal origin. Fish represents the main source of iron of animal origin, and roots/tubers/plantain followed by pulses/nuts (mainly through the consumption of brown coconut) provide the main source of iron from non-animal origin. Households engaged in fishing activities have access to a higher quantity of total iron and iron from animal origin than the national average, but the quantity of total iron consumed still remains very low.

[58] The source of the estimated average requirement used for vitamin C is the FAO/WHO expert consultation on human vitamin and mineral requirements in human nutrition. Second Edition (2004)

FIGURE 19

Average consumption and average requirement for vitamin C by population groups

Average quantity of vitamin C available with respect to average requirements (mg/capita/day)

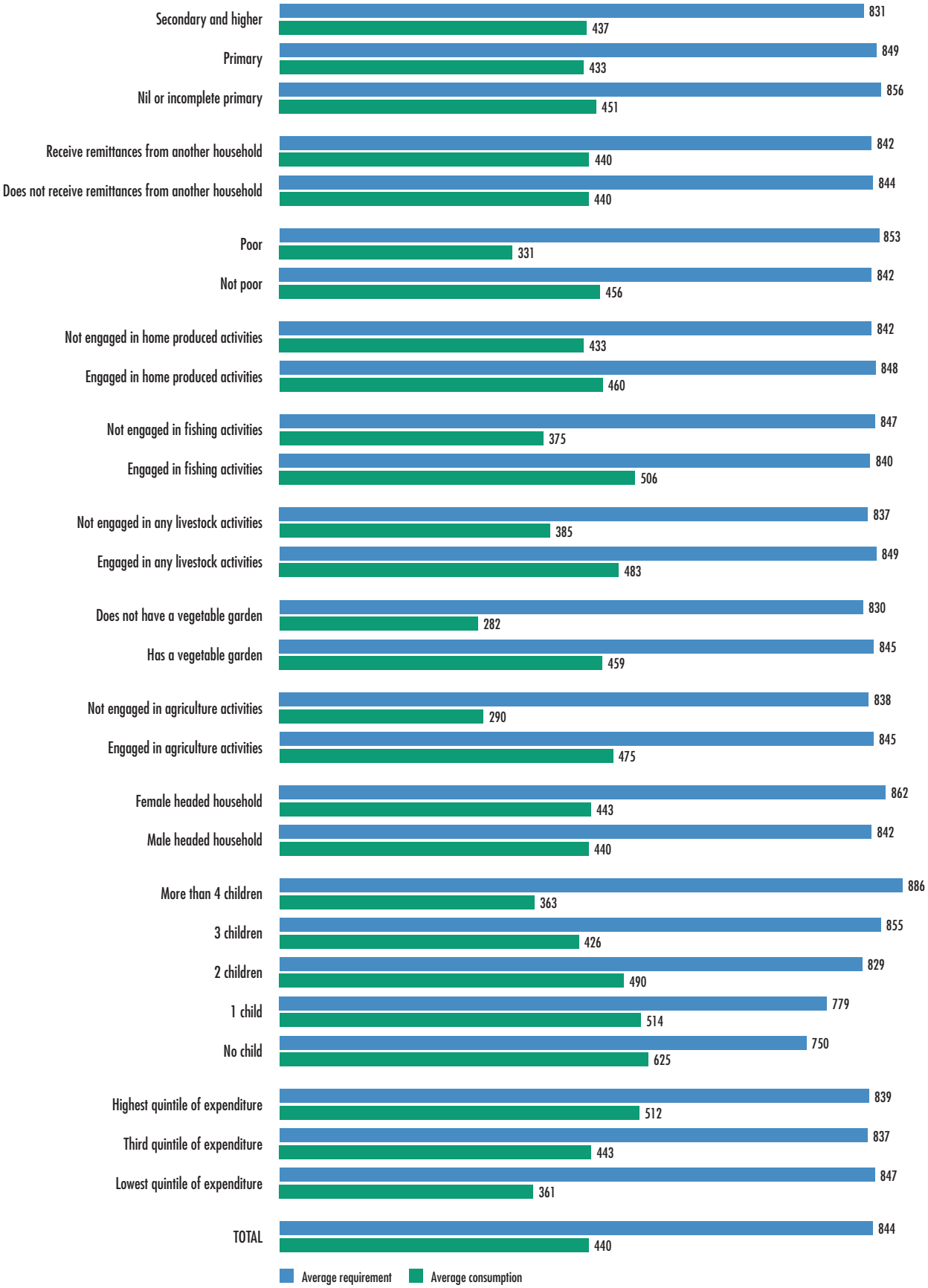


SOURCE: Solomon Islands 2012/13 HIES

FIGURE 20

Average consumption of calcium by population groups

Average quantity of calcium available for consumption with respect to average requirements (mg/capita/day)



SOURCE: Solomon Islands 2012/13 HIES

BOX 6

Iron

Iron is one of the essential nutrients for the proper growth and development of the human body. It is essential as it helps with blood production in the body. Haemoglobin, which requires iron, is used to transfer oxygen from the lungs to the tissues in different parts of the body. Deficiency of iron can cause chronic fatigue, weakness, dizziness, inability to concentrate, headaches, depression, sore tongue, increased sensitivity to cold, shortness of breath, and restless leg syndrome. The body cannot prepare iron on its own, so to maintain the amount of iron in the body, iron-rich foods need to be eaten. Two different sources of iron are found, and the body recognises the difference between *haem* and *non-haem* sources and will absorb each type differently. Non-haem sources of iron mostly refer to vegetables like beans, turnips, leafy vegetables, pumpkins along with other products like legumes, lentils, dairy and tofu. Non-haem iron from plant-based sources, however, has a bioavailability[59] between 2 and 20 percent. The bioavailability of haem iron from animal sources can be up to 40 percent. Haem sources of iron include lean meat, chicken liver, lamb, oysters, and tuna fish.

Inhibitors and enhancers change iron bioavailability. For instance, bioavailability increases when iron is consumed in the presence of ascorbic acid (vitamin C).

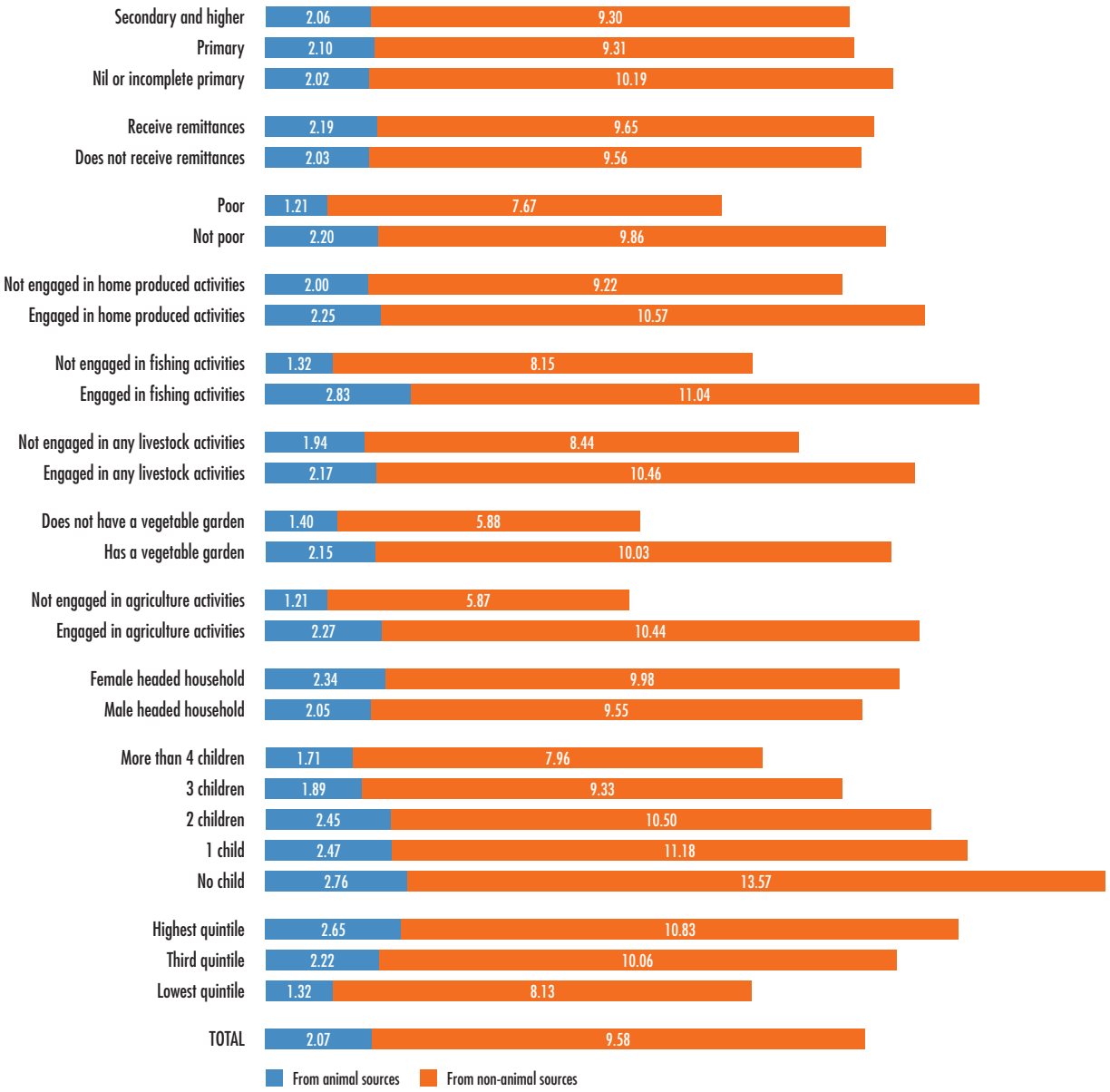
Quantities of iron needed vary greatly by age and gender and are higher for women than for men. Children need on average 7 mg to 10 mg of iron per day, a male from 19 to 99 years old needs 8 mg of iron per day while a woman between 19 to 50 years old needs more than 18 mg of iron a day and older women will need only 8 mg a day.[60]

[59] Proportion of a nutrient the human body is able to absorb and use.

[60] National Institute of Health, US Department of Health and Human Services: https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/

FIGURE 21
Iron consumption by population groups

Average quantity of iron available for consumption (mg/capita/day)



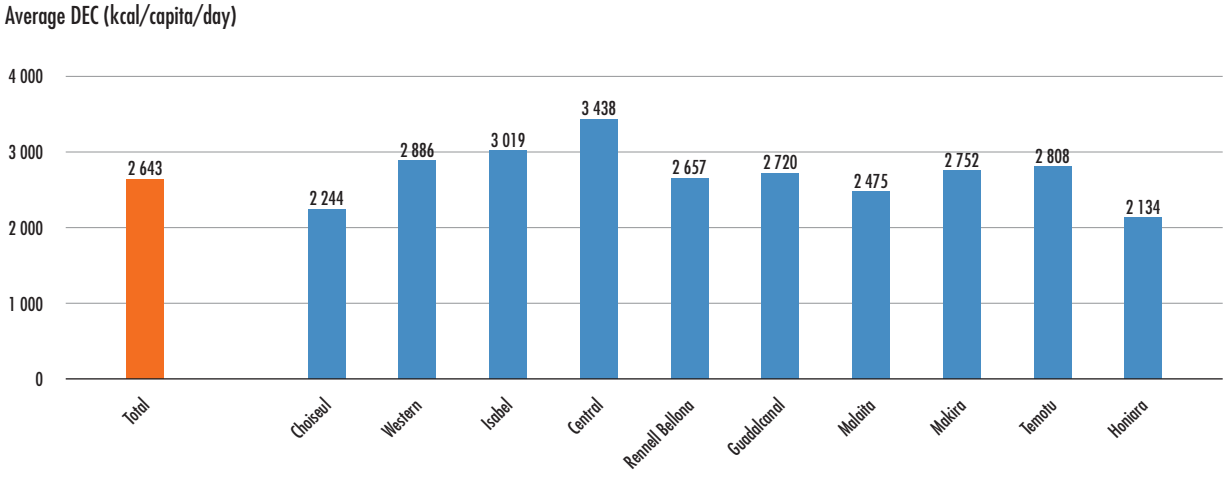
SOURCE: Solomon Islands 2012/13 HIES

To increase the amount of iron consumed, it is recommended that Solomon Islanders eat more foods of animal origin that are rich in haem iron, such as red meat or meat offal (in reasonable amount), certain aquatic foods and more pulses, such as lentils, and nuts like almonds as these products are rich in iron. However, it is important to consume these products with other food products rich in vitamin C to enhance iron absorption.

CHAPTER 6
REGIONAL DISPARITIES

Regional disparities can be observed in the dietary energy consumed in the different provinces in the Solomon Islands. Central region showed the highest level of DEC, and Choiseul and the urban capital of Honiara[61] had the lowest levels (see the results of the regression analysis in Annex 3).

FIGURE 22
Regional differences in average DEC



SOURCE: FAO.

With an average of 32 foods reported by households in Honiara compared to 24 in the Central region, the diet seems to be more diversified in Honiara. On average the number of food products acquired by the households during the previous two weeks is the lowest in Malaita with 20 food products and only 12 are acquired by at least 50 percent of the households. In the provinces of Isabel, Central and Rennell Bellona, eight food products were acquired by more than 80 percent of the households, which may mean that in these regions only those foods are the most affordable, available and meet more uniform consumer preferences.

Most of the calories consumed in Honiara were purchased, whereas in the rural regions of Isabel and Makira more than 70 percent of the calories consumed were own produced. In the region of Rennell Bellona, 16 percent of the calories consumed were received for free, which translates to more than 420 kcal out of the 2 650 kcal/capita/day consumed on average.

In terms of diversity of the diet, roots/tubers/plantain contribute most of the dietary energy consumed in all regions except for Honiara, where cereals are the main food group consumed, and Guadalcanal, where both cereals and tubers/roots/plantain contribute equally to the average energy (see Table 2.6 from companion document). The contribution of sweets and sugar is the highest in Honiara followed by Western and Choiseul. Almost 10 percent of the DEC consumed in the region of Temotu comes from fruits and vegetables, the highest proportion of all the regions. The highest contribution of fish to the total DEC is observed in the region of Isabel with more than 10 percent of DEC coming from fish. Honiara is also the region with the highest contribution of oils and fats, meat and prepared foods compared to the other regions.

[61] Note that even though overall trends indicate a lower average dietary consumption in urban areas, food consumed away from home is likely to be under-reported in urban areas.

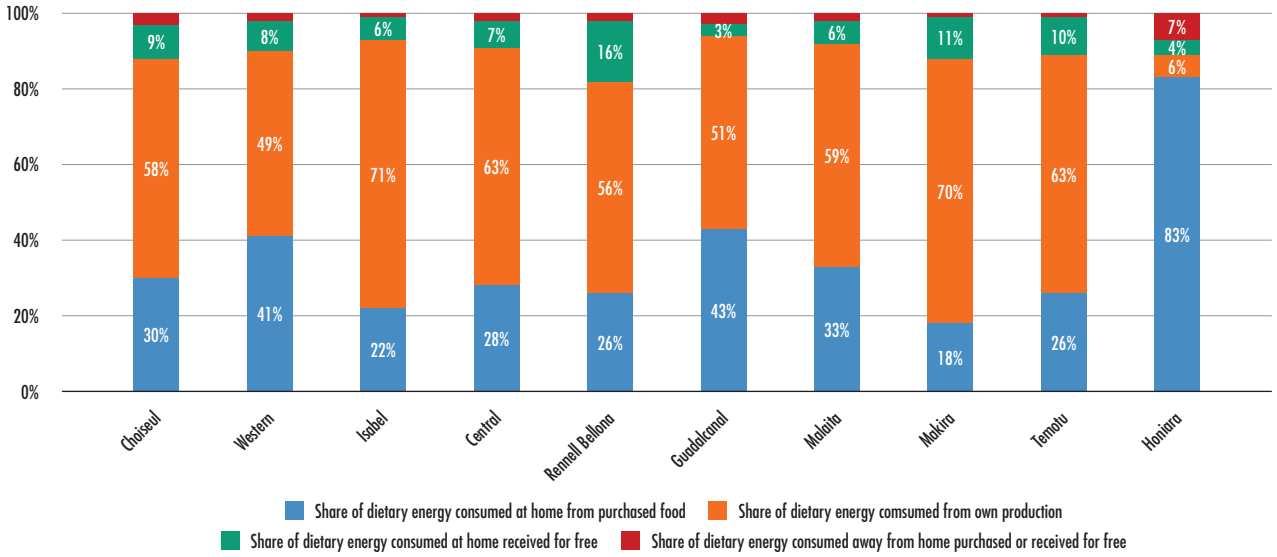
TABLE 6
Summary statistics on regional distribution of food products reported by households

Province	Average DEC (kcal/capita/day)	Number of products reported at least once in the diary	Number of products reported by households		Number of products reported by at least 50 percent of the households	Number of products reported by at least 80 percent of the households
			Average	Median		
Choiseul	2 244	190	24.6	24	16	4
Western	2 886	226	26.5	26	14	5
Isabel	3 019	169	26.4	26	17	8
Central	3 438	188	24.7	24	18	8
Rennell Bellona	2 657	147	21.5	21	14	8
Guadalcanal	2 720	210	27.0	27	18	7
Malaita	2 475	190	20.4	20	12	5
Makira	2 752	176	22.0	21	12	6
Temotu	2 808	173	23.4	21	17	6
Honiara	2 134	270	32.8	32	19	6

SOURCE: FAO.

FIGURE 23
Source of DEC (%)

Contribution of the main sources of acquisition to the average dietary energy consumed by region (%)



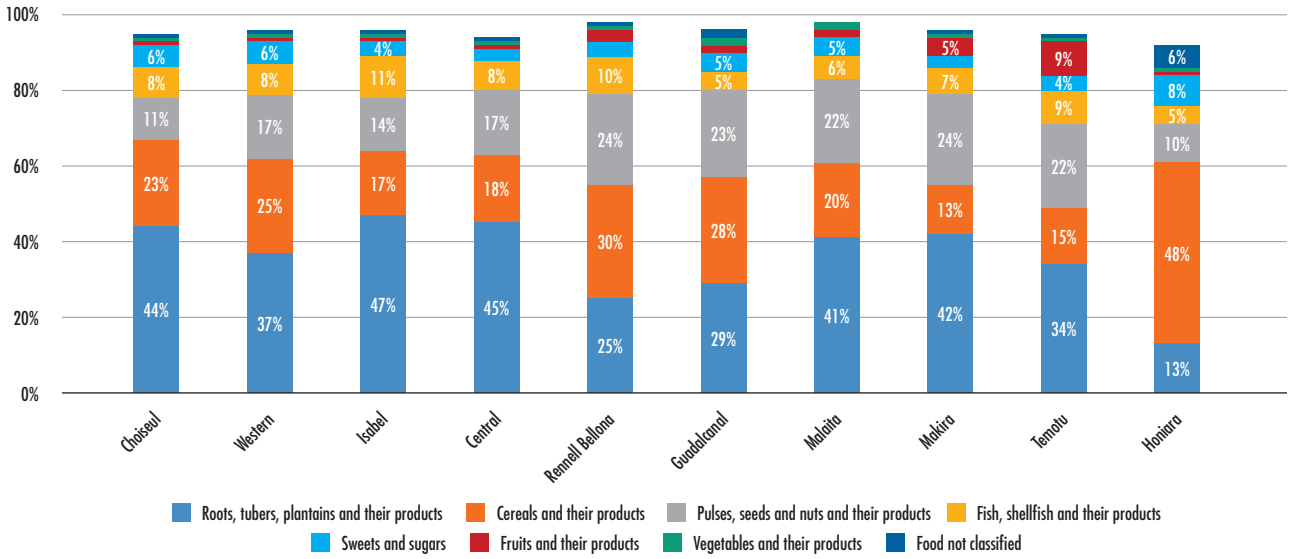
SOURCE: FAO.

In terms of following the Pacific guidelines for healthy living, the charts in Figure 25 show that more than 70 percent of the DEC in Honiara is provided by food products that should be limited or avoided. In Makira and Temotu, households are accessing their dietary energy from healthier foods that provide more than 75 percent of the average DEC consumed in these regions.

In all regions, energy-dense foods contribute to more than 80 percent of the average dietary energy consumed but Malaita is the region where this share is the highest (87 percent) and Isabel where this share is the lowest (81 percent), but Isabel is also the region where the share of body-building foods (foods rich in protein) is the highest (13 percent) followed by Choiseul (12 percent). The lowest contribution of body building foods to the average dietary energy consumed can be found in Guadalcanal, Malaita and Honiara (respectively 6 percent, 7 percent and 8 percent). The very low contribution of protective foods (fruits and vegetables mainly) is a common trait, with this contribution being the lowest in the region of Western. Note the relatively high contribution of "non-classified" foods such as alcoholic beverages and spices in Honiara.

FIGURE 24
Contribution of food groups to the regional average DEC (%)

Contribution of the food groups to the average DEC by region (%)



SOURCE: Solomon Islands 2012/13 HIES

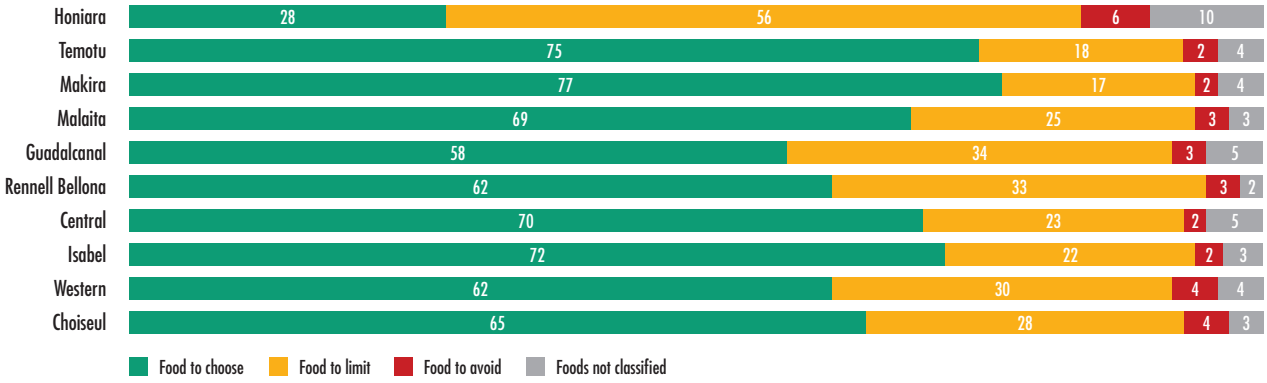
TABLE 7
Contribution of each food group to the average DEC by region (%)

Food groups	Choiseul	Western	Isabel	Central	Rennel Belonna	Guadacanal	Malaita	Makira	Temotu	Honiara
Cereals and their products	22.6	25.1	16.9	18.4	29.7	28.0	20.0	13.2	15.2	47.9
Roots, tubers, plantains and their products	44.4	36.6	47.5	45.1	25.2	29.3	40.6	42.5	34.3	13.3
Pulses, seeds and nuts and their products	11.3	16.6	14.1	17.4	23.6	23.1	22.4	24.0	21.7	9.7
Milk and milk products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Eggs and their products	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Fish, shellfish and their products	8.4	8.5	10.6	7.8	10.1	4.8	6.2	6.6	9.1	4.7
Meat and meat products	0.3	0.3	0.6	0.3	0.4	0.8	0.3	0.3	0.4	2.4
Vegetables and their products	1.3	1.0	1.2	0.9	1.1	1.5	1.1	1.2	1.3	1.4
Fruits and their products	1.4	1.1	1.3	0.8	2.6	1.5	1.1	4.5	9.1	0.8
Fats and oils	0.7	1.2	0.8	1.0	0.5	1.0	0.7	0.6	0.5	3.0
Sweets and sugars	6.1	6.3	4.4	3.5	4.3	4.8	4.7	2.8	3.7	7.7
Spices and condiments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Beverages	0.2	0.3	0.3	0.2	0.5	0.4	0.3	0.1	0.3	1.1
Food not classified	1.2	0.9	0.5	1.2	0.7	1.9	0.5	0.7	0.8	5.6
Food additives	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Composite dishes	1.0	0.4	0.2	0.4	0.7	1.1	0.7	0.7	1.0	1.6
Savoury snacks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Tobacco/betel/kava	1.0	1.3	1.6	2.9	0.6	1.6	1.4	2.8	2.6	0.6

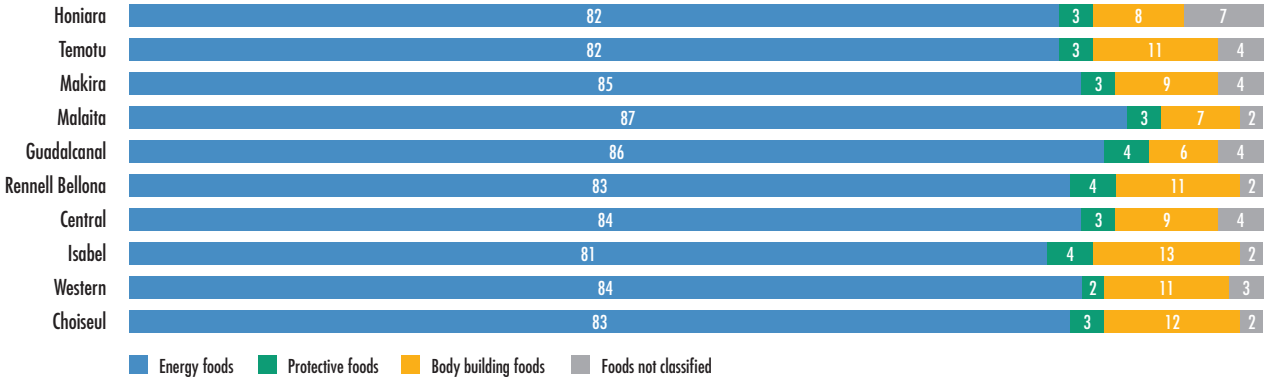
SOURCE: Solomon Islands 2012/13 HIES

FIGURE 25
Regional distribution of DEC following guidelines for healthy living

Contribution of foods to choose, limit or avoid to the regional DEC (%)



Share of energy-dense, body building and protective foods in the regional average DEC (%)



SOURCE: Solomon Islands 2012/13 HIES

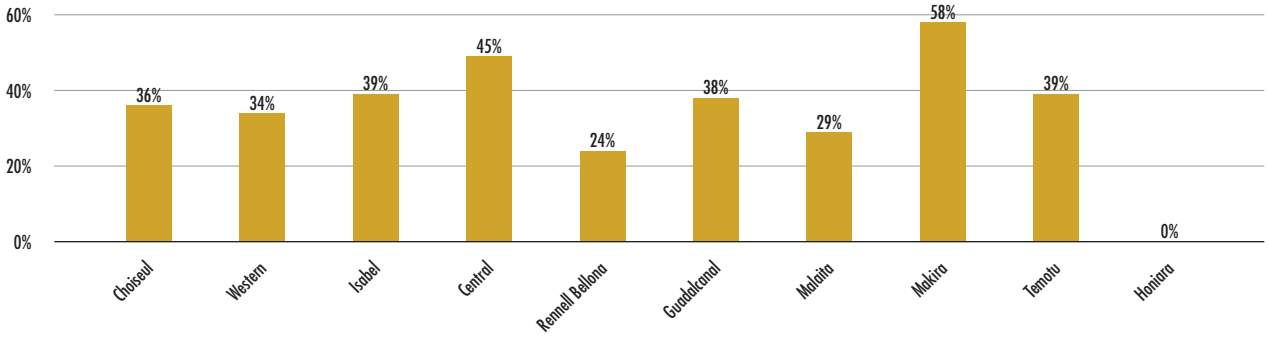
The cost of 1 000 kcal is on average 30 percent higher in Honiara than in other provinces and the difference is the most significant when compared with Makira (elaboration from Table 2.6). It costs twice as much in Honiara to acquire 1 000 kcal from fish, fruits, and vegetables than in any other province. However, cereals seem to be a more affordable source of energy in Honiara than in other provinces. Honiara is also the region where households spend the most on food, but as a proportion of their average income, the amount spent on food in their total household budget is lower than for the other regions (see Table 1.3 and Table 1.7 from companion document).

In terms of inequality in accessing food as measured by the dispersion ratio, it can be seen in Figure 27 that there is less inequality in distribution of DEC between households than in the distribution of food expenditure. The regions of Guadalcanal and Makira are among the regions where access to dietary energy is the least unequal. However, in these regions the disparities in food and total expenditures are also the greatest, with total expenditure of the high-wealth households being more than 8 times that of low-wealth households and where food expenditures are 3.5 times those of low-wealth households. This is due to the higher cost of 1 000 kcal in these regions and the correspondingly high average DEC.

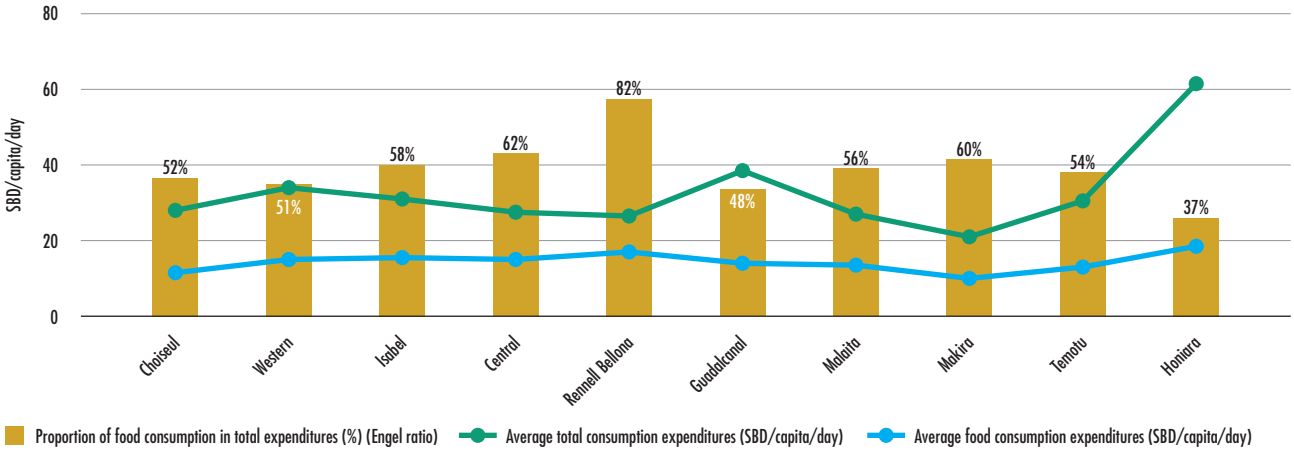
Regional disparities can also be observed in the amount of essential nutrients available for consumption. For example, in the regions of Makira, Malaita and Honiara the quantity of vitamin A consumed is much lower than in the region of Isabel. Provincial disparities can also be observed in terms of access to vitamin B, where Honiara is the worst off in terms of accessing vitamin B1, B2 and B12 followed by Guadalcanal. Guadalcanal is the region with the second lowest quantity of vitamin C available for consumption, and the region of Isabel shows the highest level. The quantity of calcium available for consumption is highest in the Central province as a result of the highest consumption of roots/tubers/plantain. Across all provinces, Honiara shows the lowest consumption of all essential nutrients, except for vitamin A.

FIGURE 26
Regional disparities in cost of food

Relative difference between the cost of 1 000 kcal in Honiara and the other regions



Share of food expenditures to total expenditures (%)



SOURCE: Solomon Islands 2012/13 HIES

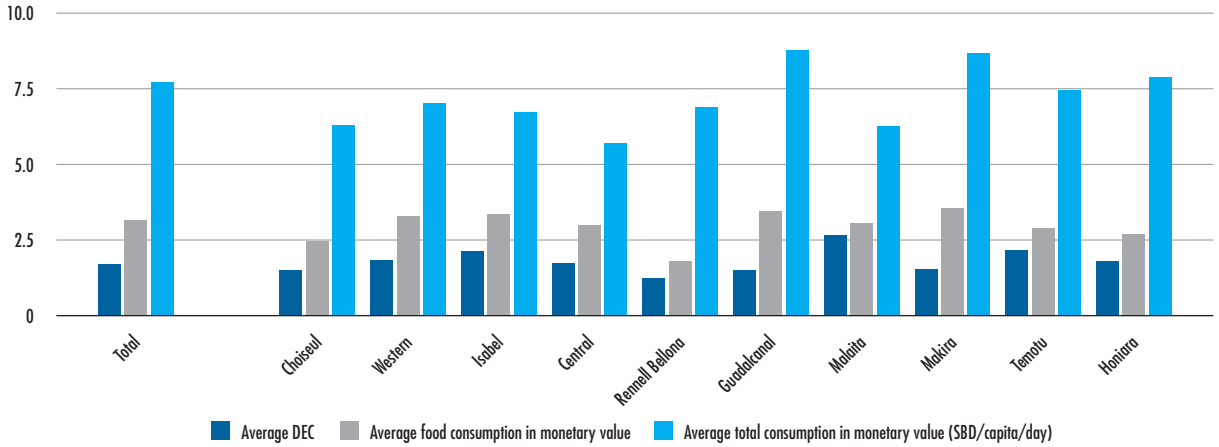
TABLE 8
Cost of 1 000 kcal by region for the most consumed food groups (SBD)

Province	Cereals and their products	Roots, tubers, plantains and their products	Pulses, seeds and nuts and their products	Fish, shellfish and their products	Meat and meat products	Vegetables and their products	Fruits and their products	Sweets and sugars
Choiseul	5.3	3.3	1.2	9.6	26.0	22.5	10.4	6.3
Western	4.3	3.6	0.7	10.0	60.8	27.4	14.0	6.1
Isabel	5.2	3.3	1.0	10.0	25.4	25.1	14.6	7.7
Central	4.8	3.1	0.6	10.0	33.4	25.3	11.3	5.3
Rennell Bellona	6.0	5.0	0.8	12.8	41.8	24.2	12.4	8.8
Guadalcanal	4.2	3.8	0.6	13.7	35.4	31.7	10.4	6.5
Malaita	5.5	5.2	0.6	13.6	54.0	31.2	12.2	4.8
Makira	5.4	2.6	0.8	6.5	48.5	19.3	3.9	5.9
Temotu	5.2	3.4	0.6	8.5	33.9	28.3	4.6	5.3
Honiara	4.4	5.3	1.3	27.0	32.1	43.3	27.2	8.1

SOURCE: Solomon Islands 2012/13 HIES

FIGURE 27
Inequality in access to food by region

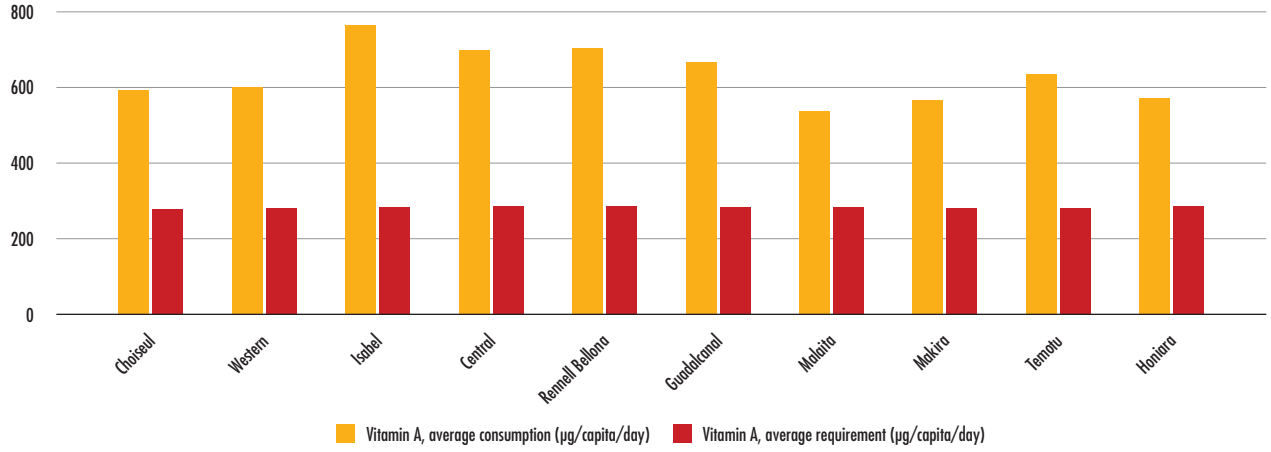
Food and total expenditure inequality as measured by the ratio of the highest income quintile to the lowest



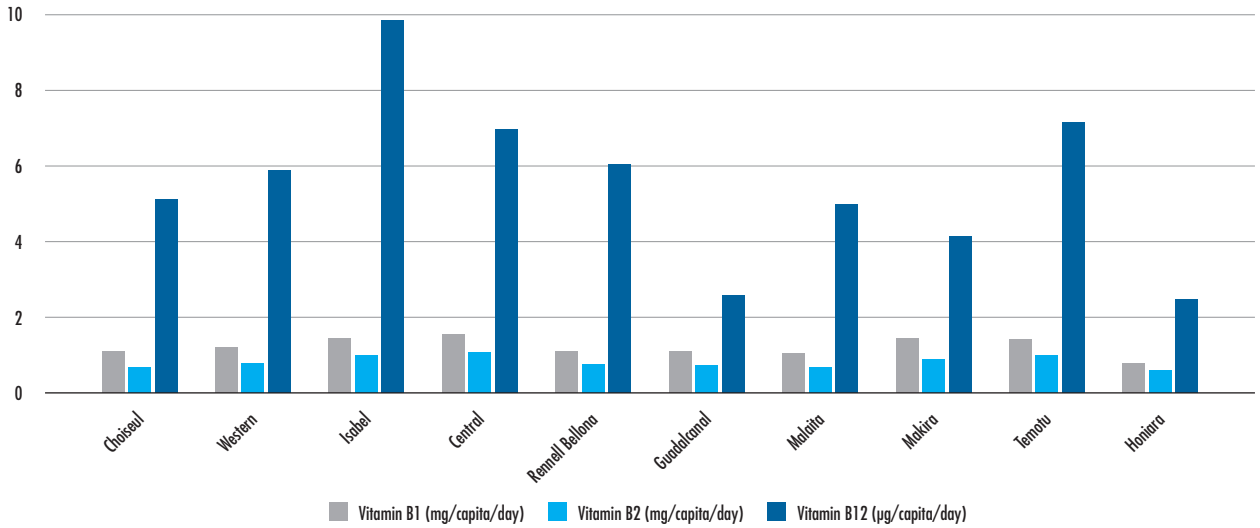
SOURCE: Solomon Islands 2012/13 HIES

FIGURE 28
Regional disparities in quantities of vitamins and calcium available for consumption

Regional distribution of quantity of vitamin A available for consumption with respect to average requirements (µg/capita/day)



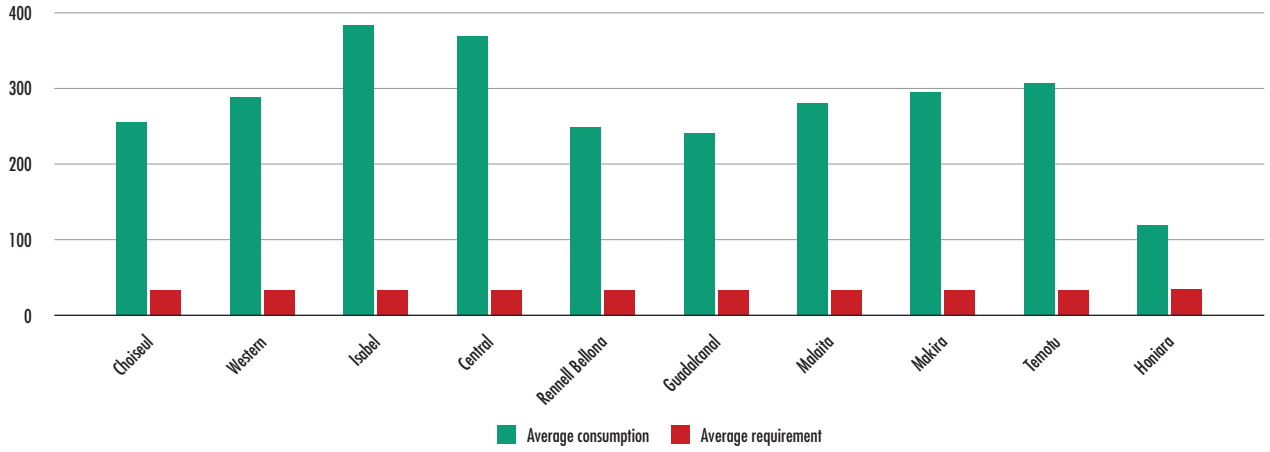
Average consumption of vitamin B1, B2 and B12 by region



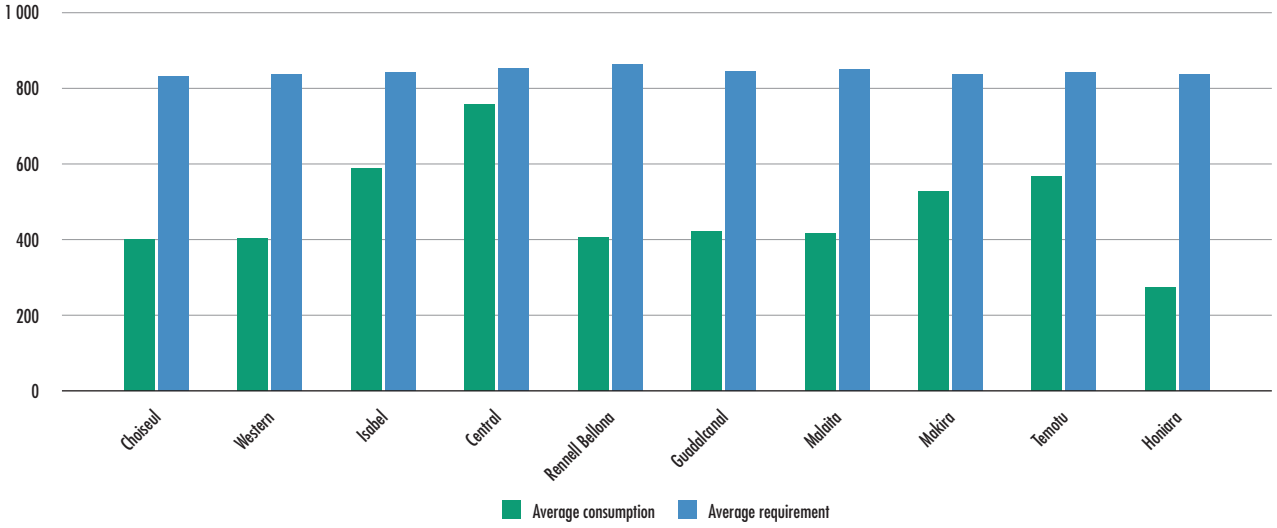
SOURCE: Solomon Islands 2012/13 HIES

FIGURE 28
Regional disparities in quantities of vitamins available for consumption (continued)

Average quantity of vitamin C available with respect to average requirements (mg/capita/day) by region



Average quantity of calcium available for consumption with respect to average requirements (mg/capita/day)



SOURCE: Solomon Islands 2012/13 HIES

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CHAPTER 7
CONSUMPTION PATTERNS OF THE LEAST WEALTHY PEOPLE

We defined as the most vulnerable people those belonging to households with the lowest total expenditures. These populations are more at risk of not being able to access the amount and quality of food they need to be in good health and to be socially/economically active. Based on WB estimates, about 12.7 percent of the population in Solomon Islands lives below the poverty line and are classified as poor. The poverty line was based on a basket of locally consumed foods providing 2 200 kcal a day. The households were ranked according to the real annual total consumption expenditure expressed in adult male equivalent,[62] and households corresponding to the lowest quintile of expenditure were identified; it is the diet of this group that anchored the food poverty lines. In this study, not just those who were defined as poor following the WB methodology are considered as vulnerable, but all the people belonging to the lowest income quintile using total consumption expenditure expressed in per capita[63] as a proxy for income. In using a different distribution to classify vulnerable people or income-deprived people, 84 percent of the households classified as poor following the WB methodology will be covered, but there will still be a slight lack of correspondence for 16 percent of households. However, this study is about analysing trends and the likelihood is that the food consumption patterns observed among the households belonging to the first per capita expenditure quintile can be extrapolated to the poor belonging to the other quintiles. In the rest of this section, whenever we refer to poor people or households, to simplify reading we will refer to people belonging to households whose total consumption expenditure per capita is lower than SBD 16/capita/day,[64] that is, about 21 565 households belonging to the bottom 20 percent of the distribution (811 sampled households).

TABLE 9
Distribution of poor and non poor households by quintile of expenditures

Quintile of per capita total consumption expenditure	Not poor	Poor	Total
1	12 728	8 837	**21 565**
2	20 715	821	**21 536**
3	20 810	779	**21 589**
4	21 321	159	**21 480**
5	21 517	13	**21 530**
Total	**97 091**	**10 609**	**107 700**

SOURCE: FAO.

[62] See Solomon Islands poverty profile based on the 2012/13 Household Income and Expenditure survey. SINSO, World Bank. December 2015.
[63] The reason why we deviate from the concept of adult male equivalent is only to be consistent with all statistics supplied by ADePT-FSM which are all expressed on a per capita basis.
[64] In nominal SBD and not corrected for inflation over year but corrected for seasonal price fluctuation.

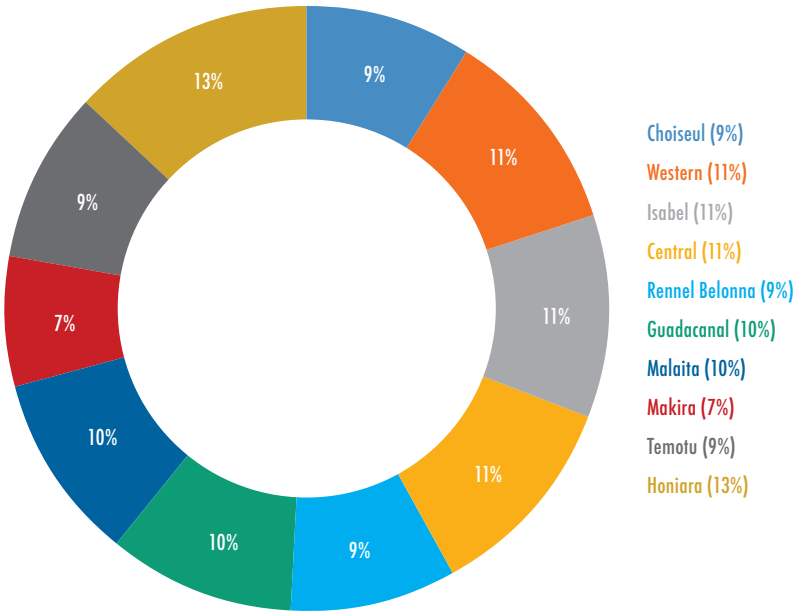
7.1 Profile of the households belonging to the lowest expenditure quintile

Almost one poor household out of three is living in the most populous region of Malaita, followed by Makira and Guadalcanal, and only 1 percent are living in the capital city of Honiara. Half of the households living in Makira are income deprived compared to only 2 percent of the households living in Honiara.

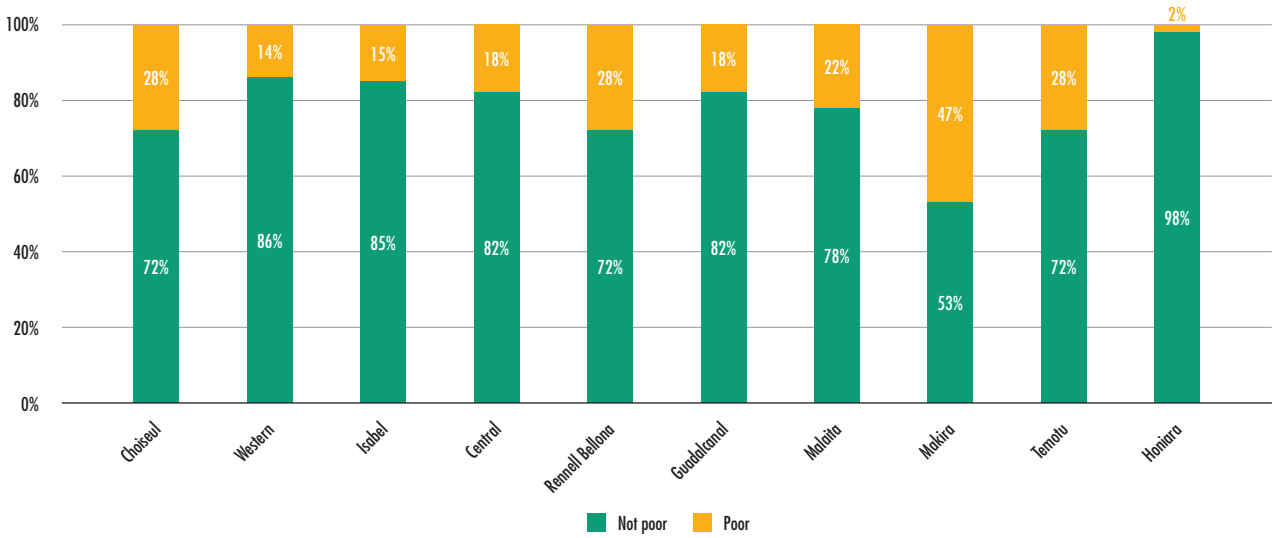
Overall, the profile of poor households is relatively homogenous between regions, apart from Honiara where only 43 percent of the income deprived households have a garden; in all the other regions more than 90 percent of the households of the lowest quintile have their own vegetable garden and are engaged in agriculture, fishing or livestock activities. Of these households, 28 percent are also involved in processing food at home for resale or in handicraft activities or receive remittances from other households. This share is the highest for Makira if we exclude Rennell Bellona where the sample is smaller.

FIGURE 29
Regional distribution of the households belonging to the lowest income expenditure quintile

Regional distribution of the poor



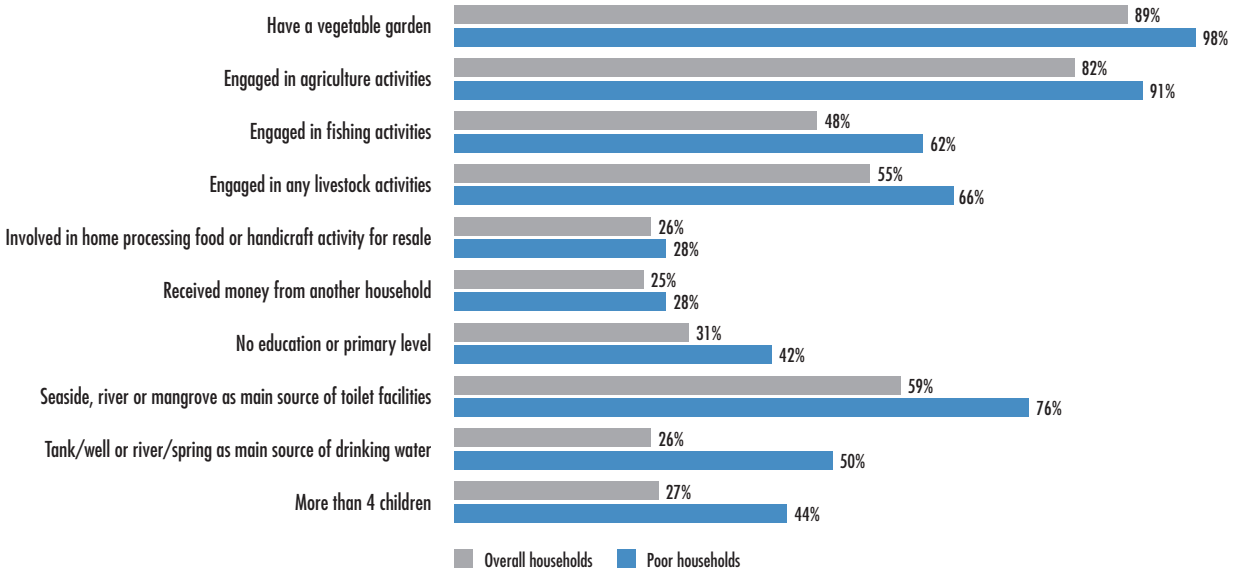
Within-region distribution of the poor



SOURCE: Solomon Islands 2012/13 HIES

FIGURE 30
Profile of the households belonging to the lowest expenditure quintile

Profile of the "poor" households (% of poor households belonging to the lowest expenditure quintile) versus overall households



SOURCE: Solomon Islands 2012/13 HIES

One poor household out of three is composed of 7 people on average; 83 percent of them have more than 4 children and 42 percent of poor households have a low level of education. One poor household out of five does not have access to a safe drinking water source and 76 percent of them are using seaside, river or mangrove as their main source of sanitation. Difficult or little access to safe drinking water and sanitation facilities may alter the ability to properly clean and cook food products, increasing the risk of infections, such as parasites and diarrhoeal disease. Such infections can decrease the ability of the body to absorb and utilise nutrients, further increasing the risk of malnutrition.

7.2 Food consumption patterns of the poor

Compared to the national average of 2 640 kcal/capita/day, poor households consumed less than 2 000 kcal/capita/day and kumara, cassava and brown coconut contribute alone to 50 percent of these calories consumed, with an average quantity consumed of 330 grams, 200 grams and 85 grams per capita per day respectively (see Table 10). The quantity of rice consumed is half the national average, but this product, together with kumara, remains the most accessible food, as more than 90 percent of households consumed these foods at least once during the previous 14 days. Fresh fish also plays an important role in the diet of the poor households, as around 75 grams per capita of fresh fish is consumed on average per day and is accessed by at least 33 percent of poor households. Cabbage, not being an energy-dense food, has a marginal contribution to the average DEC, yet more than 90 percent of poor households acquired this food at least once during the two weeks they filled in the diary.

Households belonging to the lowest expenditure quintile consumed less of all food groups, except roots/tubers/plantain, than households belonging to the highest expenditure quintile. With a difference of 245 g/capita/day between households of lowest quintile and households of highest quintile, cereals appear as the food group to which access is the least equal.

Food expenditure contributes more than 69 percent of the total budget of the poor. If own production contributes to 67 percent of the dietary energy consumed, the amount of food that is purchased still represents one third of total household cash-based consumption expenditure on food. There is also a strong reliance on food received for free, as 30 percent of the households who consumed rice received it as a gift, and the same for fish. Rice was mainly purchased by 70 percent of the households, while 30 percent received it as a gift.

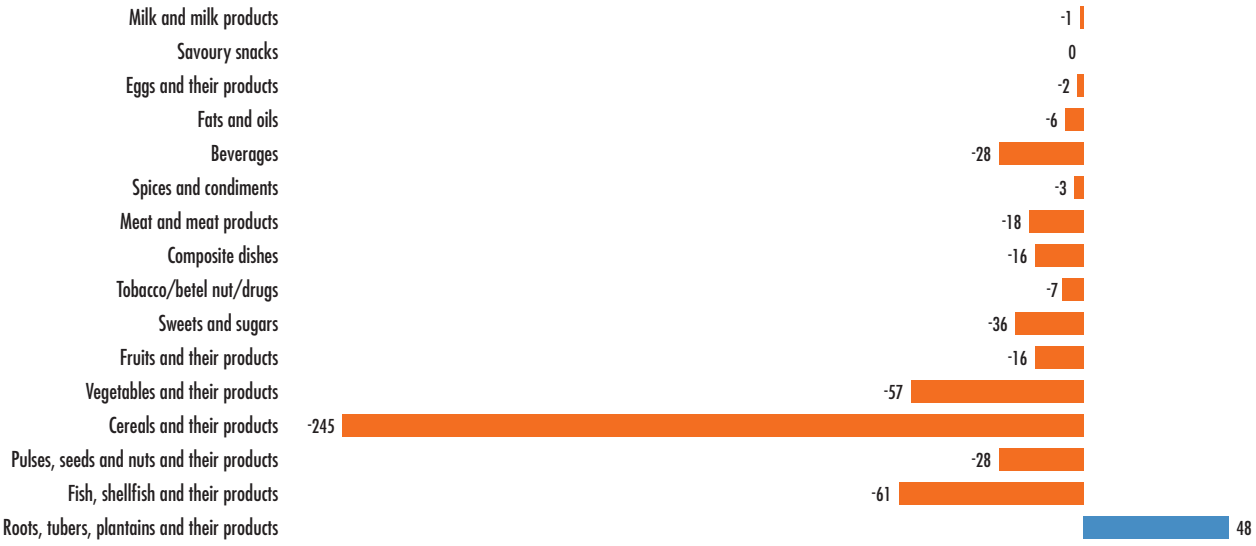
TABLE 10
Summary statistics on food consumption by products contributing to 90 percent of the total diet of the poorest households

Food product	Average edible quantity (g/capita/day)	Contribution to the total energy consumed (%)	Percentage of poor households who acquired the food at least once during the previous 14 days
Coconut, brown	85.2	17	74
Kumara/sweet potato	333.5	17	93
Cassava/tapioca/manioc	202.9	15	81
Rice, white, uncooked	76.6	13	92
Banana, cooking, raw	75.5	5	72
Taro, giant (taamu)	75.2	4	57
Fish, not further specified	42.7	3	60
Coconut, dried	6.7	2	6
Breadfruit	37.3	2	16
Fish, reef, not further specified	33.0	2	34
Betel nuts	9.7	2	63
Yam, not further specified	32.7	2	24
Potato, not further specified	38.8	1	26
Taro, not further specified	25.8	1	57
Cake, not further specified	7.0	1	43
Sugar, white	6.0	1	48
Noodles, instant (Maggi-type), dry	5.1	1	82

SOURCE: Solomon Islands 2012/13 HIES

FIGURE 31
Inequality in quantities consumed between poor and rich households

Difference between edible quantity consumed of food by lowest and highest expenditure quintile (gram/capita/day)



SOURCE: Solomon Islands 2012/13 HIES

Rice, kumara, cassava, fresh fish and taro contribute 50 percent of the total household consumption expenditure on food, with rice alone contributing 17 percent. While rice is mostly purchased, kumara, taro and cassava mainly come from own production and 25 percent of the poor households who consume fish received it for free.

In terms of following the recommendations from the Pacific guidelines for healthy living, energy-dense foods contribute 87 percent of the average DEC of the least wealthy households, which represents almost 80 percent of the total amount spent on food. The contribution of body-building foods is quite high but not diverse, as fish products represent

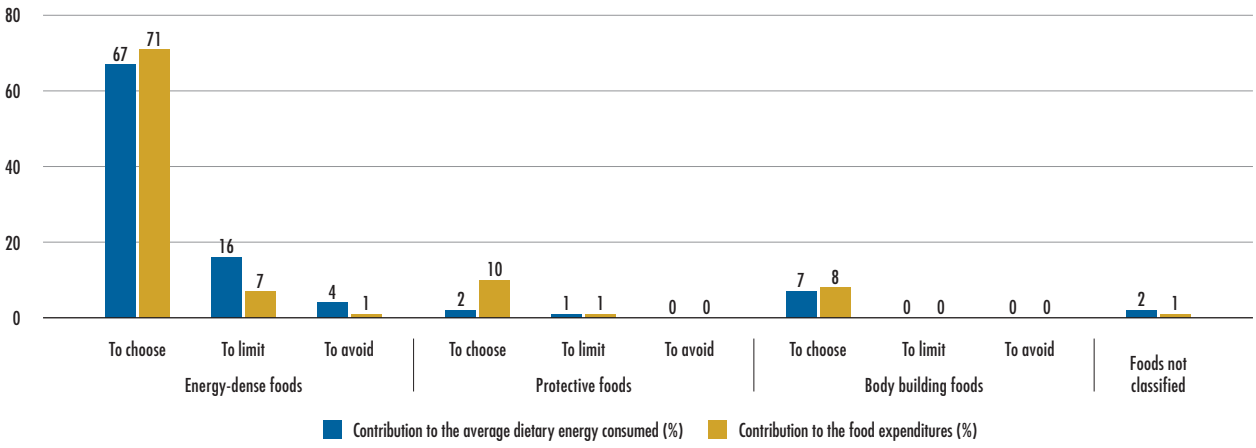
TABLE 11
Main products consumed by at least 30 percent of the least wealthy households during the 14 days they filled in the diary

Food group	Food product	Total	Own production	Purchased	Received as gift
Cereals and their products	Rice, white, uncooked	92	0	69	30
	Noodles, instant (Maggi-type), dry	82	0	85	15
Fish, shellfish and their products	Fish, not further specified	60	50	24	25
	Tuna canned, not further specified	55	1	83	16
	Fish, reef, not further specified	34	73	7	19
Fruits and their products	Pawpaw	33	92	3	5
	Coconut, green	31	81	5	14
Pulses, seeds and nuts and their products	Coconut, brown	74	86	8	6
Roots, tubers, plantains and their products	Kumara/sweet potato	92	69	13	18
	Cassava/tapioca/manioc	80	82	8	10
	Banana, cooking, raw	72	74	8	19
	Taro, giant (taamu)	57	79	5	16
Spices and condiments	Salt, not further specified	41	0	96	4
Sweets and sugars	Sugar, white	48	0	87	13
	Cake, not further specified	43	0	64	36
	Biscuits, not further specified	37	0	90	10
Tobacco/betel nuts/kava	Betel nuts	63	46	31	24
	Tobacco/cigarette	49	4	74	23
Vegetables and their products	Cabbage, not further specified	91	74	14	12
	Beans, green	46	81	9	10

SOURCE: Solomon Islands 2012/13 HIES

FIGURE 32
Distribution of food consumption of poor people following the Pacific guidelines

Contribution of energy-dense, protective and body building foods to the average DEC and food expenditures of the least wealthy households (%)



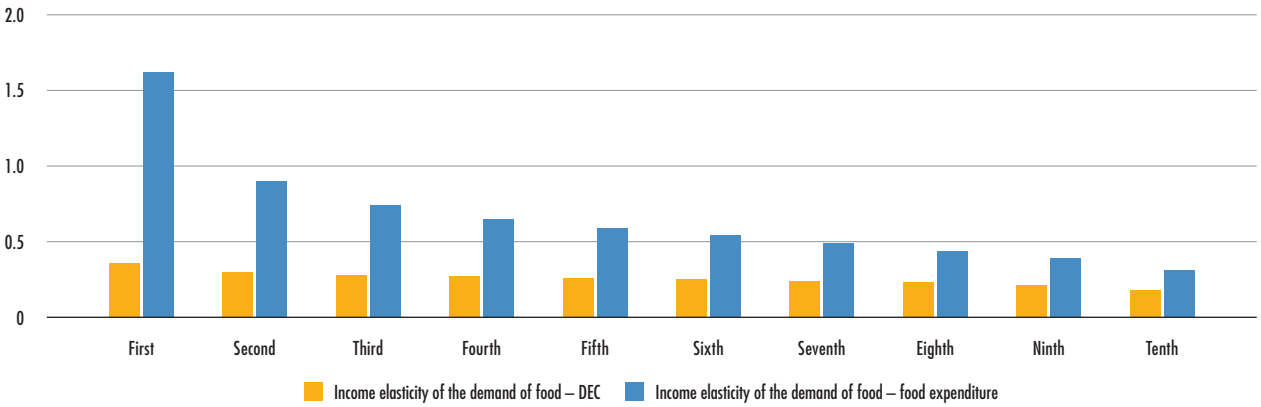
SOURCE: Solomon Islands 2012/13 HIES

84 percent of the total dietary energy from body building foods, indicating, therefore, a diet low in meat and milk products. With an average daily consumption of 122 grams per capita, protective foods contribute only 3 percent of the average DEC and represent 11 percent of the food expenditures.

With SBD 1, it is possible to acquire 460 kcal from an energy food like cassava but only 110 kcal from body building foods like fish, and around 100 kcal from protective foods like pawpaw. Therefore, to reach at least the average requirement of an average Solomon Islander of 2 190 kcal/capita/day[65] with a diet rich in

[65] This estimate is based on demographic and height information extracted from the 2012/13 HIES of Solomon Islands and represent the average requirement of an average Solomon Islander.

FIGURE 33
Income elasticity of food demand



SOURCE: Solomon Islands 2012/13 HIES

TABLE 12
Profile by region of the households belonging to the lowest expenditure quintile (%)

Province	Households with at least 4 children	Households whose head has a low level of education	Received money from another household	Households using river/spring as main drinking water source	Seaside, river, mangrove, other as main toilet facility	Household with a vegetable garden	Households engaged in agriculture activity	Household engaged in fishing activities	Household engaged in livestock activities	Household engaged in home produced activities	Total number of poor households	Total number of households
Choiseul	38	38	43	24	94	100	99	73	62	38	1 563	5 576
Western	27	20	36	15	82	98	98	82	29	33	2 278	16 289
Isabel	18	26	23	9	50	97	95	50	39	11	887	6 092
Central	47	27	6	19	87	98	93	74	62	19	1 043	5 812
Rennell Bellona	48	39	40	0	0	99	99	57	41	86	223	810
Guadalcanal	39	54	29	37	91	97	97	60	73	13	3 670	20 315
Malaita	63	48	26	34	51	99	77	41	72	23	6 297	28 659
Makira	38	37	33	34	94	100	98	80	76	50	3 965	8 432
Temotu	35	68	10	32	96	98	91	75	89	19	1 439	5 059
Honiara	33	25	7	22	18	46	46	7	0	15	200	10 656
Total	**44**	**42**	**28**	**29**	**76**	**98**	**90**	**62**	**66**	**28**	**21 565**	**107 700**

SOURCE: FAO.

protective and body-building foods represents a challenge for lowest income households, whose average total expenditure was SBD 12 per capita per day. The analysis of income elasticity of food consumption confirms the strong response of food expenditure to an increase in income among poorer households compared to richer households (see Table 4.5). The income elasticity of DEC is relatively low compared to that of food expenditures but it is still at its highest among the poorest households.

Finally, 7 percent of the poor are living in Makira but 50 percent of the population in Makira is poor. Looking at the profile of the poor households by region, the pattern is relatively homogenous when compared to the other regions. In Makira all of the poor households have their own garden, they are all engaged in agriculture activities combined with either fishing or livestock activities. Half of the poor households living in Makira are involved in handicraft or activities related to food processed at home.

Conclusion

The aim of SDG Target 2.1 is "ending hunger and ensuring access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round by 2030". The PoU (SDG 2.1.1) is one of the two indicators selected to measure progress towards this target.

In Solomon Islands, using the food data collected in the 2012/13 HIES it was found that one person out of ten is undernourished. This relatively high level of undernourishment contrasts with the high level of dietary energy of 2 600 kcal/day available on average for consumption but is in line with the high rate of overweight and obesity observed among adult populations.

From the deeper analysis of the food consumption patterns, three trends emerged: first, dietary energy is not equally distributed among the population, so not all population groups have access to the same amount of dietary energy; second, the diet is relatively homogenous and not diversified among population groups; and third, the diet is balanced nationwide in terms of the contribution of proteins, fats and carbohydrates to the total dietary energy consumed.

Deeper analysis is required to clarify whether obesity is more the result of overconsumption of highly processed foods rich in sugars and fats or excess consumption of locally grown roots that are a very cheap source of dietary energy and are mainly own produced. This need for analysis is particularly the case for a better understanding of food consumed away from home in the habitual diets of Solomon Islanders. Rice is the main food product consumed at least once by all households during the 14-day diary period. Most of the rice consumed is purchased and contributes to 19 percent of the dietary energy consumed on average in Solomon Islands. This means any shock affecting access to rice would drastically reduce the rice consumption, especially in Honiara where rice contributes almost 50 percent of the dietary energy consumed.

Almost half of the households in Solomon Islands are engaged in fishing activities, and fish represents the fourth most important source of energy and the only source of proteins, since consumption of meat and milk products is marginal. Cabbages are consumed by almost all households and are one of the main sources of vitamin A and vitamin C, and so adequacy is reached in terms of the amount of vitamins A and C available for consumption with respect to the average requirements. However, the overall consumption of fruits and vegetables is inadequate. The estimated apparent consumption is deficient in calcium, vitamin B2 and iron due to the lack of consumption of meat and milk products, which is reflected through the high prevalence of anaemia among women.

Some regional disparities were also evidenced, mainly between the other provinces and the capital city of Honiara, which has the lowest DEC, the most expensive food except for rice, and most of the food consumed must be purchased.

All of these trends are based on a survey conducted seven years ago. With the rapid transition of the diet from locally produced foods to one that is high in fatty and sweet foods, such as offcuts of meat, sugar-sweetened beverages and baked goods, which has been observed in many Pacific countries and territories, it is expected that the diet has changed since 2013. At the time this report was drafted, the world is facing a global pandemic that may also dramatically affect food systems and it is expected that all small island developing states, such as Solomon Islands whose economy widely depends on trade, will also be affected.

Finally, it is important to note that the survey was not designed to support an in-depth analysis of food and nutrient consumption and it is therefore recommended that these results be considered as reflecting a pattern rather than quantified estimates of acquisition and apparent consumption of different food types. It is only with individual intake and anthropometric surveys that it will be possible to assess the nutritional status of Solomon Islands in a more accurate and rigorous way.

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ANNEX 1
Characteristics of the sample

	Number of sampled households	Number of represented households (thousands)	Average household size	Average total consumption expenditures (SBD/capita/day)
Total	4 364	107.7	5.7	34.01
Quintiles of income				
Lowest quintile	811	21.5	6.9	11.39
Second	842	21.6	6.1	19.74
Middle	813	21.5	5.7	27.88
Fourth	877	21.6	5.4	40.50
Highest quintile	1 021	21.5	4.5	88.00
Categories for the number of children				
No child	600	14.7	3.1	51.40
1 child	890	21.6	4.1	41.16
2 children	891	21.3	5.2	35.61
3 children	800	21.0	6.1	33.56
More than 4 children	1 183	29.1	8.3	27.57
Gender of the head of the household				
Male	3 868	97.0	5.8	33.98
Female	496	10.7	4.8	34.34
Engaged in agriculture activities				
Yes	3 324	88.0	5.7	30.38
No	1 037	19.6	5.9	49.75
Have a vegetable garden				
Yes	3 623	95.9	5.7	30.94
No	741	11.8	5.7	59.29
Engaged in any livestock activities				
Yes	2 046	59.2	5.9	29.21
No	2 314	48.4	5.5	40.24
Engaged in fishing activities				
Yes	2 023	52.1	5.9	27.10
No	2 338	55.6	5.6	40.81
Engaged in home produced activities				
Yes	1 183	27.5	6.1	30.14
No	3 177	80.2	5.6	35.45
Poverty status				
Not poor	3 950	97.1	5.5	37.27
Poor	414	10.6	7.4	11.72
Received remittances from another household				
No	3 372	80.8	5.7	35.71
Yes	992	26.9	5.8	28.97
Education level of the head of the household				
Nil or incomplete primary	1 182	33.7	5.7	27.93
Primary	1 103	28.0	6.0	27.37
Secondary and higher	2 079	46.1	5.6	42.89

SOURCE: Solomon Islands 2012/13 HIES

	Number of sampled households	Number of represented households (thousands)	Average household size	Average total consumption expenditures (SBD/capita/day)
Province				
Choiseul	375	5.6	5.6	27.69
Western	557	16.3	5.6	34.56
Isabel	379	6.1	4.5	30.85
Central	380	5.8	5.4	27.53
Rennel Bellona	186	0.8	5.8	26.70
Guadalcanal	536	20.3	5.4	38.72
Malaita	560	28.7	6.0	27.32
Makira	377	8.4	6.3	21.08
Temotu	262	5.1	5.6	30.66
Honiara	752	10.7	6.4	61.50

SOURCE: Solomon Islands 2012/13 HIES

ANNEX 2
Methodology – the prevalence of undernourishment

Definition: Undernourishment is defined as the condition of an individual whose habitual food consumption is insufficient to provide, on average, the amount of dietary energy required to maintain a normal, active, healthy life.

How it is reported: The SDG 2.1.1 indicator is reported as a prevalence and is denominated as "prevalence of undernourishment" (PoU), which is an estimate of the percentage of individuals in the total population that are in a condition of undernourishment.

Methodology: To compute an estimate of the PoU in a population, the probability distribution of habitual dietary energy intake levels (expressed in kcal per person per day) for the average individual is modelled as a parametric probability density function (pdf), *f(x)*. The indicator is obtained as the cumulative probability that the habitual dietary energy intake (*x*) is below the minimum dietary energy requirements (MDER) (i.e. the lowest limit of the range of energy requirements for the population's representative average individual) as in the formula below:

$$PoU = \int x < MDER\ f(x|\theta)dx$$

where θ is a vector of parameters that characterises the pdf. The distribution is assumed to be lognormal, and thus fully characterised by only two parameters: the mean DEC, and its coefficient of variation (CV).

Data sources: the main source used to estimate the three parameters is the 2012/13 HIES of Solomon Islands.

- Minimum dietary energy requirement (MDER): Human energy requirements for an individual in a given sex/age class are determined on the basis of normative requirements for basic metabolic rate (BMR) per kilogram of body mass, multiplied by the ideal weights that a healthy person of that class may have, given his or her height, and then multiplied by a coefficient of physical activity level (PAL) to take into account physical activity. Given that both healthy BMIs and PALs vary among active and healthy individuals of the same sex and age, a *range* of energy requirements applies to each sex and age group of the population. The MDER for the average individual in the population, that is the threshold used in the PoU formula, is obtained as the weighted average of the lower bounds of the energy requirement ranges for each sex and age group, using the shares of the population in each sex and age group as weights. The population structure by sex and age is extracted directly from the survey as well as information on height of the individual.[66]
- Dietary energy consumption (DEC) and coefficient of variation (CV) were extracted from the food data collected in the Solomon Islands 2012/13 HIES. Quantities of food purchased or consumed from own production or received for free were reported by households in a diary and filled in over a period of 14 days. These quantities were converted into grams using conversion factors and further converted into nutrient values using the Pacific Nutrient Database developed jointly by SPC, FAO and the University of Wollongong. The average DEC and the CV that describe the distribution of average daily DEC in the population can be estimated. However, because of excess variability[67] observed in the distribution of daily energy, additional data treatment[68] was needed to get a reliable estimate of the CV.

[66] Using the median height by group and class of age.

[67] Excess variability is due to survey design (the 2012/13 HIES of Solomon Islands was not designed to measure individual food consumption), field work, data entry or other measurement errors.

[68] The coefficient of variation that measures inequality in accessing dietary energy is estimated as the sum of inequality in accessing energy due to socioeconomic differences (CV of income) and inequality in accessing energy due to differences in energy requirements (CV of requirements). See http://www.fao.org/3/a-i4046e.pdf for more details about the estimation of the CV and treatment for excess variability. In the case of Solomon Islands, we used income distribution as the welfare indicator to measure inequality in access to food.

SDG 2.1.1	MDER (kcal/capita/day)	DEC (kcal/capita/day)	CV (%)
9.2%	1 700	2 600[69]	29

Challenges and limitations: While formally the state of being undernourished or not is a condition that applies to individuals, it is impossible to reliably identify which individuals in a certain group are actually undernourished, since the data is usually available on a large scale. Through the statistical model described above, the indicator can only be computed with reference to a population or a group of individuals for which a representative sample is available.

Because of the underestimation or overestimation of the dietary energy observed in some provinces, the PoU for Solomon Islands is not presented by regions or area of residence.

Due to the probabilistic nature of the inference and the margins of uncertainty associated with estimates of each of the parameters in the model, the precision of the PoU estimates is generally low. While it is not possible to formally compute margins of error around PoU estimates, these are expected to exceed 5 percent in most cases. For this reason, we report an estimate of around 10 percent.

[69] This average slightly differs from the national average discussed in the report, as calories from chewing of betel nuts are excluded.

ANNEX 3
Regression analysis of the impact of socioeconomic, demographic and regional characteristics of the household on the average DEC

To assess the impact of the socioeconomic, demographic and regional characteristics of the household on the DEC, a simple linear regression was performed linking the average DEC to household characteristics:

$$ln(DEC_i) = \beta_0 + \beta_1 \ ln(inc_i) + \sum_j^n \beta_j HHchar_{ij}$$

where

DEC_i is the dietary energy consumption of household i

inc_i is the per capita total expenditures of household i

$HHchar_{ij}$ is the characteristic j of the household i.

	Coef.	Std. Err.	t	P > t
Log of per capita total expenditure	0.23	0.01	18.48	0.0
Region[1]				
Western	0.13	0.03	4.06	0.0
Isabel	0.28	0.03	8.07	0.0
Central	0.43	0.03	12.30	0.0
Rennell Bellona	0.17	0.04	4.03	0.0
Guadalcanal	0.23	0.03	6.90	0.0
Malaita	0.06	0.03	1.75	0.1
Makira	0.30	0.03	8.53	0.0
Temotu	0.16	0.04	4.20	0.0
Honiara	0.07	0.04	2.03	0.0
Female head of the household	0.07	0.02	2.96	0.0
Total number of children in the household[2]				
One child	-0.13	0.02	-5.22	0.0
Two children	-0.19	0.03	-7.59	0.0
Three children	-0.31	0.03	-12.05	0.0
More than four children	-0.39	0.02	-16.01	0.0
Does not have a garden	-0.17	0.03	-6.68	0.0
Not engaged in fishing activities	-0.14	0.02	-8.42	0.0
Not engaged in livestock activities	-0.05	0.02	-3.32	0.0
Not engaged in home produced activities	-0.09	0.02	-5.43	0.0
Not poor	-0.11	0.03	-4.03	0.0
Does not receive remittances	0.01	0.02	0.50	0.6
Education level of the head of the household[3]				
Primary	-0.01	0.02	-0.44	0.7
Secondary or higher	-0.02	0.02	-1.16	0.2
Constant	7.31	0.06	128.11	0.0
Number of observations	4 359			
Adj R-squared	0.27			

[1] Choiseul as reference [2] Household with no child as reference [3] Household whose head has no education as reference

SOURCE: Solomon Islands 2012/13 HIES

ANNEX 4
Composition of the FAO/GIFT grouping

	Food groups	Nutrition sub-groups
1	Cereals and their products excluding manufactured cereal-based products	Rice and rice-based products
		Maize and maize-based products
		Wheat
		Sorghum and sorghum-based products
		Millet and millet-based products
		Other cereals, mixed cereals or unspecified cereals and their products
2	Roots, tubers, plantains and their products excluding manufactured snacks such as chips	Potato, sweet potato and their products
		Cassava and similar roots (excluding taro) and their products
		Taro and taro-based products
		Yam and yam-based products
		Other and unspecified starchy roots and tubers (excluding sugary roots and tubers) and their products
		Plantain and plantain-based products
3	Pulses, seeds and nuts and their products, including derived and manufactured products such as canned or jarred legumes, peanut butter, tahini paste, etc.	Pulses (excluding soybeans) and their products
		Soybean and soy-based products
		Nuts, seeds and their products
4	Milk and milk products	Milk: fresh and processed (excluding fermented milk products, cream, whey, cheese and other milk products)
		Fermented milk products
		Cream, whey and any other milk products excluding fermented milk products and cheese
		Cheese
5	Eggs and their products	Eggs: fresh and processed
6	Fish, shellfish and their products including processed fish and manufactured fish products	Freshwater fish (excluding offal): fresh and processed (excluding dried)
		Diadromous fish (excluding offal): fresh and processed (excluding dried)
		Marine fish (excluding offal): fresh and processed (excluding dried)
		Offal – fish and shellfish: fresh and processed (excluding dried)
		Shellfish (excluding offal) – all types: fresh and processed (excluding dried)
		Fish and shellfish – mixed or unspecified: fresh and processed (excluding dried)
		Fish and shellfish (including offal) – all types: dried
7	Meat and meat products including processed and manufactured meat products	Offal – all types: fresh and processed (excluding dried)
		Mammals, reptiles and amphibians (excluding offal): fresh and processed (excluding dried)
		Birds (excluding offal): fresh and processed (excluding dried)
		Meat – mixed or unspecified: fresh and processed (excluding dried)
		Meat – all types: dried
8	Insects, grubs and their products	Insects and grubs
9	Vegetables and their products	Leafy vegetables: fresh
		Yellow and orange vegetables: fresh
		Vegetables (excluding leafy vegetables and including fresh legumes): fresh
		Vegetables – all types: dried
		Vegetables – all types, mixed and unspecified: processed (excluding dried)
		Vegetables – mixed and unspecified: fresh
10	Fruits and their products	Yellow and orange fruits: fresh
		Fruits: fresh
		Fruits: dried
		Fruits: processed (excluding dried and candied)

SOURCE: FAO.

Food groups	Nutrition sub-groups
11 Fats and oils	Vegetable fat and oil (excluding red palm oil)
	Red palm oil
	Animal fat and oil
12 Sweets and sugars	Dough-based sweets
	Chocolate-based sweets
	Fruit and nut-based sweets
	Other sweets
	Sugars
	Dairy or dairy imitate-based sweets
13 Spices and condiments	Herbs and spices
	Condiments
14 Beverages	Alcoholic drinks
	Drinking water
	Tea, herbal tea, coffee and cocoa
	Clear broths
	Soft drinks
	Fruit and vegetable drinks
	100% fruit and vegetable juices
15 Foods for particular nutritional uses	Infant formulas and ready-to-eat meals for infants and young children
	Foods for weight reduction
	Foods for sporting people
	Foods for medical purposes
16 Food supplements and similar	Food supplements and similar
17 Food additives	Sweeteners and flavourings
	Colorants
	Other food additives
	Home-preparation aids
	Ingredients for food fortification/enrichment and supplements
	Microbiological or enzymatic ingredients
18 Composite dishes	Meat-based dishes
	Fish and seafood-based dishes
	Egg-based dishes
	Potato-based dishes
	Legume-based dishes
	Vegetable-based dishes
	Bread-based dishes and finger foods
	Pasta and noodle-based dishes
	Rice-based dishes
	Savoury pies and tarts
	Soups
	Salad-based dishes
19 Savoury snacks	Crisps and curls
	Other snacks

SOURCE: FAO.

ANNEX 5

Median unit cost of 1 000 kcal and contribution to the total food expenditures of the food products representing more than 90 percent of the average DEC

Food group	Food product	Average food consumption in monetary value (SBD/ capita/day)	Average DEC (kcal/ capita/day)	Median dietary energy unit value (SBD/ 1 000 kcal)	Contribution of the product to the total amount spent on food (%)	Contribution of the product to the total dietary energy consumed (%)
Cereals and their products	Flour, not further specified	0.1	48.5	3.1	1	2
	Rice, white, uncooked	2.3	507.2	4.5	16	19
	Bread, loaf, not further specified	0.2	18.9	6.8	1	1
	Noodles, instant (Maggi-type), dry	0.3	42.5	7.6	2	2
	Breakfast cereal, whole wheat, added vitamins	0.0	0.1	21.1	0	0
Eggs and their products	Egg, chicken, fresh	0.0	1.4	29.8	0	0
Fats and oils	Oil, not further specified	0.0	14.3	2.5	0	1
	Butter, not further specified	0.0	2.8	8.5	0	0
Fish, shellfish and their products	Trochus	0.0	8.4	4.6	0	0
	Fish, reef, not further specified	0.3	46.7	8.9	2	2
	Fish, pelagic/ocean, not further specified	0.1	8.6	11.2	1	0
	Fish, not further specified	0.7	65.7	12.2	5	2
	Tuna canned, not further specified	0.5	15.5	31.8	3	1
Fruits and their products	Breadfruit	0.1	25.2	2.6	1	1
	Pawpaw	0.1	6.9	9.6	0	0
	Coconut, green	0.1	2.9	17.0	0	0
	Pineapple	0.0	2.2	20.5	0	0
	Melon, not further specified	0.0	1.2	32.2	0	0
Meat and meat products	Chicken, quarters	0.2	6.8	30.2	1	0
	Pork, not further specified	0.2	1.8	35.9	1	0
	Beef, canned, corned	0.0	1.0	37.3	0	0
	Chicken curry, canned	0.0	0.2	39.2	0	0
	Pork, canned	0.0	0.7	41.4	0	0
	Beef, mince/ground, regular	0.0	0.8	42.2	0	0
	Chicken, whole	0.0	0.4	42.7	0	0
Milk and milk products	Milk, powdered, full cream	0.0	0.3	13.1	0	0
	Milk, fresh, not further specified	0.0	0.0	35.5	0	0
	Yoghurt, not further specified	0.0	0.0	252.8	0	0
Narcotic	Betel nuts	0.5	42.5	15.4	3	2
Pulses, seeds and nuts and their products	Coconut, dried	0.0	74.7	0.2	0	3
	Coconut, brown	0.2	382.9	0.6	2	15
	Mixed dried fruit, not further specified	0.0	26.7	1.4	0	1

SOURCE: Solomon Islands 2012/13

Food group	Food product	Average food consumption in monetary value (SBD/ capita/day)	Average DEC (kcal/ capita/day)	Median dietary energy unit value (SBD/ 1 000 kcal)	Contribution of the product to the total amount spent on food (%)	Contribution of the product to the total dietary energy consumed (%)
Roots, tubers, plantains and their products	Cassava/tapioca/manioc	0.8	337.7	2.2	5	13
	Taro, not further specified	0.1	30.0	3.7	1	1
	Yam, not further specified	0.2	37.6	4.2	1	1
	Kumara/sweet potato	1.5	327.9	4.6	11	12
	Taro, giant (taamu)	0.4	82.4	4.6	3	3
	Banana, cooking, raw	0.4	95.5	6.0	3	4
	Potato, not further specified	0.3	40.5	7.7	2	2
Sweets and sugars	Sugar, white	0.2	49.4	4.7	2	2
	Cake, not further specified	0.2	41.9	5.1	1	2
	Biscuits, not further specified	0.3	20.2	11.1	2	1
Vegetables and their products	Pumpkin	0.0	3.8	10.8	0	0
	Corn, cob, not further specified	0.0	2.8	11.4	0	0
	Leaves, taro	0.0	1.1	14.2	0	0
	Cabbage, fern	0.0	1.6	23.2	0	0
	Cabbage, slippery bush	0.0	1.5	25.8	0	0
	Eggplant	0.0	1.5	29.1	0	0
	Cabbage, not further specified	0.4	11.7	29.5	3	0
	Beans, green	0.1	3.7	31.5	1	0
	Cucumber, unpeeled	0.0	0.4	49.3	0	0
	Onion, shallot	0.1	1.3	49.7	0	0
	Tomato, common	0.1	1.0	73.8	0	0
Beverages	Soft drink, not further specified	0.0	0.3	97.6	0	0
	Beer, not further specified	0.1	0.8	139.0	1	0

SOURCE: Solomon Islands 2012/13

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