Food and Agriculture
Organization of the
United Nations

Methods and options to monitor the cost and affordability of a healthy diet globally

Background paper for *The State of Food Security and Nutrition in the World 2022*

FAO AGRICULTURAL DEVELOPMENT ECONOMICS
WORKING PAPER 22–03

ISSN 2521-1838

July 2022

Methods and options to monitor the cost and affordability of a healthy diet globally

Background paper for *The State of Food Security and Nutrition in the World 2022*

Anna Herforth
Food Prices for Nutrition Project, Boston

Aishwarya Venkat
Friedman School of Nutrition, Tufts University

Yan Bai
Development Data Group, World Bank

Leah Costlow
Friedman School of Nutrition, Tufts University

Cindy Holleman
Agrifood Economics Division, FAO

William A. Masters
Friedman School of Nutrition and Department of Economics, Tufts University

Food and Agriculture Organization of the United Nations

Rome, 2022

Required citation:

Herforth, A., Venkat, A., Bai, Y., Costlow, L., Holleman, C. & Masters, W.A. 2022. *Methods and options to monitor the cost and affordability of a healthy diet globally*. Background paper for *The State of Food Security and Nutrition in the World 2022*. FAO Agricultural Development Economics Working Paper 22-03. Rome, FAO. https://doi.org/10.4060/cc1169en

ISSN 2664-5785 [Print]

ISSN 2521-1838 [Online]

ISBN 978-92-5-136690-5

Contents

Tables

Figures

Abstract

FAO is focusing its attention on the pursuit of healthy diets and transformations of agrifood systems to ensure healthy diets are affordable for all. Measuring and systematically monitoring the cost and affordability of healthy diets and making progress towards ensuring the affordability of healthy diets is of upmost importance and is urgently needed. To this end, FAO is committed to institutionalize the computation of the least-cost healthy diet, and the corresponding affordability indicator, and to publish updated estimates in the annual *The State of Food Security and Nutrition in the World report*, as well as provide the full data series on FAOSTAT. This background paper to *The State of Food Security and Nutrition in the World 2022* report presents the new methodological refinements applied in the estimation of the average cost of a healthy diet. This is an important methodological update as it results in a more robust indicator that provides greater transparency and supports long-term systematic monitoring utilizing annually updated price data. The paper then explores potential mechanisms and data sources for monitoring globally the cost of a healthy diet.

Keywords: cost of a healthy diet, food affordability, food based dietary guidelines, food security, nutrition**.**

JEL codes: E31, I31, O15, P46, Q11.

Acknowledgements

This work was supported by FAO through its Letter of Agreement PO347351 to Tufts University, building on the Food Prices for Nutrition project funded by the Bill & Melinda Gates Foundation with UKAid as INV-016158.

The authors thank Nada Hamadeh and Marko Rissanen at the World Bank for their insights and collaborative discussions toward building a system for monitoring the cost of a healthy diet.

The authors gratefully acknowledge the many contributions of collaborating FAO colleagues who informed and shaped this paper including Valentina Conti (Agrifood Economics, Division [ESA]); Nancy Aburto, Fatima Hachem, Bridget Holmes, Lynnette Neufeld, Victoria Padula DeQuadros, Trudy Wijnhoven (Food and Nutrition Division [ESN]); Veronica Boero, Piero Conforti, Carola Fabi, Christian Mongeau, Jean Munyeshyaka, Marco Scarno, Luis Silva, Michele Vollaro (Statistics Division [ESS]) and Fabio Palmeri, Paul Racionzer (Markets and Trade Division [EST]). We are grateful for the numerous contributions and comments of many FAO staff in the writing and development of this paper and during an FAO training workshop held in October 2021. We similarly thank Saskia de Pee at World Food Programme (WFP) for her feedback and insights.

The authors are also grateful to Christin Campbell for copyediting the paper and Daniela Verona (ESA, FAO) for their editorial support, as well as publishing coordination.

1 Introduction

The State of Food Security and Nutrition in the World 2020 report included, for the first time, the cost and affordability of a healthy diet as a critical component of food security. Since the 1990s, food security has been defined as “when all people, at all times, have physical, economic, and social access to nutritious food to meet dietary needs and food preferences for an active and healthy life” (FAO, 1996, 2021). Until recently, the available suite of food security indicators has not fully captured economic access to nutritious foods to meet dietary needs for an active and healthy life, one of the core principles embedded in the definition of food security. The cost and affordability of a healthy diet (CoAHD) indicators fill this gap, reflecting physical and economic access to a healthy diet that consists of not only adequate calories but also the essential nutrients and food groups needed for an active and healthy life. These new indicators provide crucial information for national governments, international agencies, civil society and the private sector to work together towards improved economic access to a healthy diet and achieve longstanding goals for global food security, nutrition and health.

Access to healthy diets has been an increasing focus of attention over the last decade, in particular after the Second International Conference on Nutrition (ICN2) in 2014, and during the United Nations Decade of Action on Nutrition (2016–2025). The availability of an indicator to measure cost and affordability across countries now sets the stage for increased accountability, using timely data on availability and price of retail food items in all countries of the world. The cost of a healthy diet indicator can guide policy and programmes to help make healthy diets affordable for all people at all times, and track progress towards that goal at global, national and subnational levels. CoAHD indicators show where and when healthy diets are unaffordable, and for how many people, as well as the components of the diet which are least affordable and therefore merit policy and programmatic action (Fanzo *et al.*, 2021; Herforth, 2015). Many possible policies or programmes may be invoked in response to information showing poor access to healthy diets. Making a healthy diet affordable for all calls for collaboration and communication across the entire food system, to improve access to sufficient quantities of each food group needed for an active and healthy life. This can be achieved through improved supply and lower prices alongside attention to employment, livelihoods and safety nets that reach the most vulnerable.

Using CoAHD indicators to measure the cost and affordability of a healthy diet, and thereby systematically monitor progress towards universal access, is of utmost importance and is urgently needed. FAO is committed to continuing to systematically monitor and report on the global CoAHD indicators annually in *The State of Food Security and Nutrition Report* and to refine and improve on the accuracy of these new indicators to reflect methodological advances and the availability of new data.

The cost of a healthy diet indicator is the cost of purchasing the least expensive locally-available foods to meet requirements for energy and food-based dietary guidelines (FBDGs), per person, per day. This indicator is used as the standard reflecting “nutritious food to meet dietary needs” for reasons detailed in Annex 1. The global estimates of the cost of a healthy diet generated for *The State of Food Security and Nutrition 2020* report were calculated using food price data reported through the ICP at the World Bank, covering 680 items and 177 countries in 2017. These prices were observed by each country’s official national statistics office (NSO) in coordination with the global office of the ICP, which carries out a process to ensure that item definitions are standardized and that price reporting reflects a sufficient range of widely consumed items to represent national patterns of consumer expenditure. This process is repeated only once every three to six years, most recently for 2011 and then 2017, with forthcoming data for 2021. Each year's data takes several years to process, as the 2017 data were first available in 2020 just in time for *The State of Food Security and Nutrition 2020* report. The global system by which NSOs report their country's availability and price of internationally standardized items to the ICP is the world's largest regularly occurring statistical exercise, involving almost all of the world's governments in an effort to compare price levels, measure economic activity and target efforts to reduce poverty and improve living standards. That larger mandate has made the ICP the best and only available comprehensive source of retail price data across countries globally.

Additional food price data are consistently *collected* in countries but are not consistently *available*. Each country's NSO typically collects monthly, biweekly, or even sometimes weekly prices for around 60 to 200 commonly purchased food and beverage items, for the purpose of monitoring inflation over time.[1] These data are aggregated and reported within countries and to international agencies as a consumer price index (CPI) for all food, alongside the CPI for all goods and services. That is to say that item-level price data sufficient for calculating the cost of a healthy diet are collected in almost every country every month but are not typically reported to international organizations or the public. Bai *et al.* (2021) conducted a comprehensive exercise to catalogue all publicly available food price data globally and found that although some countries publish national or subnational average prices for many of their individual food prices every month, most countries do not. The median number of item prices reported was zero. Furthermore, as demonstrated by Bai *et al.* (2021, p. 8), "of those 49 countries that do report some item-level prices, most report an insufficient diversity of items to be able to calculate least-cost nutritious diets such as the Cost of Healthy Diet indicator used in *The State of Food Security and Nutrition in the World 2020* and *2021*." Ideally, food price data on a list of items sufficient to calculate the cost of a healthy diet would be routinely available, such as on a monthly basis, rather than only every three to six years. Given that the necessary data are collected by countries but not available, there is a need to create a mechanism for reporting and aggregating food price data, in collaboration with each country.

This paper describes next steps towards systematic annual reporting on the cost and affordability of healthy diets, including an update to the method for calculating the cost of a healthy diet provides greater transparency and supports long-term systematic monitoring utilizing annually updated price data. A global food price monitoring system for tracking on an annual basis the cost of a healthy diet in each country is feasible to create, because data on prices of a diverse array of foods are currently collected at monthly or higher frequency in almost all countries worldwide. In Chapter 2 the methodology and data needs for monitoring the cost and affordability of a healthy diet on an annual basis are discussed. Chapter 3 explores options for institutional mechanisms and data sources for monitoring the cost and affordability of a healthy diet.

The major investment described in this paper is developing a system for country reporting of food item prices (Chapter 3). Continuous quality assurance efforts and database management are required, which would be highest during the initiation phase but will also need to be sustained over time. Once a reporting system is in place, the ongoing cost and effort for quality assurance and publication would be relatively small, conducted as part of each agency's

[1] To monitor inflation, these prices are typically observed at markets with the largest volume of transactions. Items are weighted by their share of consumer expenditure. Items and their expenditure shares are determined by periodic household consumption and expenditure surveys.

routine monthly, quarterly, and annual data management system. The ideal frequency of price updates would be monthly or quarterly, so that it would be possible to track seasonal trends in the cost of a healthy diet and the impact of price shocks on particular food groups. Income distribution data is updated less frequently, on an approximately annual basis, so updates to the proportion and number of people who cannot afford a healthy diet in each country could be rebased annually.

2 Update to method for calculating the cost of a healthy diet

The State of Food Security and Nutrition in the World 2020 report introduced a new approach to calculating the cost and affordability of healthy diets, using the most affordable locally available items in each country needed to meet the food group requirements specified in ten national FBDGs from diverse regions, representing a majority of the world population.

Each country's cost of a healthy diet was reported as the median cost of meeting those ten FBDGs (Herforth *et al.*, 2020). This method was employed in recognition of the fact that there is no single definition of a healthy diet, and the aim was to identify a robust estimate of the cost using a range of definitions. While the cost of each of the ten FBDGs was tied to a specific quantified diet, the median cost did not represent any particular diet. It could be thought of as representing a latent food basket, the average across definitions. Clarification of the amounts and types of food represented in the cost of a healthy diet indicator is important both for transparency and better comprehension of the indicator by users;[2] it is also important for simplifying the task of monitoring the cost of a healthy diet over time.

It is worthwhile to update the method for three reasons. First, doing so makes the diet cost indicator more transparent and tangible, in terms of what the costed diet contains (which food groups, in which amounts). A limitation of the original method was that the cost did not correspond to a set of specific food groups and quantities but rather to a median across ten sets of criteria. The lack of tangible parameters made it difficult to identify the least-cost items for each country and the cost of each food group. It would also be helpful to calculate the cost of each food group, submetrics that can be informative for assessing food systems performance.

Second, there is a need to simplify the calculation of the cost of a healthy diet indicator while also making the method more stable. It is onerous to compute the cost of ten different FBDGs each time the indicator is calculated in any setting, and furthermore individual FBDGs are subject to frequent updates; India and the United States of America FBDGs were updated since the time of the original calculation. These updates could cause the standard to shift over time, resulting in a shifting goalpost for achieving affordability of healthy diets. A simpler and more straightforward method would minimize data needs for monitoring the cost of a healthy diet over time.

Third, the method for estimating cost should reflect commonalities among national FBDGs broadly. While it was important to base the indicator on a variety of quantified FBDGs that cover a large portion of the world's regions and population, the intent was not to tie the method to a specific few FBDGs but rather to represent commonalities across most FBDGs, such as those identified by Herforth *et al.* (2019). In the following section, FBDGs are examined in more detail and more broadly to determine an appropriate standard for estimating the cost of a healthy diet globally.

[2] For example, frequently asked questions include, "How much does each food group cost in country X?" "What were the least cost items selected in each country?"

As an update to the original method, rather than only taking the average cost across the ten FBDGs, the amounts (in calories and grams) of each food group across the guidelines to meet a standard dietary energy intake target of 2 330 kcal are examined.[3] The average food group composition of the diet can serve as a set of criteria for calculating the cost of a healthy diet indicator. This is the same approach taken in *The State of Food Security and Nutrition in the World 2020*, but rather than calculating the average cost of each guideline, the cost of the average food group quantities recommended in each guideline is calculated. Recommendations in FBDGs are made using various units of measure, such as number of servings or weight, volume and macronutrient equivalents. Table 1 shows the quantities of food recommended in each FBDG, standardized in terms of kilocalories and equivalent grams of a specified reference food,[4] and the mean and median amounts for each food group.

Among this diverse set of countries, there is a high degree of similarity across their FBDGs. The proportion of the diet in each food group is largely similar, with starchy staples accounting for about half of dietary energy (range: 42–57 percent), protein-rich foods (variously including dairy, legumes, and/or nuts and seeds as separate groups or subgroups) accounting for about a quarter of dietary energy (range: 20–34 percent), and oil and fruits and vegetables each accounting for approximately 10–15 percent of dietary energy, with a range of 7–15 percent for oils, and 9–18 percent for fruits and vegetables (Figure 1 and Figure 2). Individual requirements for specific countries may lead to values outside these ranges, such as the FBDG for Oman, and the imagery or example foods used to communicate each FBDG are highly tailored to individual countries, but the proportionality between food groups is strikingly consistent.

This similarity is echoed in food guides, the pictorial representations of FBDGs. Figure 3 shows a sampling of 20 food guides from around the world, some from the same countries whose FBDGs are quantified in Table 1 (guides a–g), and some of which are not fully quantified and therefore could not be used to calculate the cost of a healthy diet. Food guides are designed to display food group proportionality approximately by volume, similar to the way food appears on a plate. It is apparent that these diverse guides generally show very similar proportions of food groups: approximately half of the basket by volume is fruits and vegetables, approximately one-quarter is starchy staple foods, approximately one-quarter is protein-rich foods (which countries define differently as one group, two groups, or three groups), and a small proportion by volume is added oils and fats. These modal patterns persist in all food guides that are presented as plates or pie charts; Table A1 in Annex 2 shows the distribution of food groups in all the plate-like food guides that are currently in use around the world (n=31).

The aim is to create a standard consistent with and reflective of the commonalities in dietary guidelines across countries to serve as a set of criteria for calculating the cost of a healthy diet indicator. This standard, called the Healthy Diet Basket (HDB), is based on the average food

[3] The cost of a healthy diet is based on a diet that has 2 330 kcal; the amount of energy required for a reference active adult woman. This level of dietary energy is very close to the unweighted mean energy requirement for all sex-age-year groups age three years and older (extrapolated from IOM, 2006; WHO, 2006; see Schneider and Herforth, 2020). Further, least-cost diets to meet energy and nutrient requirements for people in this reference group (median adult non-pregnant, non-lactating women) are approximately the median level of least costs for all sex-age groups over the entire life cycle (Bai, Herforth and Masters, 2022). This reference group/dietary energy requirement is therefore a good representation of the population as a whole (Herforth *et al*., 2020).

[4] To equate calories and grams for starchy staples, dry rice is the reference food; for dairy, whole milk; for other protein-rich foods, egg; for legumes, nuts and seeds, dry bean is the reference food; and for fruits and vegetables, the average kcal/g across the dataset for each.

group proportions and recommendations across FBDGs. The HDB food group amounts are the median amounts of each food group recommended in the FBDGs shown in Table 1, rounded to the nearest whole integer in units of 10 kcal for ease of communication (Table 1). The resulting food group proportions are verified for consistency by comparison to food guides globally (Table A1). These results show that the HDB approximates a larger range of FBDGs than only the ten that were initially quantified and captures the commonalities across national guidelines.

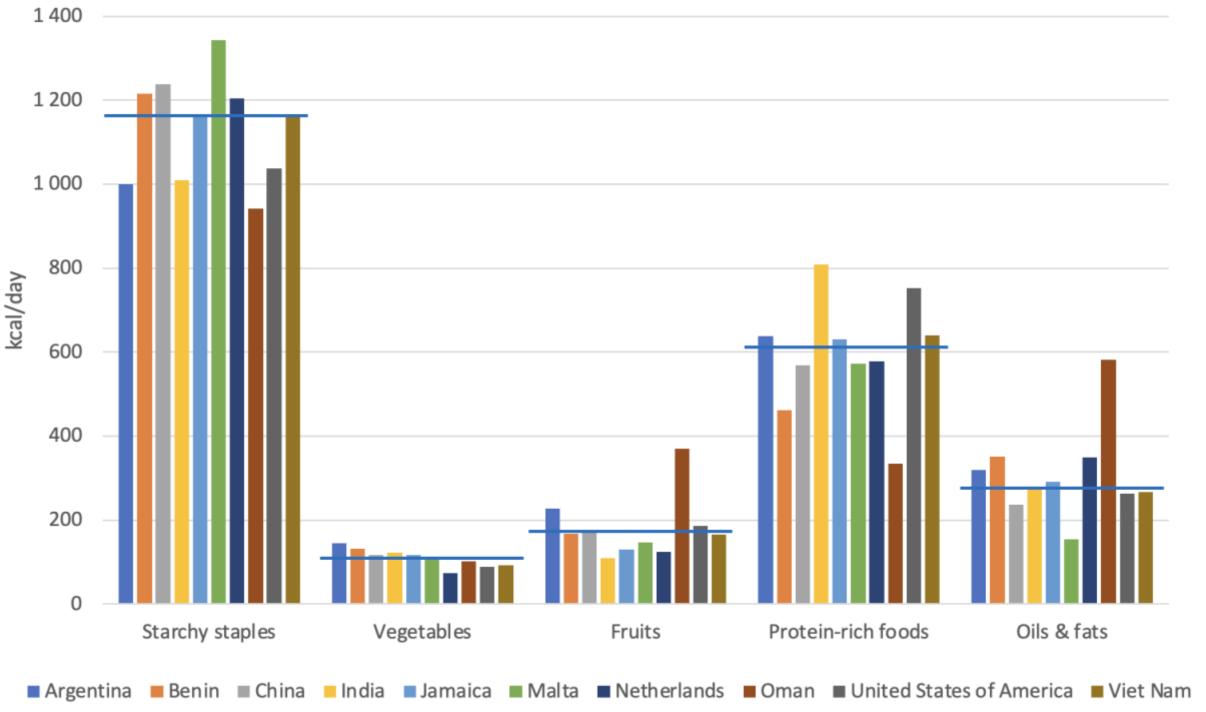
Table 1. Average food group amounts recommended across food-based dietary guidelines scaled to meet a consistent dietary energy intake target (2 330 kcal)

	Starchy staples		Vegetables		Fruit		Protein-rich foods*		Oils	
FBDGs	kcal	grams	kcal	grams	kcal	grams	kcal	grams	kcal	grams
Argentina	1 000	278	145	482	228	362	638	446	320	36
Benin	1 216	338	133	443	167	266	462	323	352	40
China	1 238	344	117	391	169	269	568	398	237	27
India	1 009	280	123	409	110	175	809	566	279	32
Jamaica	1 162	323	117	389	130	206	630	441	291	33
Malta	1 343	373	112	375	148	234	572	400	155	18
Netherlands	1 205	335	74	247	124	197	577	404	349	39
Oman	942	262	101	337	370	587	335	234	583	66
United States of America	1 038	288	89	297	187	297	753	527	263	30
Viet Nam	1 165	324	92	307	166	263	640	447	267	30
Mean	1 132	314	110	368	180	286	598	422	310	35
Median	1 164	323	114	382	167	264	604	419	285	32
HDB	1 160	322	110	367	160	254	600	420	300	34

Notes: An updated set of links to country websites is available at www.fao.org/nutrition/education/food-dietary-guidelines. Few countries have quantified national FBDGs, thus currently the analysis is guided by the quantified recommendations from these ten national FBDGs, which represent a range of dietary recommendations articulated by countries in each region. Grams are based on kcal equivalent of all foods in the group to reference food items: egg for protein-rich foods and dry rice for starchy staples. Calories per gram of fruits and vegetables, respectively, are based on the average across all fruits (0.63 kcal/g) and vegetables (0.3 kcal/g) in the dataset. HDB = Healthy Diet Basket. *Protein-rich foods here combine dairy with other protein-rich foods, including meat, fish, egg, legumes, and/or nuts and seeds. The median amount for dairy across the ten FBDGs was 230 kcal, a food group present in all the selected FBDG except Jamaica's. In some countries, protein-rich food group has sub-categories: Argentina: (a) meat, fish, egg; (b) dairy; Benin: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; China: (a) meat, fish, egg; (b) dairy; (c) soy, nuts, seeds; India: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Jamaica: (a) foods from animals including dairy; (b) legumes and nuts; Malta: (a) meat, fish, eggs, legumes, nuts and seeds; (b) dairy; the Netherlands: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Oman: (a) meat, fish, egg, nuts and seeds; (b) legumes; (c) dairy; United States of America: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; Viet Nam: (a) meat, fish, egg, legumes; (b) dairy.

Source: Authors' elaboration.

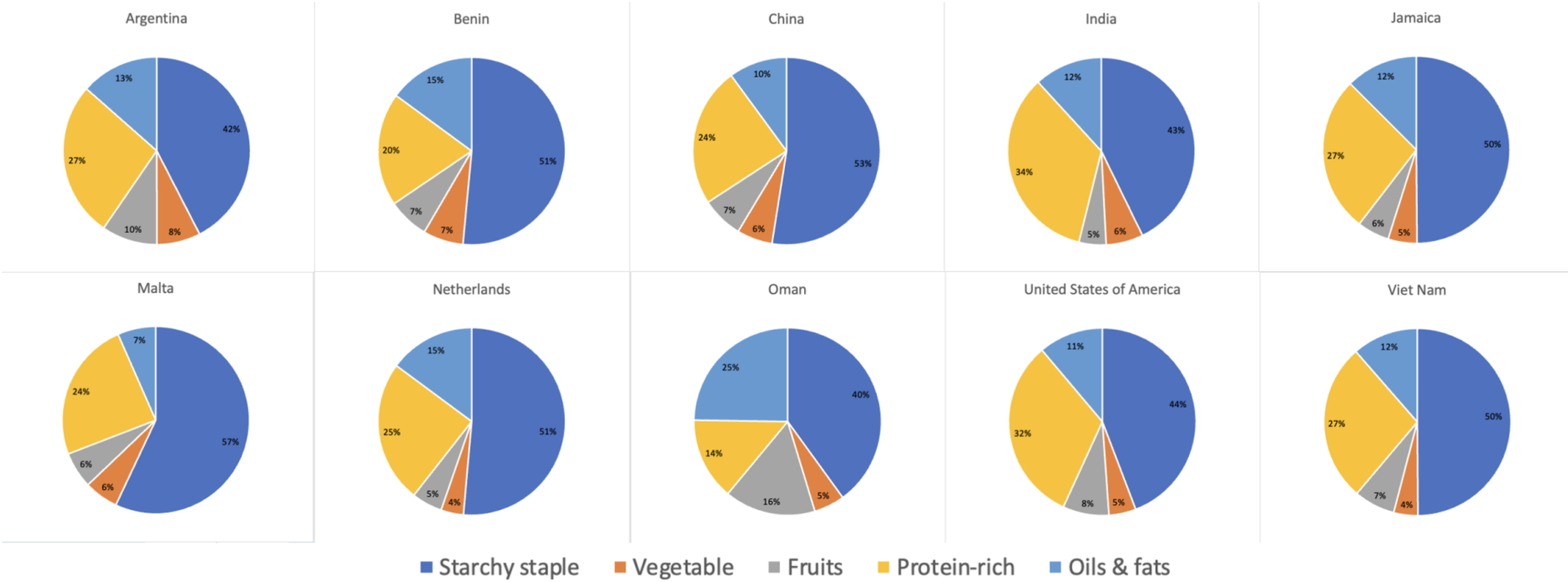
Figure 1. Amount of each food group recommended in national food-based dietary guidelines from ten countries in different regions



Notes: Results shown are authors' calculations, using data and methods as described in the text. Blue bars represent the median amounts (used to construct the Healthy Diet Basket). Protein-rich foods include dairy and other animal source foods, legumes, nuts and seeds.

Source: Authors' elaboration.

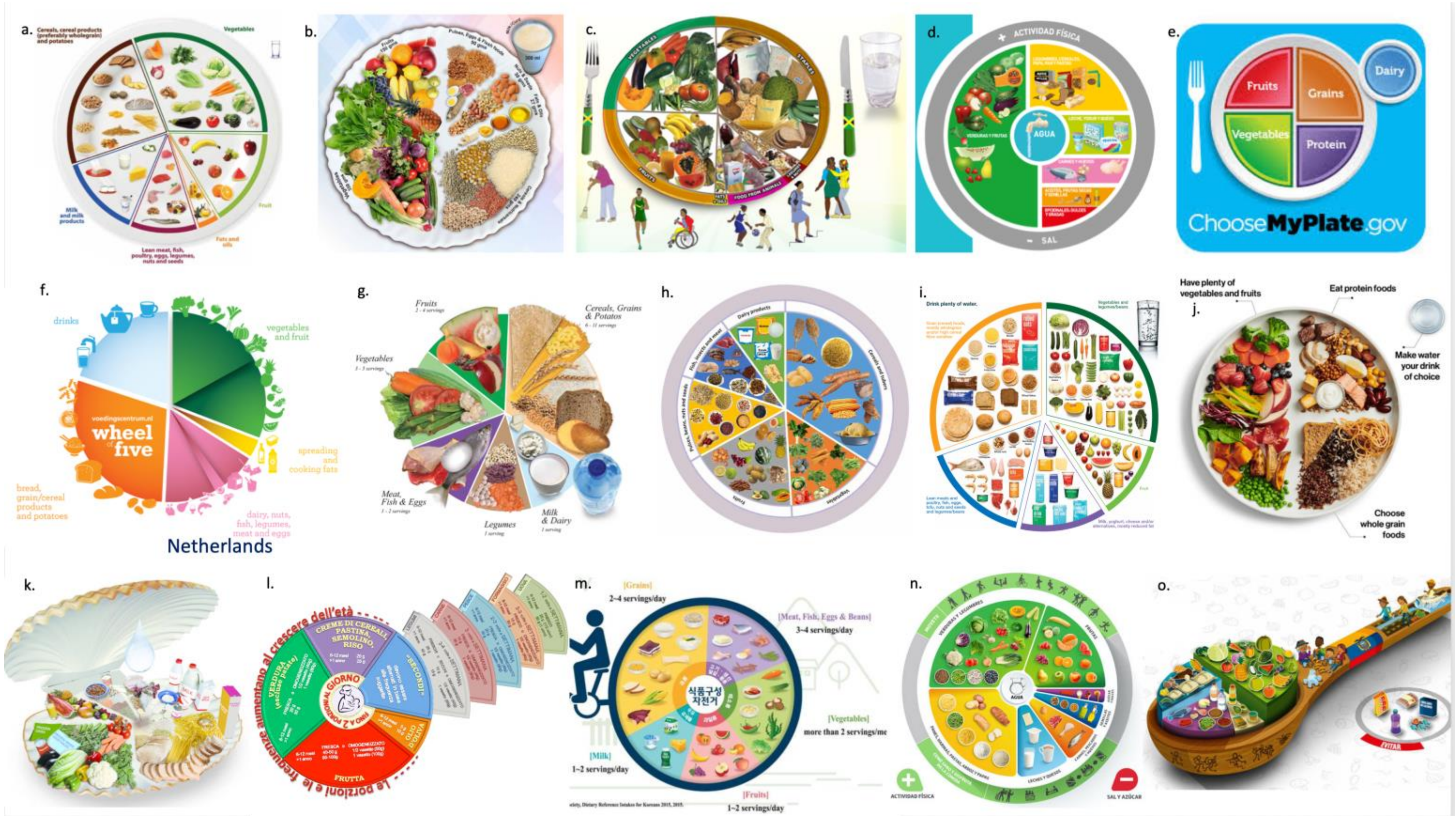
Figure 2. Distribution of food groups in each national food-based dietary guideline (percent of dietary energy)



Notes: Results shown are authors' calculations, using data and methods as described in the text. Protein-rich foods are generally defined as animal source foods including dairy and legumes, nuts and seeds. In each country, subcategories are defined as follows: Argentina: (a) meat, fish, egg; (b) dairy; Benin: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; China: (a) meat, fish, egg; (b) dairy; (c) tofu, nuts, seeds; India: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Jamaica: (a) foods from animals including dairy; (b) legumes and nuts; Malta: (a) meat, fish, eggs, legumes, nuts and seeds; (b) dairy; the Netherlands: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Oman: (a) meat, fish, egg, nuts and seeds; (b) legumes; (c) dairy; United States of America: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; Viet Nam: (a) meat, fish, egg, legumes; (b) dairy.

Source: Authors' elaboration.

Figure 3. Selected food guides showing proportionality of recommended food groups by volume



Sources: Images shown are downloaded from national FBDG documents posted on official government websites. a) Malta Health Promotion & Disease Prevention Directorate, Sptar Mater Dei, Home Economics Seminar Center, University of Malta, The Malta College of Arts, Science & Technology, & Parliamentary Secretariat for Health Ministry for Education and Employment. 2015. *Dietary Guidelines for Maltese Adults*; b) Indian Council of Medical Research & ICMR-National Institute of Nutrition. 2018. *My Plate for the Day*; c) Ministry of Health, Jamaica. 2015. *Food Based Dietary Guidelines for Jamaica 2015*; d) Argentina Ministerio de Salud. 2016. Guías Alimentarias para la Población Argentina: Documento técnico metodológico; e) U.S. Department of Agriculture, Agricultural Research Service & U.S. Department of Health and Human Services. 2020. *Dietary Guidelines for Americans, 2020-2025 (9th edition)*; f) Health Council of the Netherlands. 2015. *Dutch Dietary Guidelines 2015*; g) Oman Department of Nutrition & Ministry of Health. 2009. *The Omani Guide to Healthy Eating*; h) Zambia Ministry of Agriculture & FAO. 2021. *Zambia Food-Based Dietary Guidelines: Technical Recommendations 2021*; i) Australia National Health and Medical Research Council. 2013. *Australian Dietary Guidelines*; j) Health Canada. 2019. *Canada's Dietary Guidelines*; k) Qatar Supreme Council of Health. 2015. *Qatar Dietary Guidelines*; l) Italia Centro di Ricerca Alimenti e Nutrizione. 2019. *Dietary Guidelines for Healthy Eating—Revision 2018*; m) South Korea Ministry of Health and Welfare. 2016. *General Dietary Guidelines for Koreans*; n) Uruguay Ministerio de Salud. 2016. *Guías Alimentarias para la Población Uruguay: Para una alimentación saludable, compartida y placentera*; o) Ministerio de Salud Pública del Ecuador & FAO. 2018. *Documento Técnico de las Guías Alimentarias Basadas en Alimentos (GABA) del Ecuador*.

3 Healthy Diet Basket options and analysis

The food group quantities for the HDB are shown in Table 1; several decision points were then explored to determine a HDB that would be representative of a diversity of FBDGs and appropriate diet patterns, both in terms of nutrient adequacy and cultural acceptability. Previous analyses have shown that FBDGs are largely similar with regard to guidance on the amounts of fruits, vegetables, fat and starchy staples and that there is more variation in whether dairy foods are specified, whether animal source protein is recommended as distinct from plant source protein, and whether other requirements are needed (Herforth *et al.*, 2019). Similarly, three key questions for determining an appropriate cost standard for a healthy diet are:

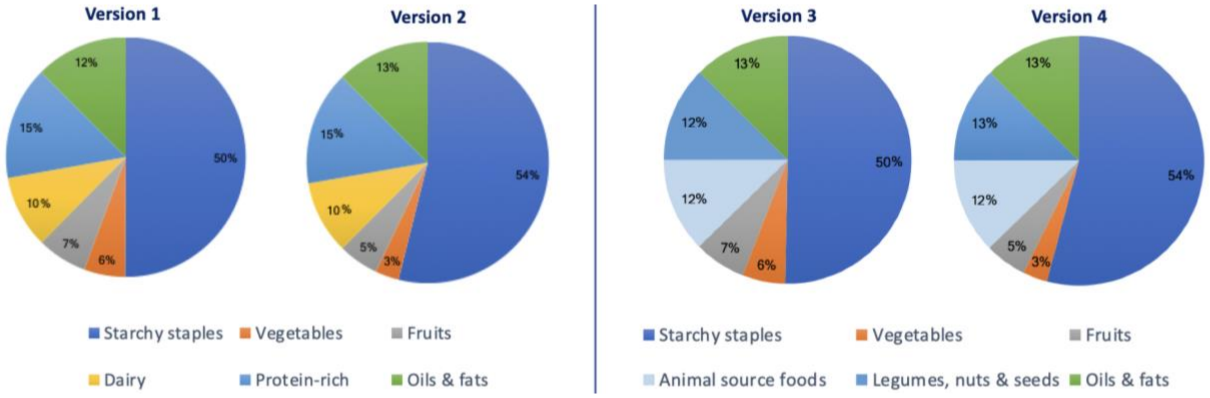
1. Should dairy be a separate food group, or can it be grouped with other foods from animals?
2. Should legumes, nuts and seeds be a separate food group, or can it be grouped all protein-rich foods?
3. Should the quantity of fruits and vegetables be reduced to the minimum intake amount recommended by the World Health Organization (WHO) (400 g) in order to limit costs?

Based on these three questions, four variants of the HDB were formulated (Figure 4):

1. Healthy Diet Basket version 1 (HDB1): Separate groups for (a) dairy; (b) other protein-rich foods (meat, fish, egg, legumes, nuts and seeds); (c) starchy staples; (d) vegetables; (e) fruits; and (f) oils. Median amounts for all groups.
2. Healthy Diet Basket version 2 (HDB2): HDB1, with fruits and vegetables fixed at maximum 400 g to limit costs, based on the observation that these are relatively high-cost food groups (FAO *et al.*, 2020).
3. Healthy Diet Basket version 3 (HDB3): Separate groups for (a) animal source foods (including dairy); (b) legumes, nuts and seeds; (c) starchy staples; (d) vegetable; (e) fruits; and (f) oils. Median amounts for all groups.
4. Healthy Diet Basket version 4 (HDB4): HDB3 with fruits and vegetables fixed at maximum 400 g.

The nutrient content was analysed of least-cost diets globally meeting each HDB variant for protein, carbohydrate, fat and 15 micronutrients. Consistent with the previous analysis, in each basket two least-cost items are selected for each food group, except three for vegetables and one each for oils, dairy, and legumes/nuts/seeds group where they appear, for 11 items total (details in Herforth *et al.*, 2020). To evaluate micronutrient content, harmonized average requirements (HARs) (Allen, Carriquiry and Murphy, 2020) are used, which are globally applicable analogues to the estimated average requirements (EARs) defined by the United States Institute of Medicine (IOM, 2006); the nutrient requirements are defined in Table A2 of Annex 2. This analysis provides empirical evidence towards selecting a HDB variant that meets nutrient needs. In the next section, these results are discussed, as well as cultural considerations for selection of food groups that are acceptable globally.

Figure 4. Healthy Diet Basket variants (percent of dietary energy)



Notes: Versions correspond to Healthy Diet Baskets (HDB) variants: HDB1: separate groups for dairy; other protein-rich foods; starchy staples; vegetables; fruits; oils. Median amounts for all groups; HDB2: HDB1 with fruits and vegetables fixed at maximum 400 g; HDB3: separate groups for animal source foods; legumes, nuts and seeds; starchy staples; vegetables; fruits; oils. Median amounts for all groups; and HDB4: HDB3 with fruits and vegetables fixed at maximum 400 g.

Source: Authors' elaboration.

3.1 Nutrient content of Healthy Diet Basket options

Least-cost diets globally meeting all HDB variants fall within acceptable macronutrient distribution ranges for protein, fat and carbohydrate (Table 2). For micronutrient content, there are some differences between the HDB variants (Table 3). HDB1 and HDB3 contain higher average nutrient content (94–95 percent) than HDB2 and HDB4 (92–93 percent). This result is comparable to the global original cost of a healthy diet results, which also met 94 percent of nutrient needs on average (Herforth *et al.*, 2020). Specifically, HDB2 and HDB4 are low in vitamin C, which appears to be a result of the lower fruit and vegetable quantity in these baskets. HDB3 and HDB4 are lower in calcium than HDB1 and HDB2, which appears to be the result of not requiring dairy as a separate food group. HDB1 and HDB2 are lower in vitamin B12, because HDB3 and HDB4 have more latitude to select other non-dairy animal source foods which increase vitamin B12 content.

Table 2. Percent of calories by macronutrient, by percentile

	Percentile	Protein	Lipid	Carb
Healthy Diet Basket 1 (HDB1)	mean	12.2%	26.7%	61.1%
	25th	11.2%	25.3%	59.7%
	50th	12.3%	25.7%	61.4%
	75th	12.9%	27.6%	63.1%
Healthy Diet Basket 2 (HDB2)	mean	12.3%	26.7%	61.1%
	25th	11.2%	25.3%	59.6%
	50th	12.4%	25.9%	61.4%
	75th	13.0%	27.5%	63.1%
Healthy Diet Basket 3 (HDB3)	mean	12.8%	26.6%	60.6%
	25th	12.1%	22.8%	57.2%
	50th	12.7%	24.4%	62.4%
	75th	13.7%	31.3%	63.6%
Healthy Diet Basket 4 (HDB4)	mean	12.8%	25.7%	61.5%
	25th	11.9%	22.1%	58.1%
	50th	12.6%	23.6%	63.4%
	75th	13.9%	30.6%	64.4%
AMDR		10–35%	20–35%	45–65%

Notes: AMDR is the Acceptable Macronutrient Distribution Range published in IOM (Institute of Medicine). 2006. *Dietary reference intakes: the essential guide to nutrient requirements*. Washington, DC, National Academies Press. All results are for 2017.

Source: Authors' elaboration.

Table 3. Nutrient Adequacy Ratios for each Healthy Diet Basket variant

	HDB1		HDB2		HDB3		HDB4	
Nutrient	NAR_HAR	NAR_RDI	NAR_HAR	NAR_RDI	NAR_HAR	NAR_RDI	NAR_HAR	NAR_RDI
Calcium	0.88	0.68	0.82	0.63	0.69	0.54	0.65	0.50
Iron	0.94	0.67	0.92	0.64	0.97	0.74	0.96	0.72
Magnesium	0.99	0.97	0.98	0.96	0.98	0.95	0.97	0.94
Phosphorous	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Zinc	0.95	0.86	0.94	0.85	0.97	0.90	0.97	0.89
Copper	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Selenium	0.99	0.98	0.99	0.98	0.99	0.98	0.99	0.98
Vitamin C	0.90	0.90	0.77	0.77	0.88	0.88	0.76	0.76
Thiamin	1.00	0.98	0.99	0.96	0.99	0.98	0.99	0.97
Riboflavin	0.92	0.92	0.88	0.88	0.85	0.85	0.80	0.80
Niacin	0.98	0.92	0.97	0.89	0.98	0.93	0.97	0.91
Vitamin B6	1.00	1.00	0.98	0.98	1.00	1.00	0.99	0.99
Folate	1.00	0.98	0.99	0.97	1.00	0.94	0.99	0.92
Vitamin B12	0.73	0.64	0.73	0.64	0.80	0.71	0.77	0.69
Vitamin A	0.97	0.96	0.96	0.89	0.97	0.96	0.97	0.89
MAR	0.95	0.90	0.93	0.87	0.94	0.90	0.92	0.86

Notes: Results shown are authors' calculations, from data and methods described in the text. Acronyms are defined as follows: NAR = Nutrient Adequacy Ratio, MAR = Mean (nutrient) Adequacy Ratio, HAR = Harmonized Average Requirement (published in Allen, L.H., Carriquiry, A.L. & Murphy, S.P. 2019. Proposed harmonized nutrient reference values for populations. *Advances in Nutrition*, 11(3): 469–483), RDI = Reference Daily Intake (published in IOM. 2006. *Dietary reference intakes: the essential guide to nutrient requirements*. Washington, DC, National Academies Press Nutrients) lacking an HAR are omitted. Energy intake of all diets is 2 330 kcal. Results are for 2017. HDB1 has separate groups for dairy; other protein-rich foods; starchy staples; vegetables; fruits; oils. Median amounts for all groups; HDB2 is like HDB1 but with fruits and vegetables fixed at maximum 400 g; HDB3 has separate groups for animal source foods, legumes nuts and seeds, starchy staples, vegetables, fruits, and oils in median amounts for all groups. HDB4 is like HDB3 but with fruits and vegetables fixed at maximum 400 g.

Source: Authors' elaboration.

3.2 Cultural and nutrient considerations for Healthy Diet Basket options

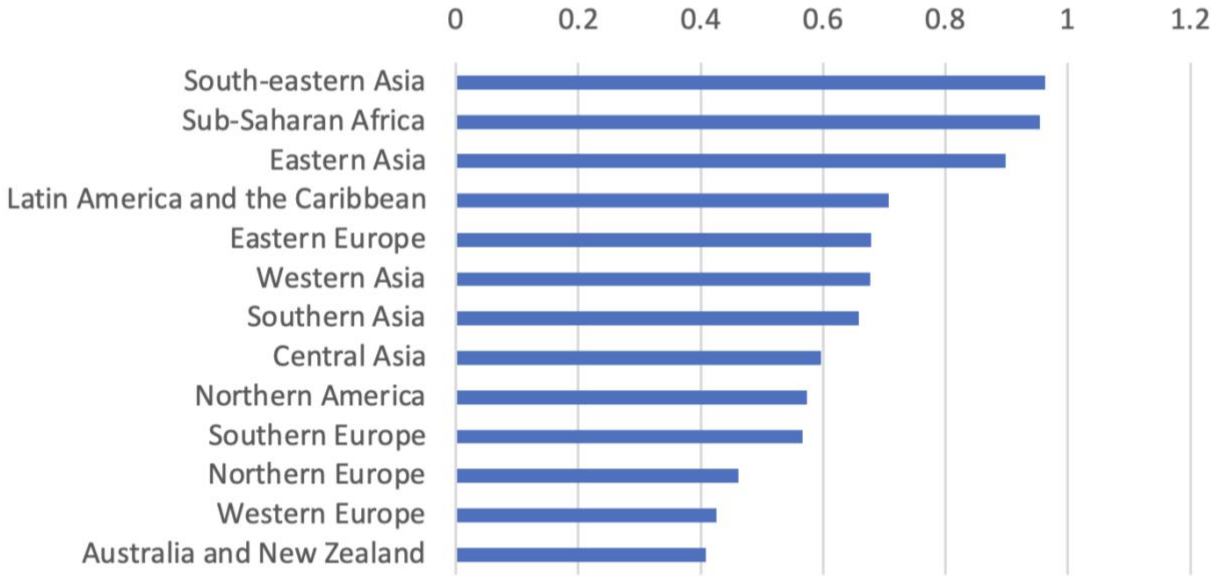
Does dairy need to be included as a separate food group? Or should it be grouped with other animal source foods?

Results reveal trade-offs to requiring dairy as a separate group, versus requiring an animal source food group that might include dairy. HDB variants that require dairy as a separate group have higher calcium, but the items selected for those diets (HDB variants 1 and 2) have lower vitamin B12 content than those that include dairy in a larger animal source food group (HDB variants 3 and 4). Some research suggests that the calcium requirements used in these adequacy calculations may be higher than most populations' actual needs, because the studies underlying the DRI requirements were done with northern populations who may have different absorption than from populations whose dietary calcium comes from sources other than dairy (Allen, Carriquiry and Murphy, 2020; Willett *et al.*, 2019). Cultural concerns regarding dietary patterns are important for a globally resonant HDB, in terms of whether dairy is an acceptable food group, and whether foods from animals is an acceptable food group.

Is dairy an acceptable food group in all countries? Globally, 75 percent of countries include dairy in their key messages or food guide; 64 percent of countries clearly indicate dairy as a distinct food group (Herforth *et al.*, 2019). The majority of countries that have published FBDGs, however, are in the global north, while the majority of countries where dairy is not a typical part of food culture, or where lactase persistence is rare, do not have FBDGs. Countries where dairy is not consumed in large quantities include, among others, Benin, Cambodia, Ghana, Myanmar, Papua New Guinea and other West African nations as well as several small island states. In the Latin America and the Caribbean region, where most countries have FBDGs and where dairy is often part of food culture, most countries do not require dairy as a separate food group apart from other animal source foods (ASF), as only 38 percent of countries do (Herforth *et al.*, 2019). Of the ten FBDGs analysed for *The State of Food Security and Nutrition in the World* 2020, one does not require dairy separately from other ASF (Jamaica), two allow soy products to substitute for dairy (the Netherlands and United States of America), and one allows small fish (where bones are consumed) to substitute for dairy (Benin).

Dairy is a relatively high-cost food group (FAO *et al.*, 2020), and costs are especially high in regions where it is not typically consumed: the cost of the average daily dairy requirement in South-eastern Asia, Eastern Asia and sub-Saharan Africa is approximately double the cost in Europe, Australia, New Zealand and North America (Figure 5). The former are subregions with low rates of lactase persistence in adulthood (FAO, 2013). Including dairy in a global standard when other foods could be used instead would overstate the actual cost of a healthy diet in some regions.

Figure 5. Cost of dairy by subregion (average recommended amount per person, per day, 2017 USD)



Note: Median dairy recommended intake per person per day across the ten FBDGs is 228 kcal, equivalent to 375 g fluid whole milk.

Source: Authors' elaboration.

Are animal source foods an acceptable food group in all countries? FBDGs universally include animal source foods in the diet; animal source foods include flesh foods (all kinds of meat or fish), as well as eggs and dairy (Herforth *et al.*, 2019). Sometimes these items are included in a larger category of "protein-rich foods", sometimes as all "foods from animals", which includes both dairy and flesh foods, and sometimes as "meat, egg and fish" separately from "dairy" and other food groups such as legumes. Inclusion of these foods in the diet may affect multiple nutrients, vitamin B12 in particular, which is only available from animal source foods. Globally, half of countries have key messages including both plant and animal source protein-rich foods, and in one third, they are framed as substitutes (Herforth *et al.*, 2019). Of the FBDGs analysed for *The State of Food Security and Nutrition in the World 2020*, only Argentina and China have a flesh food or egg requirement, and Jamaica requires animal source protein-rich foods including dairy, flesh foods or eggs. From this evidence, it seems that some animal source foods are universally required, but specific types vary widely.

In summary, the above cultural considerations suggest that a "food from animals" food group (that includes dairy) is more likely to be universally accepted and consistent with all cultural diet patterns than a separate "dairy" group.

Do legumes, nuts and seeds need to be a separate food group?

Of the FBDGs analysed for *The State of Food Security and Nutrition in the World 2020*, Jamaica and Oman require legumes, and the Netherlands, China and India require nuts and seeds. In other guidelines analysed, plant-source protein-rich foods are not specifically required, but a diversity of protein-rich foods is encouraged. More than 96 percent of countries with an FBDG recommend legume consumption in their key messages and/or food guides (Herforth *et al.*, 2019). WHO global dietary recommendations state that a healthy diet includes legumes and nuts, implying that these are required components (WHO, 2018). The Global Burden of Disease study has identified dietary patterns with "low legumes" and "low nuts and seeds" as risk factors associated with excess morbidity and mortality (Afshin *et al.*, 2019), and the EAT-Lancet diet emphasizes their inclusion (Willett *et al.*, 2019). In most geographies, legumes and nuts and seeds are accessible, widely consumed and almost always included in least-cost diets. These results suggest that in addition to their almost universal inclusion in FBDGs, including legumes, nuts and seeds in the HDB are important for affordability, regardless of health and sustainability considerations. In summary, based on global recommendations, a "legumes, nuts and seeds" food group would make sense to include in the HDB.

Should the requirement for fruits and vegetables equal the minimum intake amount recommended by WHO (400 g)?

It might be suggested that the total quantity of fruits plus vegetables in the HDB be limited to 400 g, regardless of what national FBDGs say, because that is the minimum intake amount recommended by WHO (WHO, 2018). Fruits and vegetables tend to be relatively expensive due to their high cost of production and distribution, so limiting quantity to 400 g would allow diets to reach energy balance at lower cost. It is important to note that the higher quantities specified in national FBDGs do not contradict the WHO recommendation, and that the original reference cited in support of the global recommendations from WHO and FAO specified a minimum of 400 g fruits and vegetables per day but noted that 600 g/day was preferable (WHO and FAO, 2003). The Global Burden of Disease study cites 250 g of fruit and 360 g of vegetables as optimal intake levels, for a total of 610 g/day (Afshin *et al.*, 2019). The HDB variants where fruits and vegetables were limited to 400g had overall lower micronutrient content, in particular for vitamin C but also calcium, riboflavin and other nutrients.

The quantified FBDGs analysed to produce the HDB recommend total combined fruit and vegetable amounts greater than 400g per day, often even greater than 600g. In summary, the HDB is consistent with the WHO recommendation of at least 400 g of fruits and vegetables per day, specifying an amount in terms of energy content that is approximately 600g per day to align with national governments' FBDGs and better meet nutrient requirements.

Should dark green leafy vegetables be required?

Dark green leafy vegetables (DGLV) are often highly affordable sources of key nutrients that would be more expensive to obtain from other foods (Bai, Naumova and Masters, 2020). Globally, DGLVs are distinctly recommended in ten percent of countries with FBDGs, including a wide range of places such as Benin, China, India and the United States of America (Herforth *et al.*, 2019). A practical problem with requiring them is that DGLV prices are often not recorded in food price datasets, especially in settings where a great diversity of DGLVs is consumed but where the DGLVs are unstandardized traded commodities. Their prices are absent to a large extent in the ICP and in many national CPI datasets: 32 countries (18 percent) are missing any DGLV in the 2011 ICP round, and 132 countries (77 percent) are missing DGLV in 2017. National CPI lists might be more likely to include DGLV than the ICP, because the ICP only includes items that are common across countries, and the most commonly consumed DGLV are often local. However, in the CPI lists, DGLV are also often missing, tracing back to poor measurement of their purchase or consumption in household consumption and expenditure surveys (HCES). DGLVs are generally under-represented in food price data, and requiring their compulsory inclusion may not be feasible.

Treatment of foods that are inconsistently classified: potatoes, coconuts, avocados

Foods are not always categorized in the same way in FBDGs. In some countries, potatoes and sweet potatoes are included in the vegetable category, rather than the starchy staple group. In the HDB, these are counted as starchy staples because that is how they are classified in a majority of countries (Herforth *et al.*, 2019) and also in global indicators such as dietary diversity scores (FAO, 2021), reflecting the fact that they provide lower levels of micronutrients per calorie than other vegetables. Also, some FBDGs place coconuts, avocados and nuts in the fats and oils group. Although these foods are high in fat, in the HDB they are not included in the fats and oils group because they have a different culinary use than oil. The HDB includes coconut and avocado in the fruits group, and nuts in the legumes, nuts and seeds food group, where these foods are commonly placed within most dietary guidelines and where they are classified in dietary diversity scores (FAO, 2021).

3.3 Summary of results

The HDB option that best meets nutrient needs, as well as being broadly reflective of dietary recommendations, is the HDB3 version. This version includes an average of 600g of fruits and vegetables rather than 400g, and animal-source foods (including dairy) and legumes/nuts/seeds as two separate groups. This makes the HDB consistent with FBDGs which all recommend inclusion of some animal source foods and legumes (Herforth *et al.*, 2019), and also with global dietary recommendations for consumption of legumes, nuts or seeds (WHO, 2018). Fruit and vegetable levels are consistent with both national FBDGs and global evidence (WHO and FAO, 2003) and guidance (WHO, 2018). The HDB does not have a separate requirement for DGLV primarily because of data gaps in collection and reporting of item prices. It does not have a separate requirement for dairy for several reasons: while many countries' FBDGs have a separate dairy requirement and doing so would help meet calcium requirements, dairy is not universally recommended, related to the fact that it is not universally digestible nor culturally appropriate; and the ability to substitute other foods (e.g. fish, meat or egg) within a broader "animal source food" category improves B12 levels and reduces cost.

4 Healthy Diet Basket composition

The composition of the final HDB is shown in Table 4, in terms of dietary energy and also in terms of equivalent gram content when reference foods for each food group are used to convert calories to grams.

Table 4. Healthy Diet Basket content by food group, by kcal and grams of reference food

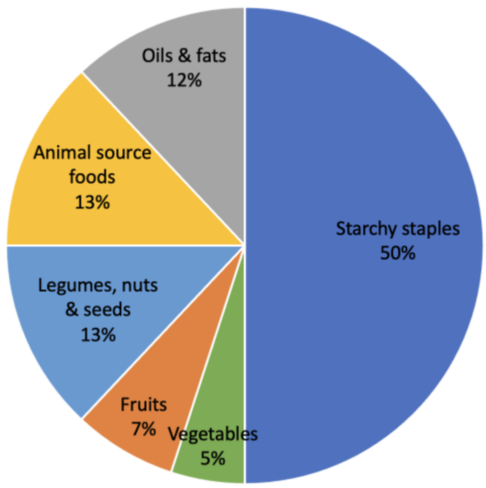
Food group	Min number of food items selected for cost of healthy diet	Total energy content (kcal)	Equivalent gram content, by reference food (edible portion)
Starchy staples	2	1 160	322 g dry rice
Vegetables	3	110	270–400 g vegetables
Fruits	2	160	230–300 g fruits
Animal source foods	2	300	210 g egg
Legumes, nuts and seeds	1	300	85 g dry bean
Oils and fats	1	300	34 g oil

Notes: To equate calories and grams for starchy staples, dry rice is the reference food; for animal source foods, egg; for legumes, nuts and seeds, dry bean is the reference food. For fruits and vegetables, the range is based on the lowest to highest kcal/g across the dataset for each.

Source: Authors' elaboration.

Using this HDB, the distribution of food groups on a per-calorie basis is shown in Figure 6. These amounts represent an average food basket across FBDGs, for the purpose of monitoring cost of healthy diet. It is important to emphasize that the amounts are not themselves dietary recommendations. Just as the reference dietary energy intake target of 2 330 kcal is not a recommendation for all people but rather an average dietary energy intake need across individuals to enable a comparable standard, the diet is a reflection of typical amounts of each food group recommended across the FBDGs analysed.

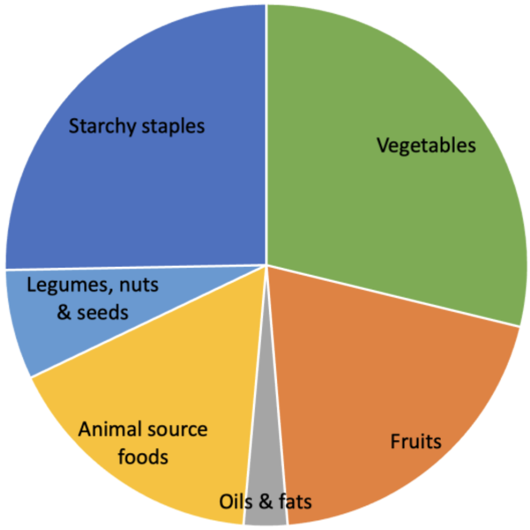
Figure 6. Composition of the Healthy Diet Basket (proportion of dietary energy)



Source: Authors' elaboration.

Figure 7 shows the composition of the HDB by volume, when the caloric content is converted into reference foods (see Table 4). Although the HDB is generally calculated based on energy content of food items, it is shown by volume to demonstrate robustness in approximating a variety of national FBDGs. Diverse food guides generally show very similar proportions of the food groups as the HDB (Table A1). This analysis demonstrates that the HDB is broadly representative of more diverse FBDGs than only the ten quantified FBDGs from which it was derived.

Figure 7. Composition of the Healthy Diet Basket by volume (dietary energy converted into grams of reference food items)



Note: To equate calories and grams for starchy staples, dry rice is the reference food; for animal source foods, egg; for legumes, nuts and seeds, dry bean is the reference food; and for fruits and vegetables, the average kcal/g across the dataset for each.

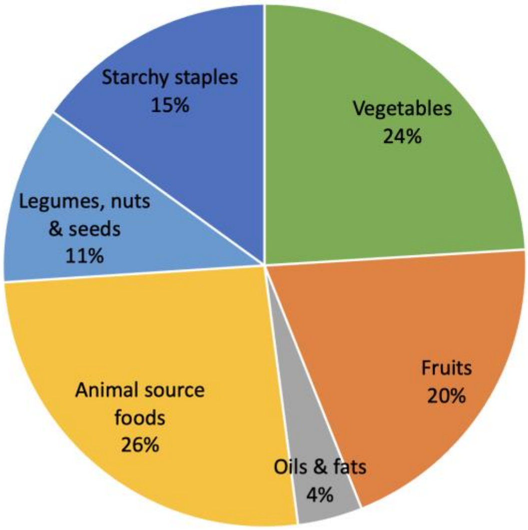
Source: Authors' elaboration.

4.1 Healthy Diet Basket cost

The cost of a healthy diet in each country was calculated using the lowest-cost items available in that country to meet HDB quantities of each food group, using availability and price data for 2017 from the ICP (World Bank, 2022). Each item was classified into its food group as specified in Table 4, and its retail cost per day was calculated as the cost per quantity containing the energy content specified for the item's food group, divided by the number of items per group specified (Table 4). The cost of all 11 items in the basket were then summed.

The global average cost of a healthy diet per day, based on the least-cost HDB, was USD 3.31 in 2017 (USD 2017 in purchasing power parity [PPP]). On average globally, starchy staples accounted for 15 percent of the cost, oils 4 percent, legumes nuts and seeds 11 percent, animal source foods 26 percent, and fruits and vegetables 44 percent of the cost (Figure 8).

Figure 8. Distribution of the cost of a healthy diet by food group (global average, 2017 USD)

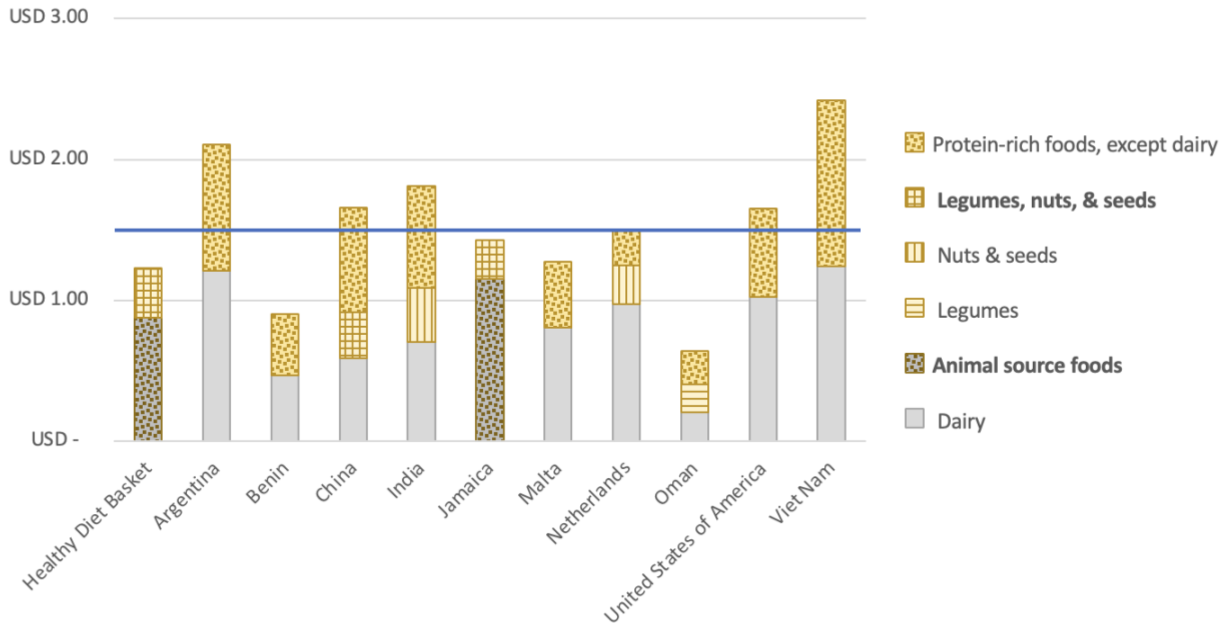


Source: Authors' elaboration.

The global average cost of USD 3.31 for the HDB is lower than when earlier methods were used to obtain a global cost of USD 3.68 (Herforth *et al.*, 2020),[5] because the latter was defined as the median cost of meeting requirements specified in ten different national FBDGs, whereas the HDB approach is the cost of meeting a single composite basket that represents the average amounts of each food group recommended across guidelines. A majority of the FBDGs contain some idiosyncratic high-cost recommendations, such as the United States of America's high dairy requirement, Oman's high fruit requirement, or some countries' requirement to include nuts in addition to other food groups. These idiosyncratic high-cost recommendations drop out when finding median amounts of food recommended in each food group across guidelines. The HDB, as the cost of the median amounts recommended, is therefore less expensive than the original cost of a healthy diet calculated in Herforth *et al.* (2020), which was the median of the cost of the same ten FBDGs. Figure 9 shows the sources of cost variation within the protein-rich food groups and that the median cost of protein-rich foods is higher than the cost of the median amount of protein-rich foods recommended (as reflected in the HDB). The cost distribution across food groups is comparable between the HDB approach and the earlier approach (Herforth *et al.*, 2020). As discussed in Section 3.1, energy and nutrient content is also comparable between the two approaches.

[5] Figure 8 differs slightly from the final median cost published in FAO *et al.* (2020) (USD 3.75) due to minor methodological updates and reanalysis of the final (rather than prepublication) ICP dataset, which included some additional items.

Figure 9. Cost per day of all types of protein-rich food groups classified in ten national food-based dietary guidelines compared to the Healthy Diet Basket



Notes: The horizontal blue line represents the median cost of protein-rich food groups across the ten selected national FBDGs. Classifications represent the various grouping used in the FBDGs for each country and the Healthy Diet Basket (HDB). These are Argentina: (a) meat, fish, egg; (b) dairy, Benin: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; China: (a) meat, fish, egg; (b) dairy; (c) soy, nuts, seeds; India: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Jamaica: (a) foods from animals including dairy; (b) legumes and nuts; Malta: (a) meat, fish, eggs, legumes, nuts and seeds; (b) dairy; the Netherlands: (a) meat, fish, egg, legumes; (b) nuts and seeds; (c) dairy; Oman: (a) meat, fish, egg, nuts and seeds; (b) legumes; (c) dairy; United States of America: (a) meat, fish, egg, legumes, nuts and seeds; (b) dairy; Viet Nam: (a) meat, fish, egg, legumes; (b) dairy.

Source: Authors' elaboration.

4.2 Affordability of healthy diets using the Healthy Diet Basket

The HDB method of averaging FBDG leads to a lower cost of healthy diets than the initial method used in *The State of Food Security and Nutrition in the World 2020* (Herforth *et al.*, 2020), so updating just that aspect of our methodology would have reduced the number of people who cannot afford a healthy diet, but the methodological updates regarding available income happen to have an offsetting effect. The methodological updates regarding both cost and income result in about the same number people who cannot afford a healthy diet in the base year of 2017, and allow for more accurate tracking of year-to-year changes.

The first update regarding affordability is that national income distributions have been improved in a new World Bank Poverty and Inequality Platform (PIP).[6] The PIP provides estimated income distributions for 2017 using larger sample sizes and improved methods, thereby replacing earlier estimates used to count the number of people in each country with insufficient income to afford that country's diet costs.

A second update concerns the fraction of household expenditure that is available for food. The approach taken in Herforth *et al.* (2020) was to define basic needs using spending patterns of the lowest-income group for whom globally representative data was available. At the time, the best global data source was the World Bank Consumption Database (World Bank, 2010),

[6] See https://pip.worldbank.org/home

which reported expenditure profiles by quintile of household income in 23 low-income countries, merging surveys from a variety of earlier years. They reported that households in the lowest income quintile within the world's low-income countries spent 63 percent of their income on food, which is the fraction used to compute affordability in Herforth *et al.* (2020). The World Bank has not updated that database, however, and there seems to be no plan to do so in the immediate future. Updating expenditure shares when calculating affordability is especially important given Engel's Law, by which economic development leads to an increasing share of income spent on non-food needs such as education, health, housing and transport, with a declining fraction spent on food. To base affordability calculations on a data source that is updated regularly, the approach used in this report is based on food expenditure shares in national accounts for all low-income countries in each year.

Using national accounts data for the share of household expenditures spent on food ensures that computational methods are standardized across countries, and will be routinely updated in the future. Each ICP cycle provides household expenditures by sector for the reference year, which is 2017 for this report and will be 2021 for the next round of data, and the ICP has already announced plans for annual updates of their national accounts data. National accounts reflect the country's total spending, and hence average expenditure per person in that population. By Engel's Law, each country's lower-income people will have larger food expenditure shares than their national average, but further disaggregation may not be desirable because national average expenditure shares in low-income countries provides a recognizable global benchmark that includes all people in those countries, in addition to the fact that disaggregation would rely on historical survey data that is increasingly outdated. For both reasons we turn to the national accounts data on household expenditure shares that is assembled by the ICP (World Bank, 2022), and for a standardized level of basic needs we use the global average for all low-income countries in 2017. Using this reference, affordability of a healthy diet is defined by allowing up to 52 percent of household income to be spent on food, reserving 48 percent of income for other spending.[7]

Using the HDB averaging method and the updated income distribution and household expenditure share data from national accounts, the cost of a healthy diet is estimated to be unaffordable for 3.05 billion people in 2017. This figure is only slightly higher than the 2017 estimate reported in the 2020 edition of *The State of Food Security and Nutrition in the World* report (3.02 billion people in 2017).

[7] For comparison, the same statistic from the 23 household surveys compiled in 2010 was 57 percent (World Bank, 2010). That decline over time reveals the importance of tracking changes in the share of income available for food.

5 Mechanisms and possible data sources for monitoring the cost of a healthy diet

The previous chapter described a method to monitor the cost and affordability of a healthy diet. To carry out this method, retail price data are needed in each country.

In most countries, the widest range of regularly collected item prices for frequently consumed foods comes from the government's national statistical office (NSO). These agencies have a longstanding mandate to monitor inflation by sending enumerators to a variety of markets around the country, collecting prices for standardized items that are reported as widely consumed in the country's most recent household consumption and expenditure surveys. Those surveys also provide the quantity weights by which item prices are averaged in the country's CPI. However, these prices may not be published or accessible.

This chapter explores whether sufficient food price data are currently accessible through various sources to enable ongoing monitoring of the cost of a healthy diet. These sources include primary sources including NSOs themselves; sometimes market information systems (MIS) of ministries of agriculture or trade; regional or commodity-specific entities such as the East Africa Grain Council; and other (often secondary) sources including early warning systems (EWS) such as WFP Vulnerability Analysis and Mapping (VAM), FAO Global Early Warning and Information System (GIEWS) and the USAID-funded Famine Early Warning Systems Network (FEWS NET); and some private companies or crowdsourced efforts. In considering possible data sources for monitoring the cost of a healthy diet, it is important to consider:

- Feasibility: Who can actually cover the items and report their prices?
- Timeliness: How quickly can prices be reported for each month or each quarter, to generate a reliable flow of updated data with minimal lags and omissions?
- Consistency: Which prices will be reported, to limit variation in the characteristics of each item, its vendor and the circumstances of its purchase? Prices for given food such as tomatoes or milk can vary widely based on those attributes, even within a given town on a given day, so data collectors must follow a standardized protocol to obtain prices for a representative item at a typical outlet under the normal conditions of routine shopping in each country. Standardization is especially important for the quantity obtained, especially for fruits and vegetables where each unit purchased, such as one mango, might vary greatly in its size and edible fraction.
- Data quality: Are the prices accurate? Data quality arises in part from consistency in data collection, but also from quality assurance after prices have been collected. Errors and omissions in data entry or aggregation are inevitable, so quality control processes designed to find and fix mistakes quickly are an essential foundation for any successful price reporting system.
- Representativeness: Do the prices represent what consumers see in the market across all areas of the country, both rural and urban? Price data collection to monitor inflation is intended to capture the average transaction, which typically occurs in more urban environments serving higher-income people than where low-income people might live and shop. Monitoring food access for the average person in a country requires not only collecting prices for the items that they might need, but also at the locations and circumstances where they live and acquire their food.

- Acceptability: Will member states accept the data? Often, official inflation data from the NSO are the only generally-accepted information on prices, and market information systems managed by ministries of agriculture or other sources might not have as much trust and support from other parts of government, the business sector and the public. In building a global system for tracking the cost of a healthy diet, the buy-in of member states is important.
- Resourcefulness: What makes the best use of existing resources? Abundant food price data are currently collected. It would be cost-effective and collaborative to leverage existing data where those data meet the need.

In light of each of these facets, several possible data sources can be considered. To understand each, a series of information-gathering phone calls was carried out, including with the FAO Food Price Monitoring and Analysis (FPMA) team, the FAO Data Lab team, the World Bank ICP team, and the WFP Fill the Nutrient Gap team. Existing data available from each online source were also assessed.

5.1 The FAO Data Lab

Because many food prices are collected and published online, the first question is whether it would be possible to gather them via the internet, in a process of "web scraping."

The FAO Data Lab (FAO, 2022a) was created to fill gaps in timeliness and granularity in official data, providing automated analysis and early warning signals by using web scraping, text mining, geospatial data, artificial intelligence, and sources such as social media and newspapers. For food prices, currently the Data Lab tracks daily prices of 14 products from Numbeo.com and uses them to nowcast CPIs.[8] The Data Lab uses this source is because it is open and almost real time, but the item prices are uploaded to Numbeo by self-selected individuals who report data for items and vendors that they have chosen, with limited effort to maintain consistency over time and across countries. Data uploaded to Numbeo could potentially be made to follow more standardized protocols, and could potentially be validated against other sources, but reliability and accuracy are not guaranteed.[9] The prices reported to Numbeo are for items in locations where urban professionals live and work, and are therefore unlikely to be representative of the prices in lower-income areas.

Bai *et al.* (2021) explored the potential for web scraping by cataloguing and describing all the retail prices published globally by NSOs and EWS. The exercise was restricted to these two sources for reasons of consistency, data quality, and representativeness; other sources of data, such as those gathered via crowdsourcing or published by private companies like grocery stores, would have unknown or inconsistent quality and representativeness. The data were restricted to *retail* prices; wholesale prices would be systematically different and would not capture the cost to consumers of purchasing foods in local markets.

Price data were found to be highly heterogeneous in terms of number and selection of items posted, frequency and mode of publication. Many countries post zero prices, although some post a large number (60–200). Within their CPI data collection, countries collect many more prices than they typically post. Often, governments are reluctant to post all of their price data because that could enable others to reproduce their CPI. Among 49 countries reporting food

[8] This feature is described at https://www.fao.org/datalab/website/web/food-prices as "Nowcasting Food Prices" accompanied by a "Daily Food Price Acceleration Monitor" for change over time.

[9] Crowdsourced data are inherently inconsistent, as the number of observations and where they are taken can vary from day to day.

price data, the average number of food items with CPI prices reported is about 52. In addition to heterogeneity in items posted, Bai *et al.* (2021) found that the mode of publication was heterogeneous, with some prices posted within pdf documents and bulletins and others in interactive portals. Web scraping is challenging for heterogeneous items that are posted in diverse ways.

Even if these challenges of web scraping from diverse sources could be overcome, the most prohibitive factor is lack of data availability for diverse foods. In the majority of countries, the food price data posted is insufficient for computing the cost of a healthy diet indicator. Therefore, web scraping would not return sufficient information, because data collectors keep their findings offline and post only aggregate averages from which each food's price cannot be extracted.

In the future, new technology might enable new modes of price data collection, such as automated capture of prices posted publicly by online retailers such as Amazon food or regional online delivery firms such as Jumia Food. This work was pioneered by the Billion Prices Project but is not suitable for least-cost diet analysis because low-income people typically do not use online purchases for daily food needs. Web scraping of prices from online vendors could become attractive if and when online ordering extends to a wider range of foods and locations, but for the foreseeable future online grocery stores in Africa, Asia and Latin America serve only relatively affluent consumers in urban areas, at prices above those charged for generic items in markets serving lower-income consumers.

5.2 The FAO Food Price Monitoring and Analysis Tool

The FPMA tool of the FAO Global Early Warning and Information System (GIEWS) in the FAO Markets and Trade Division was identified as a potential data source that could be scaled for global monitoring of the cost of a healthy diet indicator (FAO, 2022b). The FPMA was borne out of the food price crisis in 2008, with a focus on obtaining data for early warning and monitoring within LMICs. FPMA focuses on prices of a small number of commodities in each country that it covers, mostly staple foods,[10] for three reasons: Firstly, it has an intentionally circumscribed scope, in service to its mission as an early warning system to monitor food security; secondly, there is limited capacity, with only one to two staff members actively seeking and assembling the data on a monthly basis; and thirdly, prices for additional items are not easily available. Continuous efforts have been made to increase the country and commodity coverage in the dataset over the life of the FPMA activity although progress has been somewhat limited by resource restrictions. In many cases, FPMA gets data that national government agencies have published online, downloading or copying information manually from official websites; in other cases they pay for subscriptions or obtain not-yet-published prices from individual contacts in data collection agencies. FPMA obtains data from approximately 41 NSO sources, 59 government ministries of trade or agriculture, and 18 regional or private entities. Additional partnerships include data sharing with WFP and with FEWS NET for a small number of countries.

Owing to the heterogeneous sources of price data assembled by FPMA, the representativeness of the price data is variable. The dataset includes a mix of retail and wholesale prices; some are more representative of rural regions and some more of urban regions. It would not be easy or straightforward to expand the FPMA to include additional food

[10] Ten countries have legume prices, 18 countries have milk prices, five have any vegetable prices, one has any price for fruit, and one has any price for nuts.

prices. Firstly, in most countries FPMA sources data from what is published online by various entities and is not in direct contact with government data collectors in most countries. Secondly, FPMA covers only 87 countries and territories. Whether or not the geographic scope could reasonably be expanded to all countries, the FPMA would nonetheless have to be revamped as a much different effort than it has been, requiring direct contact with government food price data collectors to obtain the prices for a greater number of food item prices.

5.3 The World Bank International Comparison Program

The International Comparison Program (ICP), led by the World Bank, was created and is maintained for the purpose of obtaining retail prices for standardized items from the NSO of every country or territory in the world. The ICP's objective is to compare price levels across countries and over time, in order to establish PPP exchange rates and thereby compare economic activity in real terms.

The ICP's unique mandate makes it the only data source with global coverage for the cost and affordability of healthy diets, but their data are assembled every few years, and availability lags several years behind when the price data were collected (for example, prices for 2017 became available in 2020). A further limitation is that the ICP's mandate requires it to focus on items sold in multiple countries, which omits country-specific foods such as enset and teff in Ethiopia. Both limitations could be overcome by asking NSOs to report prices more often for the food items used in their own inflation monitoring. The ICP is already seeking to increase the frequency and timeliness with which it assembles prices, and is seeking to expand the range of items for which prices are reported beyond the 680 foods and non-alcoholic beverages on its global and regional item lists for 2017.

There are several advantages of a World Bank-led global food price monitoring system, building upon the ICP program. One is global coverage. ICP is in touch with each NSO in the world either directly, or indirectly through regional development banks and agencies, for the purpose of requesting retail price data from countries' CPI data collection. This also presents the advantage of consistency: all the price data would be from the same type of statistical process designed to monitor inflation. The ICP provides a quality assurance procedure in place, including data quality protocols for processing the government data for international comparisons, and countries are accustomed to working with ICP on any issues that arise; these same quality assurances could be applied for more frequent assembly of price data.[11] A fourth advantage is that as a partner of the Food Prices for Nutrition project, the World Bank hosts the Food Prices for Nutrition DataHub, which provides initial infrastructure on which to build a global food price monitoring system for tracking the cost and affordability of healthy diets.

The World Bank has substantial experience in global price data collection, and their experience suggests that a phased approach can work well, where some regions and countries are contacted first, to be followed by others where contacts are less immediate. This is how the ICP was built. Their experience also suggests that it will be important to explain to governments why food price data is sought, and the benefit to them of providing it. While countries may not

[11] For the purpose of data quality assurance, it is an advantage to select sentinel foods that are already on the ICP food list of over 550 relevant items, because countries are already used to working with ICP processes to provide the data in a certain standardized way (e.g. price per kg, standardized items). ICP food lists for each country include a selection of foods that comprise a substantial expenditure share but are standardized to include foods that are common globally. As such, some country-specific sentinel foods may not be present in the ICP food list, but the majority are.

be willing to share price data for all items on their CPI list, they are likely to be willing to share prices for a short list of sentinel foods, from which reconstruction of the CPI would not be possible.

Compared to other alternatives, a system that would compile food prices from existing official data collection in every country is likely to be highly acceptable to member states, whose own official data would be used, thereby increasing confidence in its validity and its alignment with national uses of the data. Such a system would also be a cost-effective use of existing resources, avoiding duplication of efforts and reducing the number of different requests for data that countries receive. Instead of separate requests from ICP, FAO, WFP and other initiatives, one recurring request could be made and all global actors could then access the data from a central hub.

The elements needed to track access to healthy diets using prices collected for inflation monitoring already exist, but considerable effort will be needed over time to report nationally representative diet costs each month or each quarter, and potentially extend that to subnational regions for more geographic disaggregation. When focusing on food access in the most vulnerable locations, the WFP plays a particularly important role as described below.

5.4 The WFP Vulnerability Analysis and Mapping Project

WFP reports producer, retail and wholesale prices through its Vulnerability Analysis and Mapping (VAM) project, which facilitates WFP's food and nutrition assistance work. Retail food prices are available from 58 countries and 1 750 markets with monthly updates of most data series. Like FPMA, there is wide variation in the number of nutritious food item prices reported. The focus of the VAM is on staple foods, which always includes grains and/or tubers and often includes legumes. Most countries have no fruit, vegetable, nut or dairy prices. Several countries have far more items with retail food prices available than others, such as Ethiopia with 85 items and the Gambia with 74 items, while 24 countries have fewer than 15 item prices available. Often, WFP obtains its food price data via ongoing partnerships with national market monitoring systems: sometimes this is with the NSO, but more often an MIS. There is variation in which government agency WFP partners with, depending on who is already collecting food prices. In other cases, WFP collects data directly if none are available. Because WFP often has locally specific programmes, there are times when no data are being collected in the local target area, so WFP collects them to inform the programme design.

As with the current FPMA dataset, limitations in country and food item coverage limits the usefulness of WFP data for a comprehensive global food price monitoring system. However, the availability of data from numerous regional marketplaces provides a distinct granularity that is absent from other data sources. These subnational data are not consistent, as they are collected by different agencies that may have different methods, quality assurance, market coverage and item lists. However, they could be useful to include in a potential Data Hub, less for the purpose of official cross-country tracking of the cost of a healthy diet indicator, such as in *The State of Food Security and Nutrition in the World*, and more for the purpose of other applications users may have for subnational data. Furthermore, WFP data may be useful to fill in gaps in countries where official statistics do not function, such as in conflict situations.

In turn, the sentinel food method for cost of a healthy diet indicator may be useful in WFP's own local data collection efforts. Interest has been growing within WFP towards expanding its price data collection to include more diverse foods, for the purposes of monitoring food environments, performing market assessments, and analysing what can be bought with a voucher. The sentinel method could be a useful tool to plan data collection at local level and analyse the data. Furthermore, many other research efforts could use this simplified method for rapid assessment in the field if they do not have access to the more detailed data and analytical methods needed for Cost of the Diet linear programming used in Fill the Nutrient Gap analyses (WFP, 2020).

5.5 Alternative approaches to data collection

To have more control over which markets and foods are covered, or if using NSO prices were somehow unfeasible, one could imagine setting up a separate system to collect and report prices observed by other means.

One option is to contract a private sector source for food price data. There is no known existing private sector data source that is feasible or representative,[12] so this option would entail a new effort by a survey organization that could hire paid contractors in each country to gather price data. In this scenario, temporary workers would receive specific instructions and training on capturing the prices of items of consistent specified quality (e.g. medium tomatoes, not premium). A system like this could be built, but whether it is worthwhile to do so depends on careful consideration of what would be gained and lost in the process.

An advantage of setting up a new data collection system would be to target rural markets and to include food items (such as local dark leafy green vegetables) that are not well covered by urban-biased CPI data collection.[13] Another advantage could be ensured timeliness of the data. These advantages explain why private food price data collection companies already exist, where subscribers are willing to pay for data because the government data is not accessible or timely and might not cover specific markets of interest.

A disadvantage of setting up new data collection systems is that it might not be cost-effective, and would miss the opportunity to bring governments on board in a global effort to use food prices for nutrition. Government participation in the cost of a healthy diet reporting is important not only for practical reasons but also because their data are the officially accepted data, and the purpose of these indicators is to inform public policy and programmes. The supply as well as the demand for indicators such as the cost of a healthy diet rests primarily in the public sector, as a kind of information infrastructure to steer the private sector and coordinate action towards greater affordability of healthy diets at all times and places.

---

[12] Some proprietary private sector food price benchmarking efforts, including AIR-INC.com or the Economist Intelligence Unit (EIU), would not be sufficient or representative because their purpose is to make international salary comparisons and guide personnel relocation for multinational enterprises, so they focus on prices at high-end retail outlets for food items consumed by internationally mobile professionals. Some food prices are also collected by consulting and market intelligence firms such as Gro Intelligence, Nielsen or Euromonitor, but these focus on the small number of countries and products for which their customers need highly targeted price data. Private efforts to collect food prices for market intelligence purposes, such as Esoko in Ghana charge a subscription fee for access to real time data, but the information is limited to specific items and markets.

[13] A disadvantage of using prices collected for inflation monitoring is their aim is to represent the average transaction in the economy, rather than the average person, so they may be collected in higher-income cities and towns rather than the rural areas where food access is of greater concern. They also focus on the foods that account for the largest share of total sales, rather than the least-cost items in each food group that might determine access to a healthy diet. Some national statistical organizations do report price indexes tailored to the needs of low-income people, and the UK Office for National Statistics (2022) recently published an experimental index of least-cost grocery items.

6 Discussion – future directions and conclusions

Setting up a global system to inform government policy and programmes requires sustainable infrastructure and commitment. A long-term institutional strategy is more sustainable than a short-term project, and can achieve consistency across countries.

The World Bank ICP provides a ready avenue for institutionalizing an ongoing monitoring system for the cost of a healthy diet indicator. It is feasible and desirable from the World Bank perspective, and the ICP already has existing links with NSOs in each country. The expectation is that NSOs would be willing and able to provide national prices for all items or for sentinel items on a monthly basis. Establishing regular timely data delivery is the challenge, but one that ICP experience predicts can largely be met.

These data are official, which is a major advantage over data collected through parallel efforts and leverages the existing investments of each country in data collection. Once assembled, regular, consistent price data may be useful for other applications as well. WFP may also play a role in a global data hub in providing missing data for states in conflict and in the longer-term, possibly in providing another layer of information: regional or subnational data. These data are collected by variable systems and may not be fully comparable to the NSO data but may be useful for secondary purposes.

A first step would be to draft a memo explaining to country NSOs the purpose and scope of the data collection and usage, why food prices are needed, and how the results would be useful to them. In initial countries, feedback would be sought on whether it is feasible to report the full price list. If countries are unwilling to share all item prices from their CPI, however, the cost of a healthy diet could be calculated with a subset of sentinel prices. Prices of country-specific sentinel foods would be designed to proxy for the least-cost items within the full list of foods. As few as 22 food items (twice the number of items used in calculating the HDB) may be sufficient to provide a proxy for the cost of a healthy diet. A method for identifying sentinel foods is described in Annex 3. The process of communication is important, to engage governments as allies in the movement towards using food prices for nutrition. Broadly, this is nutrition-sensitive development. By participating in a global effort, governments may shift the way they themselves use food price data for decision-making. By going about the process in a collaborative way, it is possible to have far greater impact – by shifting dialogue and perceptions about the purpose of food prices. Other actors, including FAO, could help build capacity within countries for more streamlined and validated price data capture and aggregation. WFP or private sector data collection could play a role where governments are in crisis and lack the capacity for food price monitoring.

Because governments often struggle to collect and disseminate data in a timely way, there is an underlying need for capacity building to improve reliability and timeliness of food price data. Some governments lack the resources for tools as simple as tablets, gathering data using pen and paper. If there were a temptation to build a parallel data collection system for the purpose of timely data, resources might be better invested in capacity building among price collectors in governments, both for data capture and dissemination (e.g. devices, apps and web portals). To reach food markets in more remote areas, an alternative kind of new technology uses smartphones for informants to upload observations along with geotags, time stamps and possibly also photographs to confirm validity of the data. Some new software apps (e.g. Poket) are aimed at allowing a sponsor to recruit data collectors, train them in how to obtain and upload each observation, and then compensate them appropriately for the effort, all without requiring informants to meet in person. Capacity building may be a future agenda to further enhance national use of food prices.

The HDB method of calculation, with complete data or sentinel food prices, is a feasible method to monitor the cost of a healthy diet indicator. The HDB is broadly consistent with dietary guidelines across countries and serves as a set of criteria for calculating the cost of a healthy diet indicator.

Currently, there are abundant food price data in almost every country that have not effectively been harnessed for a global information system. The discussions informing this report reveal an opportune situation where both the will and the way exist to build a global food price monitoring system for the diverse foods that would be needed to calculate the cost of a healthy diet. ICP offers the best global data hub for this purpose. Collaboration across global institutions would make it possible to build a system that reduces burden on countries and increases utility of existing data. Annex 4 to this paper (*Building a global system for monitoring the cost of a healthy diet*) fully summarizes the proposed way forward. Selection of appropriate sentinel food items is feasible if countries are unwilling to share their full food price data for all items, and the list of items and prices reported by each country would evolve over time as analysts and decision makers gain experience using diet cost data to guide policy (Annex 3). A concerted effort, bringing together multiple resources and systems already in place at national and global level, will allow routine monitoring of the cost of a healthy diet as a central component of food security: access to sufficient, safe nutritious food to meet dietary needs.

References

Afshin, A., Sur, P.J., Fay, K.A., Cornaby, L., Ferrara, G., Salama, J.S., Mullany, E.C. *et al.* 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184): 1958–1972. https://doi.org/10.1016/S0140-6736(19)30041-8

Allen, L.H., Carriquiry, A.L. & Murphy, S.P. 2020. Perspective: Proposed Harmonized Nutrient Reference Values for Populations. *Advances in Nutrition*, 11(3): 469–483. https://doi.org/10.1093/advances/nmz096

Bai, Y., Costlow, L., Ebel, A., Laves, S., Ueda, Y., Volin, N., Zamek, M., Herforth, A. & Masters, W.A. 2021. Review: Retail consumer price data reveal gaps and opportunities to monitor food systems for nutrition. *Food Policy*, 104: 102148. https://doi.org/10.1016/j.foodpol.2021.102148

Bai, Y., Herforth, A. & Masters, W.A. 2022. Global variation in the cost of a nutrient-adequate diet by population group: an observational study. *The Lancet Planetary Health*, 6(1): e19–e28. https://doi.org/10.1016/S2542-5196(21)00285-0

Bai, Y., Naumova, E.N. & Masters, W.A. 2020. Seasonality of diet costs reveals food system performance in East Africa. *Science Advances*, 6(49): eabc2162. https://doi.org/10.1126/sciadv.abc2162

Fanzo, J., Haddad, L., Schneider, K.R., Béné, C., Covic, N.M., Guarin, A., Herforth, A.W. *et al.* 2021. Viewpoint: Rigorous monitoring is necessary to guide food system transformation in the countdown to the 2030 global goals. *Food Policy*, 104: 102163. https://doi.org/10.1016/j.foodpol.2021.102163

FAO. 1996. *Rome Declaration on World Food Security*. Rome. www.fao.org/3/w3613e/w3613e00.htm

FAO. 2013. *Milk and dairy products in human nutrition*. Rome. www.fao.org/3/i3396e/i3396e.pdf

FAO. 2021. *Minimum dietary diversity for women: An updated guide to measurement - from collection to action*. Rome, FAO. https://doi.org/10.4060/cb3434en

FAO. 2022a. Food prices monitoring & nowcasting. In: *FAO Data Lab*. Rome. Cited 21 March 2022. www.fao.org/datalab/website/web/food-prices

FAO. 2022b. GIEWS - Global Information and Early Warning System on Food and Agriculture. In: *FAO*. Rome. Cited 21 July 2022. www.fao.org/giews

FAO, IFAD (International Fund for Agricultural Development), UNICEF (United Nations Children's Fund), WFP (World Food Programme) & WHO (World Health Organization). 2020. *The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets*. Rome, FAO. https://doi.org/10.4060/ca9692en

FAO, IFAD, UNICEF, WFP, & WHO. 2021. *The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all*. Rome, FAO. https://doi.org/10.4060/cb4474en

Herforth, A. 2015. Access to Adequate Nutritious Food: New Indicators to Track Progress and Inform Action. In: *The Fight Against Hunger and Malnutrition*. pp. 139–162. Oxford, Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198733201.003.0007

Herforth, A., Arimond, M., Álvarez-Sánchez, C., Coates, J., Christianson, K. & Muehlhoff, E. 2019. A Global Review of Food-Based Dietary Guidelines. *Advances in Nutrition*, 10(4): 590–605. https://doi.org/10.1093/advances/nmy130

Herforth, A., Bai, Y., Venkat, A., Mahrt, K., Ebel, A. & Masters, W.A. 2020. *Cost and affordability of healthy diets across and within countries*. Background paper for The State of Food Security and Nutrition in the World 2020. FAO Agricultural Development Economics Technical Study No. 9. Rome, FAO. https://doi.org/10.4060/cb2431en

IOM (Institute of Medicine). 2006. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington, DC, National Academies Press. https://doi.org/10.17226/11537

Kennedy, E.T., Ohls, J., Carlson, S. & Fleming, K. 1995. The Healthy Eating Index: design and applications. *Journal of the American Dietetic Association*, 95(10): 1103–1108. https://doi.org/10.1016/S0002-8223(95)00300-2

Schneider, K. & Herforth, A. 2020. *Software tools for practical application of human nutrient requirements in food-based social science research*. Cited 21 July 2022. https://doi.org/10.12688/gatesopenres.13207.1

UK Office for National Statistics. 2022. Tracking the price of the lowest-cost grocery items, UK, experimental analysis: April 2021 to April 2022. In: *UK Office for National Statistics*. Cited 21 July 2022. www.ons.gov.uk/economy/inflationandpriceindices/articles/trackingthelowestcostgroceryitemsukexperimentalanalysis/april2021toapril2022

WFP. 2020. Fill the Nutrient Gap. In: *WFP*. Rome. Cited 21 July 2022. www.wfp.org/publications/2020-fill-nutrient-gap

WHO. 2006. *WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development*. Geneva, Switzerland. www.who.int/publications-detail-redirect/924154693X

WHO. 2018. *Healthy diet*. Fact sheet no. 394. Geneva, Switzerland. www.who.int/publications/m/item/healthy-diet-factsheet394

WHO & FAO. 2003. *Diet, nutrition, and the prevention of chronic diseases*. Report of a joint WHO/FAO Expert Consultation. WHO Technical Report Series 916. Geneva, Switzerland, WHO.

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T. *et al.* 2019. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170): 447–492. https://doi.org/10.1016/S0140-6736(18)31788-4

World Bank. 2010. Global Consumption Database | Food and Beverages. In: *World Bank | Data*. Washington, DC. Cited 18 November 2021. https://datatopics.worldbank.org/consumption/sector/food-and-beverages

World Bank. 2022. International Comparison Program (ICP). In: *World Bank*. Washington, DC. Cited 21 July 2022. www.worldbank.org/en/programs/icp

Annexes

Annex 1. Statement on the appropriate standard for a global indicator

The cost and affordability of a healthy diet (CoAHD) is a global standard used to measure a population's access to sufficient quantities of nutritious food to meet dietary needs for an active and healthy life, defined as the cost per person, per day of the least expensive locally-available foods to meet requirements for energy and food-based dietary guidelines (FBDGs). To measure access, each population's diet cost is based on market prices of items available for routine food acquisition, selecting the least expensive items at each time and place to allow for substitution among items within food groups. Using market prices for foods being routinely sold ensures that items selected for each least-cost diet meet local standards for acceptability and safety, while substitution within but not between food groups ensures that the overall diet meets food group requirements. Affordability of these diverse healthy diets is computed by comparing cost per day to available income, in local currency units or converted to international terms using PPP exchange rates.

The CoAHD approach uses food group requirements to extend and complement other indicators, reflecting recent advances in data availability and evidence-based nutritional policies adopted by governments around the world. The CoAHD extends beyond dietary energy needs and also extends beyond access to adequate nutrients, which can be tracked using least-cost diets that provide adequate calories within upper and lower bounds for all essential macro- and micro-nutrients.[14] Each indicator can be useful for specific purposes. The CoAHD can be computed as a global average, or for regions, countries, and any subnational populations for which food prices have been measured. Similar calculations can be done for the cost of nutrient adequacy to avoid deficiencies of specific nutrients such as vitamin A or zinc, but a least-cost nutrient adequate diet would not meet food group requirements specified in national dietary guidelines. The CoAHD is a preferred indicator of access to healthy diets for two main reasons.

First, dietary needs are greater than energy and nutrient needs. Dietary needs include dignity, and protection of health over the life course "for an active and healthy life." Regarding dignity: it is not adequate to meet nutrient needs via a diet that is not culturally familiar and appropriate. Regarding protection of health: the impact of diet on health, morbidity and mortality beyond nutrients is well recognized throughout the field of nutritional epidemiology, where the preponderance of diet-disease relationships has to do with the influence of diet on non-communicable disease (NCDs). The field of nutritional epidemiology studies and provides evidence on the importance of non-nutrient dietary components of food (fibre, phytochemicals, influence on microbiome, food matrix, degree of processing, fatty acid profile) on health (including mental health), and the influence of proportionality between food groups.

Second, an indicator of the most affordable way to meet dietary needs should be transparent and reflect the way regular people make food choices. Governments defined FBDGs in terms of food groups, instead of nutrient requirements primarily to specify diet quality using criteria that are visible to consumers and could be used as a guide to food choice. The least-cost items used for CoAHD can be identified by any person based on the least expensive options in each food group, whereas the least-cost items for nutrient adequacy can be identified only through linear programming using dozens of constraints, each representing an upper or lower bound

[14] For definition of the nutrient adequate diet referenced here, see Box 10 of *The State of Food Security and Nutrition in the World 2020* report (FAO *et al.*, 2020).

for a nutrient that is unobservable to the consumer. No human can enter a market and be able to identify the exact set of items and their precise amounts that would result in a least-cost diet to meet all nutrient needs. Only a linear program in a computer can do that. Therefore, in practice, even the most well-informed choices of a human intending to choose foods to meet nutrient needs will result in a higher cost than the least-cost nutrient-adequate diet derived from linear programming. Food based dietary guidelines and the resulting CoAHD indicators reflect this fact. When people go to a market to choose foods to meet nutrient needs, the best knowledge they can employ to select a nutrient-adequate diet is to select foods that meet food group requirements in FBDGs. For this reason, nutrition education programmes for at least the last 80 years have been based on familiarizing consumers with FBDG to make food choices. FBDGs have also (in the last 40 years) incorporated concerns about health protection beyond nutrients, such as recommendations to increase fruits and vegetables aligned with global evidence on their role in health beyond nutrients (WHO and FAO, 2003) and recommendations to limit processed meat, sugar, and other forms of processed foods – based on protection of health against NCDs, rather than nutrient concerns alone.

The primary purpose of FBDGs is to help people choose diets that would meet nutritional needs with a diversity of culturally appropriate food choices. This is done through food group recommendations that allow substitution of items within groups, based on evidence that consuming a diversity of items within each food group in the amounts recommended will generally lead to a diet with adequate levels of almost all nutrients, as shown for ten individual countries' national dietary guidelines in Annex 5 of Herforth *et al.* (2020), and for the HDB composite global dietary guideline in Section 3.1 of the same study. Substitutions within a FBDG might be done for cultural reasons relating to agriculture and food systems, for example between rice and wheat-based cuisines in India, or for convenience and taste between different kinds of meals with similar proportions of items from each group. Substitution might also occur based on prices and income, as in the selection of least-cost items used to determine whether a person can afford enough of each food group to meet dietary guidelines.

Using FBDGs as a diet quality standard began in the 1990s, with the introduction of the Healthy Eating Index that measures adherence to the Dietary Guidelines for Americans (Kennedy *et al.*, 1995). Many successive diet quality standards and indicators have been developed. CoAHD uses a greatly simplified criterion based on the commonalities among FBDGs published to date, specifying only the identity and proportionality of food groups (six food groups in the HDB), and the number of items selected in each food group (a total of 11 different items in the HDB). This is designed to be a globally representative, evidence-based diet quality standard that is easily communicated for policy purposes and ensures alignment between a diet cost metric and normative guidelines used to guide individual choice.

In summary, measuring food access using the cost and affordability of a healthy diet based on FBDGs represents a realistic and understandable way for regular people (not just computers) to select nutrient-adequate diets that also protect against non-communicable diseases, in ways that are dignified and culturally appropriate. Meeting food group requirements specified in FBDGs also ensures adherence to official diet quality standards adopted by national governments for the general population – not as an aspiration or target only for a privileged few, but for all citizens. For this reason, many countries base social safety nets and nutrition education for low-income citizens on FBDG. The HDB captures commonalities among national FBDGs, providing a global standard to track progress towards well-established goals for food security and nutrition, guiding food production and distribution towards universal availability and affordability of healthy diets.

Annex 2. Food group proportions and nutrient reference values

Table A1. Food group proportions (by volume) depicted in plate-shaped food-based dietary guidelines from all countries where they are available

Country (year)	Starchy staples	Vegetables	Fruits	Vegetables and fruits	Protein-rich foods*	Fats and oils	Total
Antigua and Barbuda (2013)	39	14	14	28	28	5	100
Argentina (2015)	25			50	20	5	100
Australia (2013)	30	28	16	44	26	0	100
Canada (2019)	25			50	25	0	100
Chile (2013)	15	30	20	50	30	5	100
Colombia (2015)	30			27	38	5	100
Dominica (2007)	28	25	17	42	25	5	100
Ecuador (2018)	25			50	20	5	100
Germany (2017)	30	25	17	42	25	3	100
Grenada (2006)	47	10	10	20	27	6	100
Guyana (2018)	33	15	15	30	30	7	100
India (2018)	27			50	20	3	100
Italy (2018)	20	27	27	54	20	6	100
Jamaica (2015)	30	24	25	49	18	3	100
Latvia (2008)	25			50	25	0	100
Malawi (unofficial)	33	23	22	45	17	5	100
Malta (2015)	25	27	20	47	25	3	100
Mexico (2015)	33	16	16	32	35	0	100
Oman (2009)	34	15	15	30	36	0	100
Pakistan (2018)	33	19	15	34	27	6	100
Panama (2013)	38	16	16	32	25	5	100
Peru (2019)	36	16	16	32	27	5	100
Poland (2020)	25			50	25	0	100
Portugal (2003)	27	24	20	44	26	3	100
Qatar (2015)	27	25	13	38	35	0	100
South Korea (2015)	30	24	16	40	30	0	100
Switzerland (2011)	40			40	20	0	100
United Kingdom of Great Britain and Northern Ireland (2016)	37			37	24	2	100
United States of America (2020)	25	30	20	50	25	0	100
Uruguay (2016)	28	30	20	50	16	6	100
Zambia (2021)	34	15	18	33	33	0	100
Mean	30.1	21.7	17.6	41.0	25.9	3.0	100
Median	30.0	24.0	16.5	42.0	25.0	3.0	100
Mode	25.0	24.0	20.0	50.0	25.0	0.0	100
HDB	25.3%	28.8%	19.9%	48.8%	23.3%	2.7%	100%

Note: * Protein-rich foods include dairy, other animal source foods, legumes, and sometimes nuts and seeds.

Source: Authors' calculations based on FAO. 2022. Food-based dietary guidelines. In: *FAO*. Cited March 2022. www.fao.org/nutrition/education/food-based-dietary-guidelines

Table A2. Nutrient reference values for a representative adult woman

	Nutrient	Unit	ARs	RDAs or AIs*	AMDR lower	AMDR upper	UL
1	Energy	kcal	2 329	2 329			
2	Protein	g	37.6	46.0	58.2	203.8	
3	Lipids	g			51.8	90.6	
4	Carbohydrates	g			262.0	378.5	
5	Calcium	mg	750	1 000			2 500
6	Iron[2]	mg	22.4, 11.2	22.4, 18			45
7	Magnesium[1]	mg	265	310			350
8	Phosphorous	mg	580	700			4 000
9	Zinc[b,3]	mg	8.9	10.2			25
10	Copper	mg	0.7	0.9			5
11	Selenium	mcg	45	55			300
12	Vitamin C[c]	mg	80	80			2 000
13	Thiamin	mg	0.9	1.1			
14	Riboflavin[c]	mg	1.3	1.3			
15	Niacin[1]	mg	11	14			35
16	Vitamin B6[c]	mg	1.3	1.3			25
17	Folate[1]	mcg	250	400			1 000
18	Vitamin B12	mcg	2.0	2.4			
19	Vitamin A[4]	mcg	490	700			3 000
20	Vitamin E	mg	12	15			300
21	Sodium	mg					2 300
22	Vitamin B5[a]	mg	4.0	5.0			
23	Choline [a]	mg	320	425			3 500
24	Manganese[a,c]	mg	2.4	2.4			11

Notes: Values shown are for a 30-year-old, non-pregnant, non-lactating woman. Average requirements (ARs) and Tolerable Upper Intake Levels (ULs) are taken from Allen, L.H., Carriquiry, A.L. & Murphy, S.P. 2019. Proposed harmonized nutrient reference values for populations. *Advances in Nutrition*, 11(3): 469–483. * The values in this column are recommended dietary allowances (RDAs – IOM) except where noted: a. The value is an adequate intake (AI) value. b. The value for zinc takes the assumption of an undefined diet. c. The same values are used for both AR and RDA because the RDA/AI is not larger than the harmonized average requirements (H-ARs). 1. The upper levels only refer to the supplement intakes and therefore are not considered in the CoNA calculation. 2. The H-AR of iron takes the assumption of a low-absorption diet for the AR value for the CoNA and a moderate-absorption diet for assessing nutrient content of the CoRD. 3. The H-AR of zinc takes the assumption of a semi-undefined diet for the AR value. 4. The upper level of vitamin A refers to the intake of retinol.

Source: Herforth, A., Bai, Y., Venkat, A., Mahrt, K., Ebel, A. & Masters, W.A. 2020. *Cost and affordability of healthy diets across and within countries.* Background paper for *The State of Food Security and Nutrition in the World 2020*. FAO Agricultural Development Economics Technical Study No. 9. Rome, FAO. https://doi.org/10.4060/cb2431en

Annex 3. Sentinel food method for monitoring the cost of a healthy diet

Monitoring diet costs is best done with data on the availability and price of many different items, for example all of those items used to monitor overall inflation. In some situations, however, it might be necessary to prespecify a shorter list of "sentinel" food items that are likely to be the least-cost items which are available and commonly consumed in each country. If needed, this sentinel foods approach to tracking the cost of a healthy diet would include preselected candidates for at least 11 different items in six different food groups that make up the Healthy Diet Basket (HDB): two least-cost starchy staples, two least-cost fruits, three least-cost vegetables, two least-cost animal source foods, one least-cost food from legumes, nuts and seeds, and one least-cost oil or fat (Table 4).

Preselection of items in a sentinel-foods approach is needed only if prices for a longer list of locally available items in each food group are not already being reported for other reasons, such as inflation monitoring for national accounts or early warning for targeting of food aid. Monitoring a wider range of items being sold at each location every month is important to recognize that nutritional requirements can potentially be met from diverse foods within each group, so households may still have access to a healthy diet even when certain items are unavailable or expensive. Items might be the least-cost way to meet dietary recommendations only seasonally or in particular locations, especially fruits and vegetables or other perishable and bulky items such as roots and tubers or plantains. To monitor household and individual access to a healthy diet, it is important for the list of items whose prices are collected to include as many as possible of the options that might turn out to be the least-cost items for each food group, in each time point in each country.

It may be feasible to monitor prices of double the minimum number of foods necessary, or approximately 22 items, to ensure at least one item is available as a substitute. That is, instead of selecting only two starchy staples, four are selected, from which only two will be least-cost at any given time point. It would be important to identify items that are least-cost at various times of the year, considering seasonally low-cost items.

Therefore, the minimum data required for the monitoring of the cost of a healthy diet indicator are prices for 22 country-specific sentinel food items per country: four starchy staple items, four fruit items, six vegetable items, four animal source food items, two legume, nuts and seed items, and two oils or fats.

The cost of a healthy diet indicator, calculated at each time point within a year when the country-specific sentinel food item prices are reported, will be a close approximation of the cost of a healthy diet using a longer food list. The reason is that while the least-cost items can vary across time in a given country, there are many items in the market that are never the cheapest item (such as lobster or asparagus). Previous work on seasonality and spatial variation shows that the prices for many food groups move in parallel (Bai, Naumova and Masters, 2020). Sentinel items should be food items whose prices are likely to move in tandem with the other low-cost foods in that group – so that they are truly *sentinels* of the food group in each location. Sentinel food items are those which are most likely to be least-cost over time, ameliorating the need for data reporting of all item prices.

Method for country-specific sentinel food selection

The calculation of the cost of a healthy diet may not require a country's full set of retail food prices. A set of 22 sentinel food items can be selected, specific to each country, as items that are (a) among the least-cost items in each food group and (b) commonly-consumed and culturally important. Double the minimum number required are selected to allow for price variation over time. Items are country specific because there is no global set of items that is least-cost and commonly-consumed everywhere.

Country-specific sentinel foods are identified as follows:

1. Each country's least-cost items for each food group in the ICP datasets from 2011 and 2017 are identified.[15]
2. Qualitative Global Diet Quality Project data (currently available for 105 countries)[16] are then used to ensure that each item is commonly-consumed and culturally appropriate.

These first two steps provide draft, country-specific lists of sentinel foods for consideration by each country. The next steps to finalize the country-specific sentinel food selection for an actual global monitoring system are outside of the scope of this paper, but will be important:

1. Request CPI food list from each country, and remove draft sentinel food items that do not appear in the country's CPI food list.
2. For items that do appear, select the specific item in the CPI food list that corresponds to the sentinel food (e.g. rather than the generic item "rice", a country's CPI item might be "rice, white medium-grain, 25 percent broken")
3. Seek country input/approval for the list.

[15] The International Comparison Program of the World Bank (ICP) aggregates and publishes price data from NSOs as part of its calculation of PPP exchange rates, which occurs every three to seven years. The 2017 round of ICP price collection included 170 countries and 680 foods and non-alcoholic beverages.

[16] This project has just completed desk reviews (e.g. of household expenditure surveys) and over 600 in depth key informant interviews in 105 countries to identify and rank the most commonly-consumed food items across 29 food groups, which cover all of the food groups except for oils/fats in the Healthy Diet Basket. www.advancingnutrition.org/what-we-do/activities/adapting-country-specific-food-lists-measure-diet-quality-and-advance

Annex 4. Building a global system for monitoring the cost of a healthy diet

Motivation

Food security exists “when all people, at all times, have physical and economic access to sufficient, safe, nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). The cost of a healthy diet indicator represents the cost of obtaining “nutritious food to meet dietary needs.” Affordability of a healthy diet represents economic access, identifying whether the sufficient quantities of each food group could be acquired given the household’s total income and required spending on non-food items. Tracking the cost and affordability of a healthy diet complements existing indicators to more fully reflect the globally-accepted definition of food security.

These indicators first appeared globally in *The State of Food Security and Nutrition in the World 2020* and were updated in *The State of Food Security and Nutrition in the World 2021* using inflation and income distribution data, in the absence of updated food price data. Over the longer term, “Estimates of the cost and affordability of healthy diets will be updated annually and disseminated in this report, reflecting the most recent data as they become available” (FAO *et al.*, 2021, p. 29).

Global metrics for the cost of a healthy diet are based on a unique dataset of item prices and availability for diverse foods in each country, assembled by the International Comparison Program (ICP) primarily to compute the purchasing power of national currencies. ICP data play a central role in global economic statistics, providing the only internationally standardized global dataset on nationally representative retail food prices (i.e. prices consumers face) that includes diverse foods sufficient to meet dietary needs in each country. Key limitations include that their data are only available for certain years (most recently for 2005, 2011, 2017 and the next round will cover 2021), take several years to process (for example the data for 2017 was not available until 2020), and provide only a single national average price for each item (and therefore cannot be used to consider subnational or seasonal variation in diet costs).

The motivation for this note is to outline a recommended long-term strategy to institutionalize cost and affordability indicators within FAO and to annually inform *The State of Food Security and Nutrition in the World* report. It proposes collaborations between FAO, the World Bank and potential other external partners, in order to expand the collection of food prices for years where World Bank ICP data are not available.

Background: The necessary food price data exist but are not reported

Almost every country’s national statistical office (NSO) collects high-frequency information on food prices as part of inflation monitoring. Food commands a significant proportion of expenditures, so food price monitoring is built into the consumer price index (CPI) and the food CPI is also regularly reported. NSOs typically collect monthly, bi-weekly or even sometimes weekly prices for around 60–200 food items, constituting the most commonly purchased items nationally as determined by periodic household consumption and expenditure surveys.

Currently each country’s food price monitoring data are not readily accessible. Bai *et al.* (2021) conducted a comprehensive exercise to catalogue all publicly available food price data globally and found that although some countries publish many or all of their food prices, most countries do not. The median number of prices reported was zero, and they conclude that “of those 49 countries that do report some item-level prices, most report an insufficient diversity of items to be able to calculate least-cost nutritious diets such as the Cost of Healthy Diet indicator used in *The State of Food Security and Nutrition in the World 2020* and 2021" (Bai *et al.,* 2021, p. 8).

The retail food price data that countries do report for global monitoring is their CPI for all foods and non-alcoholic beverages, alongside their overall CPI for all goods and services. Since the mid-2000s, the International Monetary Fund (IMF) assembles and disseminates each country's monthly food CPI and overall CPI, while the ILO also reports and uses these data to monitor the cost of living, and the FAO monitors monthly variation in food CPIs to track food markets. Each country compiles its CPI based on retail item prices weighted by their average expenditures, so food prices are multiplied by their share of consumer spending and reflect the existing mix of foods consumed, rather than the diet quality needed for health. Individual item prices are not reported, so it is not possible to use countries' monthly reported CPI data to calculate the cost of a healthy diet.

The cost of a healthy diet, in contrast to the food CPI that is an index reflecting what is currently consumed, could be constructed and published on a quarterly or monthly basis using all or a subset of prices collected in countries' existing CPI monitoring systems. The publication of the cost of a healthy diet indicator can help guide policy and programmes to make healthy diets affordable for all, creating a need and an opportunity to build a global food price monitoring system for tracking the cost of a healthy diet in each country. This system is well within reach, because data on prices of a diverse array of foods currently are collected at monthly or higher frequency in almost all countries.

Minimum data needs for a monitoring system

First the minimum set of data that would be required to calculate the cost of a healthy diet for each country need to be identified.

The cost of a healthy diet, based on the HDB standard for global comparison, is made up of 11 food items in six different food groups: two least-cost starchy staples, two least-cost fruits, three least-cost vegetables, two least-cost animal source foods, one least-cost food from legumes, nuts and seeds, and one least-cost oil or fat. The least-cost items are best identified from a country's full CPI list. In case the full list was unavailable, a short list of items likely to be (a) least-cost, and (b) commonly consumed and culturally relevant can be identified in each country. These are **sentinel food items** for tracking the cost of a healthy diet. To allow for price variation over time in the same country, double the number of items serving as sentinel food items in each food group are needed to allow substitution. That is, instead of selecting only two starchy staples, four are selected, from which only two will be least-cost at any given time point.

Therefore, the minimum data required for the monitoring of the cost of a healthy diet are prices for 22 country-specific sentinel food items per country:

- four starchy staple items
- four fruit items
- six vegetable items
- four animal source food items
- two legume, nuts, and seed items
- two oils or fats.

The cost of a healthy diet, calculated at each time point when the country-specific sentinel food item prices are reported, will likely be a close approximation of the cost of a healthy diet using the country's full CPI list. The reason is that while the least-cost items can vary across time in a given country, there are many items in a country's CPI food list that are never the cheapest item (such as lobster or asparagus). Sentinel food items are those which are most likely to be least-cost over time, ameliorating the need for complete data in case of limitations in data access.

Assessment of institutional options for global data assembly

Several options were explored to identify the institution(s) which could assemble consistent retail price data from all countries for monitoring the cost of a healthy diet. Key representatives from each group were interviewed to identify strengths, limitations and opportunities.

One option is the Food Price Monitoring and Analysis tool (FPMA) of the FAO Global Early Warning and Information System (GIEWS) in the FAO Markets and Trade Division, potentially with support from the newly formed Data Lab. FPMA publishes monthly food prices from 87 countries in total, sourcing a mix of wholesale and retail data from NSOs, government ministries of trade or agriculture, and regional or private entities. They currently obtain retail data from NSOs in 41 countries, although for the majority, FPMA sources data from what is published online and is not in direct contact with government data collectors. To expand the geographic scope to all countries, and obtain consistent retail prices, the FPMA would need very different goals and staffing levels, requiring direct contact with government NSOs in all countries to obtain retail prices for sentinel foods. Essentially, this would require building new links to NSOs for almost all countries.

A second option is the WFP, which reports producer, retail and wholesale prices through its Vulnerability Analysis and Mapping (VAM) project. Retail food prices are available from 58 countries with monthly updates of most data series. Like FPMA, there is wide variation in the number of nutritious food item prices reported and the focus is on staple foods; most countries have no fruit, vegetable, nuts, or dairy prices. It is thus not possible to use current VAM data to calculate the cost of a healthy diet across countries. It may be possible to expand and systematize VAM to include country-specific sentinel food items for the cost of a healthy diet. However, there are limitations in terms of consistency and data quality, alongside political acceptance by national governments of unofficial data. Often, WFP obtains its food price data via ongoing partnerships with national market monitoring systems: sometimes this is with the NSO, but more often a different agency or ministry. In other cases, WFP directly collects data if none are available. Many countries only recognize official price data from the NSO. For a global monitoring system, the use of official price data would be important.

A third option is the ICP led by the World Bank. The ICP was established as a system to assemble price data for standardized items across all countries of the world, to estimate PPP exchange rates and thereby calculate the real size of economic activity in the world. The ICP covers 177 countries, which report local availability and price for up to 680 food and non-alcoholic beverage items in the most recent round of 2017. Although the global ICP price dataset is currently only assembled once every few years, the structure in place to collect that data lends itself to a potential of greater partnership with NSOs for more frequent data assembly. The World Bank is in contact with each NSO in the world either directly, or indirectly through regional agencies and development banks, for the purpose of requesting price data and other statistics. Furthermore, the World Bank has data quality protocols for processing the government data for international comparisons, and countries are accustomed to working with

ICP on any issues that arise; these same quality assurances could be applied for more frequent assembly of price data.[17] The necessary geographic scope (global), consistency (retail prices from NSOs), quality assurance and experience are already in place to be able to make requests to NSOs and compile more frequent data.

Given the above strengths and limitations, the best option is for the World Bank to coordinate the data collection and validation, and to host the data required. The ICP has the structure and scope necessary to engage with NSOs and increase the frequency of data reporting for a list of sentinel food items. As a partner of the Food Prices for Nutrition project, the World Bank has already constructed a Food Prices for Nutrition Data Hub, hosted on the World Bank DataBank. This Data Hub is structured to contain multiple indicators, including the cost of a healthy diet and its food group subcomponents; affordability of a healthy diet in comparison to the international poverty line, food expenditures, and income; and the number of people in each country who cannot afford a healthy diet.

Specific vision for a global monitoring system

Countries report the national average retail prices from their existing CPI food list on a monthly or quarterly basis to the World Bank under an agreed access to information policy. When these prices are received, the World Bank in partnership with FAO uses them to calculate the cost of a healthy diet, as well as the cost of each food group (starchy staples, fruits and vegetables, animal source foods, legumes nuts and seeds, and oils). These indicators are publicly posted on a regular (monthly or quarterly) basis on the Food Prices for Nutrition Data Hub.

On an annual basis, the number of people who cannot afford the cost of a healthy diet will be computed using World Bank income distribution data available via the World Bank Poverty and Inequality Platform (PIP). This indicator will be published annually in *The State of Food Security and Nutrition in the World* and simultaneously on the Food Prices for Nutrition Data Hub.

Next steps: establishing a global partnership

In order to build a global system for monitoring the cost of a healthy diet, a global partnership is needed. FAO would bring leadership and the mandate to report food security indicators. The World Bank would bring expertise, capacity and established connections to initiate country participation. The WFP might be involved as a data supplier in countries with extraordinarily weak or conflict-affected food price monitoring systems and/or as a user of the data in direct country engagement. And importantly, all national governments would also play a role as partners by sharing official price data for food items.

Next steps include discussions to clarify institutional roles, possible funding sources, and then preparation of a detailed concept note for this long-term effort. The World Bank has substantial applicable experience building a global food price data collection and validation system; their experience suggests that a phased approach can work well, where some countries can be considered first-movers, to be followed by others. It will be crucial to bring national governments on board to provide food price data and understand how the resulting indicators

[17] For the purpose of data quality assurance, it is an advantage to select sentinel foods that are already on the ICP food list of over 550 relevant items (after exclusions of items not included in the cost of a healthy diet indicator), because countries are already used to working with ICP processes to provide the data in a certain standardized way (e.g. price per kg, standardized items). ICP food lists for each country include a selection of foods that comprise a substantial expenditure share but are standardized to include foods that are common globally. As such, some country-specific sentinel foods may not be present in the ICP food list, but the majority are.

can inform their national policymaking. A request from a global coalition (FAO, World Bank and other UN agencies) would show evidence that this is a global coordinated effort. By participating in a global partnership, governments may shift the way they themselves use food price data for decision-making. Longer term, various actors could help to build capacity within countries for more streamlined and validated food price data capture and indicator compilation.

By developing a global partnership for monitoring the cost of a healthy diet, it is possible to have great impact – by shifting dialogue towards the problem of lack of access to nutritious food. A change in perspective, driven by new indicators, is the starting point for taking action to improve access to nutritious food around the world.

FAO AGRICULTURAL DEVELOPMENT ECONOMICS WORKING PAPERS

This series is produced by the Food and Agriculture Organization of the United Nations (FAO) since 2001 to share findings from research produced by FAO and elicit feedback for the authors.

It covers different thematic areas, such as food security and nutrition global trends and governance; food security and resilience; sustainable markets, agribusinesses and rural transformations; and climate-smart agriculture.

The complete series is available at:
www.fao.org/agrifood-economics/publications/working-papers

The Agrifood Economics Division (ESA) is the focal point for FAO's research and policy analysis on agricultural and economic development. The Division produces evidence-based policy analysis and strengthens the capacity of Member Nations to improve decision-making on food security and nutrition, resilience, climate-smart agriculture, sustainable markets, agribusinesses and rural transformations.

CONTACTS

Agrifood Economics Division – Economic and Social Development
ESA-Director@fao.org
www.fao.org/agrifood-economics

Food and Agriculture Organization of the United Nations
Rome, Italy

ISBN 978-92-5-136690-5 ISSN 2664-5785

9 789251 366905
CC1169EN/1/07.22