*N238 – Economics for Food and Nutrition Policy Friedman School of Nutrition, Tufts University*

**Least-Cost Diet Exercise: Prices, Nutrients and the Cost of Nutrient Adequacy
Fall semester 2023**(Updated prices will lead to different least-cost diets at different times and places)

**Note:** This Word document accompanies an Excel workbook in which the exercise itself is done. The full text of the document is very long and detailed, providing enough context to fully explain the data and methods being used. The Excel workbook is designed to be self-revealing, so you can just start doing the exercise by opening the workbook and following the directions you see there. As you proceed, you will see puzzling or interesting aspects of the data and can return to this document for details. It will also be helpful to skim this whole document now so you have an idea of what’s here, and then revisit it later while you’re doing the work and ready to submit your written exercise using the Word template at the very end of this document.

This exercise provides a quick way for you to do three things:

1. **Discover how food choice relates to nutrient requirements**, using Excel to add up the cost of foods you might choose to consume on a given day in Boston, showing the fraction of nutrient needs that would be met by that dietary pattern. You will practice guessing what combination of foods can stay within lower and upper bounds for dietary energy and 20 essential nutrients at the lowest possible cost, and compare your guesses to the actual solution to that mathematical puzzle obtained using the “solver” feature of Excel.
2. **Compare a least-cost diet in Boston to what some of the world's poorest people actually eat**, and thereby build familiarity with the main kinds of data we have about dietary patterns around the world, and how human diets relate to the least-cost ways of meeting nutrient requirements.
3. **Observe and begin practicing how to transform raw data into meaningful tables**, using Excel to summarize, compare and contrast numbers in a way that can be pasted into a Word document and discussed in your exercise report. In later data analysis exercises and your course project, you will download raw data from a variety of websites to make professional-looking figures. Finding and downloading raw data that you then transform into useful tables and charts is the key skill for any kind of data analysis. An excellent introduction to data visualization is the APA style guide: <https://apastyle.apa.org/style-grammar-guidelines/tables-figures>.

Step 1 of the exercise involves guessing at and then using your computer to find a daily diet that would meet all nutrient requirements at the absolutely lowest possible cost per day. These least-cost diets are a useful benchmark but are not what humans actually eat, first because many people do not meet their nutrient requirements (and thereby face a higher burden of disease), and also because people seek things from food other than just nutrients (such as taste, convenience and cultural significance). Even for people who care only about their health, achieving nutrient adequacy is just one step towards a healthy diet. Recommendations such as the Dietary Guidelines for Americans ([www.dietaryguidelines.gov](http://www.dietaryguidelines.gov)) call for larger quantities of fruits and vegetables and other criteria beyond nutrient adequacy, based on clinical and epidemiological evidence about the value of components other than essential nutrients. Friedman School research on how least-cost diets for nutrient adequacy relate to the least expensive way of adhering to dietary guidelines is described here: <https://sites.tufts.edu/foodpricesfornutrition>.

The question of what is a least-cost diet that supplies just enough nutrients to stay healthy has been asked ever since the presence of essential nutrients in foods was discovered in the early 20th century. Mathematical solutions to the problem were first developed during World War II for the purpose of allocating food rations and also formulating livestock feed.  Cows and pigs are still fed least-cost diets on a routine basis and computing them for people provides useful insights into the economics of food and nutrition. In this exercise, we use least-cost diets as a benchmark to reveal which nutrients are most expensive for people to obtain from locally available foods, and use the differences between least-cost diets and actual food consumption to see what else drives food choice beyond just nutrients. For use in dietary recommendations, we would need to add other criteria for a healthy diet, and other factors affecting food choice such as preparation time, culinary traditions and personal preferences.

A least-cost diet, defined as that combination of foods that meets a person's minimum nutrient requirements at the lowest possible total cost, is not a realistic description of what most people actually eat -- but it is very informative, if only to reveal what else besides minimum nutrient requirements is being consumed. In the first part of this exercise, your task is guesswork, to select just enough of the right foods needed to meet your estimated nutrient requirements at the lowest possible total cost. In the second part of the exercise, your task is to compare the foods you selected with diets that the world’s poorest people actually eat. The third purpose of this exercise is to see and begin practicing how best to transform real data into presentation-quality tables using Excel. That skill is very helpful for many jobs, and we will return to it in four more data analysis exercises later in the semester. Since some students have not had much (or any) previous opportunity to make your own tables and charts, this is an important opportunity to learn how to do that. You are free to share Excel tips with other students, but the final tables and explanations of your findings should be your own work.

When working with data it is especially important to watch out for definitions and units of measure. Your document must clearly explain what your numbers represent, with definitions for each acronym (such as DRI) and labels for each unit of measure (mg, kcal etc.). Every table must have an appropriate title and a note below the table describing the data as in the preformatted tables provided with this exercise, and be accompanied by brief summaries in plain English immediately above or below that refer to a few of the numbers in each table. Presenting your own calculations in this way is an important professional skill that leverages your understanding of the economic forces behind your data.

In the end, you should save your Word document and convert it to PDF form before uploading to Canvas. Converting to PDF will ensure that formatting is preserved, and the document should be formatted like any report (for example, your course project). A template for this is provided along with this assignment. At the top please include your name and email address, the purpose of the document (course number, course title, and assignment information), a title for the report itself and the date of last revision. A great introduction to social science writing is the APA style guide, including their explanation of tables (and figures): <https://apastyle.apa.org/style-grammar-guidelines/tables-figures>.

**1. A least-cost diet in Boston**

The first part of this exercise focuses on the prices and nutrient composition of foods currently available in Boston. The accompanying Excel file provides information on 50 food products in five categories, designed to facilitate understanding and build intuition about the least-cost diet problem.

***1.1 Dietary reference intakes (DRI) values***

The first sheet of your workbook, labeled “1.NutrientRequirements”, contains U.S. Institute of Medicine (IOM) estimates for recommended lower bounds and upper limits on dietary energy plus 22 essential nutrients for which upper and lower bounds have been measured and published by the U.S. National Academies. These data have been already downloaded for you from the USDA Food and Nutrition Information Center, <https://www.nal.usda.gov/fnic/dri-calculator>, and formatted in a way that clearly reveals target levels for energy balance, and the lower or upper bounds for a healthy population of men and women aged 19-30 years old as defined by the World Health Organization.

For this introduction to the economics of food choice, we use the Recommended Daily Allowance (RDA), which would be adequate for almost all (at least 97.5%) people in their demographic group, as a lower bound for 22 essential nutrients. For clinical or public health purposes, nutritionists would consider many other aspects of diet quality associated with health and longevity such as dietary patterns and the food matrix, lipid quality, and phytochemicals or other factors. Students who are interested in diet quality and not already familiar with the strengths and limitations of DRI data should review their definition and usage in the original source documents, at <https://ods.od.nih.gov/HealthInformation/nutrientrecommendations.aspx>.

***1.2 Food cost and composition***

The second sheet of your workbook contains data on a selection of foods available for home delivery from <http://peapod.com> in the area around the Friedman School (zip code 02111). A typical U.S. grocery store carries over 30,000 distinct food items, with prices and items fluctuating over time. The specific selection of products and prices were obtained in early September 2022. Each is a typical version of a commonly consumed food that one might expect to see in everyday use by a variety of low-income households. These prices reflect what happened to be available that day from this particular vendor, rather than average prices from many grocery outlets over an entire month or year.

To illustrate food choice, items are grouped into five broad categories for ease of comparison among products that might substitute for each other. For each item, data shown are the price per package and corresponding price per serving, based on package and serving sizes that are shown in both natural units such as one apple or one cup of blueberries, and also metric units such as grams. Data on the nutrients in each serving were downloaded from the USDA National Nutrient Database at <https://fdc.nal.usda.gov>

and are shown in their respective scientific units of measure such as kcal, g or mg.

**1.3 Guesswork: How close to a least-cost diet can you get without higher mathematics?**

The remaining sheets allow you to enter the number of servings you might choose of each item. When you enter a number in the highlighted cells, formulas in row 13 at the top of each column will then calculate the total cost per day, and the amount of each nutrient obtained. Formulas then compare those hypothetical nutrient intakes to the DRI values. Cells are colored reddish when outside their DRI bounds, and blueish when within bounds for a nutrient-adequate diet. Shading is darker when farther from the boundary, and lighter when closer to 100%. Cells which are at the boundary have bold text at exactly 100%. In DRIs, lower bounds (row 8) are based on RDA, AI or AMDR criteria ; upper bounds (row 9) are based on UL, CDDR or AMDR criteria. Dietary energy balance is both an upper and lower bound, so appears in both rows. At the mathematically exact least-cost diet for nutrient adequacy, energy and a few other cells would at precisely 100%, no cells would be red, and the number of limiting nutrients (at 100% in bold) will exactly equal the number of foods included in the diet. Nutrients that are not colored are not binding, so only those that are colored influence the cost and composition of the least-cost diet. The exactly least-cost diet is practically impossible for a human to find, but can quickly be computed by Excel as shown in the worksheets marked "Solved", which you should look at after experimenting with guesswork.

Your first task in this exercise is to experiment with the mix of foods that might come close to meeting the DRIs at lowest cost, until you reach a guesswork diet that gets as close as you can to that goal. For example, starting with the first food in your spreadsheet, it turns out that a healthy woman whose diet consists of exactly 25.5 apples would achieve energy balance and adequate levels of a few micronutrients, but she would have a terrible stomachache and many other problems including excess carbohydrates and many nutrient deficiencies. That diet would also be very expensive. As you adjust the number of servings for various foods, you will see how the balance of nutrients changes, and how total diet cost rises and falls. Your task is to use your considerable knowledge of food and nutrients, as well as the power of your spreadsheet, to keep guessing until you run out of time and patience.

Finding a mix of foods that would actually meet all DRIs is extremely difficult to do by guesswork, and basically impossible to guess at least cost. You are not expected to actually meet that goal, but to make and describe your guesswork in a way that demonstrates the logical principles involved. As in real life, the portion sizes used here are merely indicative, and you can choose any number or fraction of portions for each food included in a given diet plan. The fun of this exercise comes from being able to alter diet plans quickly and observe their consequences for nutrient intake, without harming any people or lab animals and without spending actual money. Experimenting with different quantities of various foods in this computer simulation allows you to discover for yourself some of the underlying principles that govern the relationship between food choice, nutrient adequacy and diet cost.

Your written report should compare and contrast two guesswork diets for a woman and two for a man. The guesswork diets will not actually meet all DRIs, and will definitely not do so at least cost, because doing that would require use of advanced math with the Excel solver. The goal of this exercise is to use your mind to guess at and then describe four diet plans that can be summarized in two kinds of tables:

-- Table 1, showing the quantity of each food in the four diet plans and their total cost per day, as well as the corresponding result obtained using mathematical programming by the Excel solver; and

-- Table 2, showing the quantity of each nutrient in each diet, and their adequacy as a percentage of the lower or upper bound in the U.S. DRIs. To fit on a page this table is divided into two parts. A corresponding Table 3 is also provided to show nutrient composition of the true least-cost diet as computed by the Excel solver.

Tables 1, 2, and 3 are already constructed for you on separate sheets of the workbook. Their contents will be filled in automatically from the data in other tabs, including especially the quantities of each food that you choose in the four Guesswork sheets. You can paste these tables directly into a Word document. As in any report, each table must be numbered with a brief title above the table and detailed notes below it that describe the original source of your data and provide any definitions not already stated in the title and labels for the rows and columns of your tables.

Below the tables, summarize any insights from your guesswork in response to the following questions:

(a) How does the number and type of foods consumed affect the cost of meeting these DRIs? In other words, what level of diet diversity helps you get closer to DRIs at lower cost, and what types of foods should be included?

(b) Beyond dietary diversity, what individual foods are most likely to appear in least-cost diets, and why? Which foods are likely to be needed in relatively large quantities, and which foods could be consumed in small quantities?

(c) How do the differences in DRIs for women and men affect the least-cost diet? In other words, what are differences in DRI values for macro- and micronutrients, and what are the corresponding differences in your chosen diet plans? To illustrate your answer, the plans in your report should have some similarities but also differences between women and men.

***1.4 Comparing guesswork to the true least-cost diet today, and Stigler’s original least-cost diet of 1939***

A fun aspect of this exercise is to compare your guesswork to the exact true result found by Excel’s algorithms, giving the precise mix of foods that meets all DRIs at lowest total cost. You can also compare these results, obtained with modern foods at recent prices, with the original least-cost diet that was formulated by George Stigler in 1939 as detailed here: <https://en.wikipedia.org/wiki/Stigler_diet>.

To see the true least-cost diet in Boston you can look in your workbook at the sheets marked "Solved". You can also make Excel calculate this exact solution yourself, by:

-- For each sheet, Review | Unprotect Sheet to permit modification; and

-- In the search box, find and add in the “Solver”, which then appears under Data | Analysis. When you click on the Solver, Excel will have remembered the following settings, based on the total diet in row 13 of each sheet:

-- Objective:

Minimize the total cost of all foods included in the diet (cell B13); subject to

-- Constraints:

 Maintain energy balance, by setting total intake equal to needs (F13 = F4) [row 4];

 At or above lower bounds for all nutrients (G13 ≥ G5, H13 ≥ H5,…, AB13 ≥ AB5) [row 5]; and

At or below upper bounds where needed (G13 ≤ G6,…, H13 ≤ H6,… Z13 ≤ Z6) [row 6]

A checkbox in the Solver command includes additional constraints that food quantities cannot be negative. The command also specifies that the solution method is the “Simplex” developed in response to Stigler by George Dantzig, using the least-cost diet as an example of many other optimization tasks. The least-cost diet found by Excel depends on the list of foods, their prices and nutrient contents, as well as the DRI requirements for each nutrient. If you want to explore further, you can use this workbook to conduct a variety of sensitivity analyses. You can also read all about our research using larger-scale versions of this exercise, in the Food Price for Nutrition project described at <https://sites.tufts.edu/foodpricesfornutrition>.

For this exercise, briefly compare your guesswork to Excel’s exact solution, and compare both of them to Stigler’s original guess at a least-cost diet in 1939. In your guesswork, did you choose the same foods as Stigler did for his project, almost 80 years ago? Did you choose the same foods as Excel’s Solver? How did these choices differ, and to what extent have the many changes in the U.S. food environment since 1939 altered the foods that would be included in a least-cost diet?

**2.  What do the world’s poorest people *actually* eat?**

The second part of this exercise asks you to describe what people eat in the world’s poorest food environments, and compare that to your insights from part 1. We do not expect even the world’s poorest people to consume exactly a least-cost diet, if only because many people do not actually meet their DRIs. They may also spend more than the minimum required to obtain nutrients, because other factors also matter for food choice such as cooking time and digestibility.

In the exercise we look at the average quantities per person per day of various foods consumed by a whole population. This differs from an individual’s diet in part because it is the average over many people, and therefore includes more different foods than any one person might ever eat. There are two possible ways to measure food consumption:  one is by asking people to record what they ate, and the other to infer what they ate by subtraction, as the balance obtained by adding up food production plus purchases minus sales, nonfood uses and waste.  Each method is useful for different aspects of food consumption, so we’ll use both in this exercise:  first the national Food Balance Sheets that show a country’s total food use per person of the type that FAO calculates for all countries every year, and then a national Household Consumption and Expenditure Survey of the type conducted in most countries every few years.

We’ll focus on Ethiopia, which is one of the world’s poorest countries and is the focus of many development efforts.  By definition, a national Food Balance Sheet can provide only the whole country’s average per capita, while Food Consumption Surveys allow disaggregation to subsets of the population, in this case to compare poorer versus richer people within Ethiopia.  We can also compare the per-capita average from the two methods, to get a sense of their strengths and limitations.

***2.1 FAO Food Balance Sheet (FBS) data***

For total national food supplies, the Food and Agricultural Organization (FAO) of the United Nations maintains “balance sheets” to account for all items produced and consumed in each country. These are based on each government’s official statistics. Since consumption is the most difficult variable to observe directly it is obtained by subtraction, from the government’s estimate of total national production plus imports minus exports, feed or other uses and estimated loss or waste up to the point of household acquisition. By definition, Food Balance Sheet data refer to a national total so distribution among people is unknown. Since consumption is not observed directly, this measure of how much food was used for food is referred to as "food supply" in FAOSTAT, and as "disappearance" in other data sources; its definition differs from per-capita dietary intake by the amount of kitchen and plate waste.

***To speed up the exercise, a well-formatted version of the final table is appended to the assignment document, for use as Table 4 of your report.*** You can use that table directly, but should be aware of the how it was constructed so that you can make charts and tables from this kind of data in later exercises this semester. The source of these FAO data is <https://www.fao.org/faostat/en/#data/FBS>. Once in the FAOSTAT site, if you wanted to reconstruct this table, you would:

o Click on "Metadata" are read their description of the FBS carefully

o Click on “Download Data”, and then: (a) under "Countries", choose the countries or regions of interest, (b) under "Elements" ” choose "Food Supply (kcal/capita/day)” and any other quantities of interest; under "Items" choose either individual food commodities or use "Items Aggregated" to select categories labeled “+(Total)” to obtain the sum of items in that category, and under “Years” choose those of interest.

o Experiment with downloading the data of interest. Always copy the sheet in your workbook and save your work frequently so that you can revert to a previous version if necessary, after the inevitable errors.

The actual Table 4 provided for you contrasts the two initial years of FAO data (2010 and 2011) and two recent years (2018 and 2019), in a way that is designed for ease of comparison with the Ethiopian government’s national household survey described below. The two types of data differ in various ways, and taken together they provide a clear view of dietary patterns in Ethiopia.

***2.2 National household survey data***

For diet recall data, Ethiopia’s Central Statistical Agency (www.csa.gov.et) conducted a nationally representative Household Consumption Expenditure Survey (HCES) in 2010/11, for ease of comparison with the FAOSTAT data for that year. Reports from the survey are most conveniently downloaded from the International Household Survey Network (IHSN).

***To speed up the exercise, a well-formatted version of the final table needed for your exercise is appended to this assignment document, for use as Table 5 of your report.*** You can use that table directly, but as always you should be aware of where data comes from so that you can make charts and tables yourself in later exercises this semester.

o  To understand the context of this particular survey, open the Analytical Report with descriptive statistics and read its first ten pages (Executive Summary, then Introduction and Summary): <http://catalog.ihsn.org/index.php/catalog/3123/download/46156>

o  If you are very curious about details of the survey, such as sampling methods and the questionnaire, those are provided by the IHSN here: <https://catalog.ihsn.org/index.php/catalog/3123>

o  In brief, the survey description explains that respondents in each household were given a diary book to record all foods consumed each day, over seven consecutive days. The totals were recorded on a questionnaire, and then used to compute the household’s average consumption of each food per day, per adult-equivalent person. Adult-equivalent scales are based on estimated energy requirements of people at each age and sex; the one used in this case counted a child at 24 mo. as consuming one-half of an adult’s food use.

o  For this exercise, our interest is to see overall diet composition in a way that can be compared to your guesswork about least-cost diets in Boston (part 1) and also compared to the FAO’s Food Balance Sheet for Ethiopia (part 2.1). Here, for part 2.2 of the exercise, the data needed show food consumption per adult-equivalent person from each category of food, for survey respondents in each quintile of income from poorest (quintile 1) to richest (quintile 5). Results in your preformatted Table 5 are transcribed from Table 36 on p. 75 of the Analytical Report.

**3. Discussion**

From your tables, you can discuss the evidence you’ve found regarding the following questions:

(a) What are the main similarities and differences in dietary patterns between the least-cost diets in Boston from Part 1 and the real-life national average consumption levels you found in Part 2 for Ethiopia? The specific foods in your Boston food basket may not fit neatly into the categories used in either the food balance sheet or household survey data in Ethiopia, and those data sources group foods in slightly different ways, but the comparison will reveal important similarities and differences. Please include a brief description of how Ethiopian diets changed over time using the FAO Food Balance Sheets (Table 4), and how they compare among poorer versus richer Ethiopians using the recall data from their household survey (Table 5).

(b) What can you infer from the Ethiopian data about the adequacy of their diets, first in terms of total available calories and protein from the FBS data (Table 4) and then in terms of diet quality at each level of household income and expenditure (Table 5). You need not calculate micronutrient adequacy of the Ethiopian diet, and in any case that would be measured with considerable error so you should focus only on the big picture of diet quality in these data.

(c) Finally, what lessons can you draw from this exercise for interventions to lower the cost and improve affordability of meeting nutrient requirements in Boston and in Ethiopia? Even without knowing anything about variation in requirements among people, do the data discussed here offer any insight into how the food environment affects the cost of nutrient adequacy? In particular, consider the difference between fortification (by which nutrients are added to foods before sale), supplementation (by which nutrients such as vitamin A are provided separately from foods), and food assistance (by which people are helped to obtain additional quantities of ordinary foods). What factors might lead to preferring one strategy over the other?

Since this is just the second of twelve weekly exercises, this is a good time to set up a folder structure and file naming convention that will help you manage your work quickly and effectively.

Some key points are:

*-- Keep improving.* Computers are like kitchens: a little chaos is fine, but if you devote some effort to occasional cleaning and organizing, the rest of your time will be much more productive and fun.

---*Make names as short as possible, but no shorter*. Most likely you should have a folder for the whole course, maybe called “*…\Courses\N238-Economics*”, and subfolders for each activity for example this one could be “*…\WeeklyExercises\Ex2-LeastCostDiets*”. Using the fewest possible letters is helpful because it identifies the essential information needed to avoid confusion, by distinguishing the key facts about each thing.

-- *Think ahead to what your future self, and other people, will need.* One key to success is realizing that your future self, and other people, will need different things from what you are now thinking. For example, you will be tempted to write “FINAL” in the filename, to distinguish it from the draft version you just had. That is a mistake. Do not do this. Other people will receive only one file, and you will often want to continue revising the file called “FINAL”, so what’s useful to you in the moment will be confusing to everyone (including yourself) in the future. A much better approach is to create a subfolder called “…\archive” inside every working folder, and put everything that’s not the most recent version there.

With all that, you’re ready to submit your first economics report! These detailed guidelines and the accompanying Excel sheet with its preformatted tables should help you quickly discover new skills and unexpected insights into the economics of food and nutrition.

*Template for clear and simple scientific or scholarly documents*

This document’s identifying information

**This document’s title**

The least-cost diet exercise…

*The first words of every paragraph should be its topic, so that readers can quickly scan the first few words and quickly see what’s there. Also you should include an introductory paragraph just below the document’s title and below every section heading, explaining its content and purpose.*

**1. A least-cost diet in Boston**

Part 1 of this exercise…

*This section will have your explanation of what you did to compute the results you should paste in here as Tables 1 and 2, and also Table 3. These would be pasted here in table format, rather than as an image, so that you can edit the text as needed to customize your work. In this case the tables have been preformatted for you, so that you can focus on your guesswork diets and discussing the results here.*

*When pasting tables, they should be formatted to fit on one page if possible. If a table spreads onto two pages, the continuation of the table needs a separate heading at the top of that page saying “Table # (continued)”, with the column headings repeated, so that the reader can quickly understand what is being shown.*

*As with all writing, the challenge is to do as much editing and formatting as you can, within the time available. If you run out of time and need to take shortcuts, that’s OK. Just always remember that the more you edit and format your writing in a reader-friendly way, the more likely they are to trust you and understand what you have written.*

**2. What the world’s poorest people actually eat**

Part 2 of this exercise….

*This section will have your explanation of how Tables 4 and 5 were constructed, and what they imply about diet quality of very low-income people. You can use the preformatted Tables 4 & 5 below, but must explain in your own words how they were made and what they mean.*

**3. Conclusions**

Comparing least-cost diets in Boston to observed food consumption in Ethiopia…

*This section will have your response to question prompts (a), (b) and (c) that summarize the exercise.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 4. Food balance sheet data for Ethiopia, 2010-2011 and 2018-2019** |  |  |  |  |
| **Panel A. Dietary energy (kcal/person/day)** |  |  |  |  |  |  |
|   |   | 2010 | 2011 |   | 2018 | 2019 |   |
| *Grand Total* | 2,212 | 2,228 |  | 2,452 | 2,439 |  |
|  | Vegetal Products | 2,068 | 2,109 |  | 2,349 | 2,338 |  |
|  | Animal Products | 144 | 119 |  | 103 | 101 |  |
| *Starchy staples* |  |  |  |  |  |  |
|  | Cereals - Excluding Beer | 1,601 | 1,610 |  | 1,623 | 1,656 |  |
|  | Starchy Roots | 62 | 64 |  | 205 | 201 |  |
| *Pulses, nuts and seeds*  |  |  |  |  |  |  |
|  | Pulses (e.g. beans, lentils) | 206 | 211 |  | 209 | 200 |  |
|  | Oilcrops (e.g. groundnuts) | 11 | 15 |  | 22 | 9 |  |
|  | Treenuts | 5 | 5 |  | 4 | 4 |  |
| *Oils and fats* |  |  |  |  |  |  |
|  | Vegetable Oils | 53 | 66 |  | 95 | 77 |  |
|  | Animal fats | 14 | 11 |  | 9 | 8 |  |
| *Fruits and vegetables* |  |  |  |  |  |  |
|  | Fruits (excluding wine) | 11 | 11 |  | 14 | 14 |  |
|  | Vegetables | 15 | 15 |  | 14 | 13 |  |
| *Animal-sourced foods*  |  |  |  |  |  |  |
|  | Milk (excluding butter) | 79 | 63 |  | 51 | 51 |  |
|  | Eggs | 1 | 1 |  | 1 | 1 |  |
|  | Fish and seafood | 0 | 0 |  | 1 | 1 |  |
|  | Meat | 46 | 40 |  | 37 | 36 |  |
|  | Offals | 4 | 4 |  | 3 | 3 |  |
| *All other items* |  |  |  |  |  |  |
|  | Sugar and sweeteners | 59 | 61 |  | 92 | 96 |  |
|  | Spices | 32 | 33 |  | 42 | 41 |  |
|  | Alcoholic beverages | 10 | 14 |  | 24 | 24 |  |
|  | Stimulants | 2 | 3 |   | 5 | 3 |   |
|  |  |  |  |  |  |  |  |
| **Panel B. Percent of food consumption by food group (share of dietary energy)** |  |  |
| Food group | 2010 | 2011 |   | 2018 | 2019 |  |
| *Starchy staples* | 75% | 76% |  | 83% | 84% |  |
| *Pulses, nuts and seeds*  | 10% | 10% |  | 11% | 10% |  |
| *Oils and fats* | 3% | 3% |  | 5% | 4% |  |
| *Fruits and vegetables* | 1% | 1% |  | 1% | 1% |  |
| *Animal-sourced foods*  | 6% | 5% |  | 4% | 4% |  |
| *All other items* | 5% | 5% |   | 7% | 7% |  |
|  |  |  |  |  |  |  |  |
| **Notes:** Data shown are estimated total quantity of each food used for human consumption in Ethiopia, obtained from total production plus imports minus exports, feed or other uses and estimated loss or waste up to the point of household acquisition. By definition, Food Balance Sheet data refer to a national total so distribution among people is unknown. Since it is not observed directly, this measure of how much food was consumed is referred to as "food supply" in FAOSTAT, and as "disappearance" in other data sources; its definition differs from per-capita dietary intake by the amount of kitchen and plate waste, and differs from survey averages due to measurement error in each kind of data.  |
| **Source:** Calculated from data in FAO (2021), Food Balance Sheets. Downloaded 26 Dec 2021, from https://www.fao.org/faostat/en/#data/FBS. |

|  |
| --- |
| **Table 5. Dietary recall data on food consumption in Ethiopia, 2010/11** |
| **Panel A. Dietary energy (kcal/day), per adult equivalent person** |
|  |  |  |  |  | poorest |  | middle |  | richest |
|   |   |   | *Total* |   | 1 | 2 | 3 | 4 | 5 |
| *Total* |  |  *3,005*  |  |  2,391  |  2,768  |  2,921  |  3,143  |  3,451  |
| *Starchy staples* |  |  |  |  |  |  |  |  |
|  | Cereals |  |  *1,740*  |  |  1,402  |  1,634  |  1,734  |  1,834  |  1,921  |
|  | Potato, tubers & stems |  |  *407*  |  |  392  |  430  |  423  |  423  |  372  |
|  | Injera (bread & others) |  |  *58*  |  |  38  |  42  |  48  |  62  |  84  |
|  | Pasta  |  |  *12*  |  |  2  |  4  |  9  |  10  |  28  |
| *Pulses and oilseeds* |  |  |  |  |  |  |  |  |
|  | Pulses |  |  *202*  |  |  156  |  191  |  208  |  218  |  216  |
|  | Oilseeds |  |  *5*  |  |  4  |  5  |  5  |  5  |  5  |
| *Oils and fats* |  |  |  |  |  |  |  |  |
|  | Oils and fats |  |  *130*  |  |  59  |  92  |  110  |  134  |  208  |
| *Vegetables and fruits* |  |  |  |  |  |  |  |  |
|  | Vegetables and fruits |  |  *63*  |  |  53  |  59  |  60  |  64  |  75  |
|  | Spices and condiments |  |  *43*  |  |  37  |  39  |  39  |  42  |  52  |
| *Animal-sourced foods* |  |  |  |  |  |  |  |  |
|  | Milk, cheese & egg |  |  *36*  |  |  18  |  28  |  31  |  42  |  49  |
|  | Meat |  |  *15*  |  |  2  |  5  |  7  |  13  |  39  |
|  | Fish |  |  *1*  |  |  1  |  0  |  1  |  1  |  2  |
| *All other items* |  |  |  |  |  |  |  |  |
|  | Other food items |  |  *67*  |  |  33  |  46  |  53  |  66  |  111  |
|  | Foods away from home |  |  *72*  |  |  81  |  66  |  62  |  67  |  85  |
|  | Non-alcoholic beverages |  |  *6*  |  |  1  |  3  |  5  |  6  |  10  |
|  | Coffee, tea & hops |  |  *61*  |  |  58  |  64  |  57  |  69  |  56  |
|   | Alcoholic beverages |   |  *88*  |   |  55  |  60  |  72  |  88  |  139  |
|  |  |  |  |  |  |  |  |  |  |
| **Panel B. Percent of food consumption by food group (share of dietary energy)** |
|  |  |  |  |  | poorest |  | middle |  | richest |
|   |   |   | *Total* |   | 1 | 2 | 3 | 4 | 5 |
| *Total* |  | *100%* |  | 100% | 100% | 100% | 100% | 100% |
| *Starchy staples* |  | *74%* |  | 77% | 76% | 76% | 74% | 70% |
| *Pulses and oilseeds* |  | *7%* |  | 7% | 7% | 7% | 7% | 7% |
| *Oils and fats* |  | *4%* |  | 2% | 3% | 4% | 4% | 6% |
| *Vegetables and fruits* |  | *4%* |  | 4% | 4% | 3% | 3% | 4% |
| *Animal-sourced foods* |  | *2%* |  | 1% | 1% | 1% | 2% | 3% |
| *All other items* |   | *10%* |   | 10% | 9% | 9% | 9% | 12% |
|  |  |  |  |  |  |  |  |  |  |
| **Notes:** Data shown summarize household-level recall of all foods consumed each day over seven consecutive days from a nationally representative household survey, transcribed from page 75 (Table 36) of the source. Survey averages may differ from food balance sheets due to measurement error in each kind of data, and in this case survey data are reported per adult-equivalent in each household based on age and sex of the person (for example, infants 0-1, 1-2, and 2-3 are counted as 0.33, 0.46, and 0.54 adult equivalents), whereas quantities in food balance sheets are per person of any age.**Source:** Federal Democratic Republic of Ethiopia Central Statistical Agency, Household Consumption and Expenditure Survey 2010/11: Analytical Report. Addis Ababa, October 2012. Available online at: <https://catalog.ihsn.org/index.php/catalog/3123>.  |