

SUBSISTENCE COST DIET PROJECT

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With a growing world population, everybody's gotta eat. The idea of this project is to characterize *subsistence* diets which deliver adequate nutrition. Formally, we're looking for the *minimum cost diets* for people of different types which nevertheless satisfy a set of dietary requirements.

1. DELIVERABLES

We'll start this project with a working prototype, for you to explore improving and exploring.

A: These deliverables are *required*. Note that other deliverables may rely on completion of A deliverables.

B: These deliverables are *very desirable*.

C: These deliverables would be *nice to have*.

1.1. **#A Description of population of interest.** This may be the most important decision you have to make. The minimum cost diet for vegan students in Berkeley will almost certainly be different from the minimum cost diet for rural villagers in India.

What population are you interested in? Contrasts may also be interesting. Some examples:

- Vegans vs. omnivores in Berkeley
- Refugees in Uganda
- The world population
- People who eat only at McDonalds
- Berkeley students living in Co-ops
- Americans in 1950 vs. Americans today
- The Indian population (perhaps accounting for dietary restrictions related to religion)

1.2. **#A Dietary Reference Intakes.** Write a function that takes as arguments the characteristics of a person (e.g., age, sex) and returns

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a `pandas.Series` of Dietary Reference Intakes (DRI's) or "Recommended Daily Allowances" (RDA) of a variety of nutrients appropriate for your population of interest.

1.3. **#A Data on prices for different foods.** Construct a google spreadsheet of different prices of different kinds of food. The different foods should be keyed to the USDA's *Food Data Central* database (<https://fdc.nal.usda.gov/>)

The foods and prices you use will vary depending on context and the particular population of people you're concerned with. For example, if you're concerned with people who eat only at McDonald's, you'll want prices and nutritional information for the McDonald's menu. If you want to think of minimum cost organic diet, you should consider a wide range of different organic foods.

1.4. **#A Nutritional content of different foods.** For all the foods you're considering you'll need to be able to describe their nutritional content, in terms that allow you to compare with recommended daily allowances. We'll provide pointers to US government recommendations, but many other countries have their own recommendations, which may be better suited to their populations.

1.5. **#A Solution.** What is the minimum cost diet for the population you're concerned with? How much does it cost, and of what does it consist? How does it vary with age, sex, and level of activity?

1.6. **#B Is your solution edible?** Turn your minimum cost diet into a meal. Make enough for the whole class. If making your diet palatable requires adding additional ingredients (e.g., salt or other spices) be sure to document this and account for it in the overall cost.

Whose meal is least costly? Whose is most tasty?

1.7. **#C Sensitivity of Solution.** In general, your solution will depend on relative prices of different kinds of food. And these prices can be quite volatile; for example, the prices of fresh fruits and vegetables usually exhibit a great deal of seasonal variation. If the price of a particular kind of food increases by $x\%$, how much does price of diet change, and how does the composition of the diet change?

Try and find an nice way to visualize these changes.

1.8. **#B What is total cost for population of interest?** You've been interested in a particular population. It is likely to consist of people of different sexes, ages, and levels of activity. How much food would be required to feed the entire population of interest? At what cost? (You may want to go back to the Population Project and look at counts of people by age and sex for different countries).

1.9. **#B Review of Your Code.** Have someone outside your group review your code. This need not wait until your code is final—a more productive code reviewer may happen earlier in the process. The most basic review will just verify that someone else can run your code, but will also usually involve reading over the code, identifying bugs, suggesting design improvements, etc. You can document the review by asking the reviewer to use `github.com` Issues.

1.10. **#B Review of Another Group's Code.** Just as you've asked some other person or group to review your code, serve as a reviewer for some other groups' code. The most basic review will just verify that someone else can run your code, but will also usually involve reading over the code, identifying bugs, suggesting design improvements, etc. You can document the review by submitting issues on `github.com`.

1.11. **#A Presentation.** Each group will be responsible for giving a 15 minute demonstration of the work they've accomplished during the sprint. Be creative! Think of awesome new ways to help others visualize what you've learned.