

Zero Hunger - Achieve Sustainable Consumption

UN Sustainable Development Goal - 2 & 12

End hunger, achieve food security, ensure sustainable consumption and promote sustainable agriculture

1. Web-map application purpose and target audience

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With our web-map we want to provide answers to the research question “How big is the inequality between missing food and food waste per person across the world?” by showing the spatial distribution on Earth at national levels. There are three possible target audiences: population, researchers and NGOs. We would like to raise the awareness of the population that food waste is a big problem that affects all the world over many aspects. In addition to the different thematic maps, the map design allows the user to retrieve several statistics for each country and perform a quick visual analysis of the food situation they are interested in. Furthermore, in the “map info” section we provide some links to projects and documentations related to food waste and its consequences. Additionally, since researchers and decision makers could also be interested in global food production and trade, to investigate why these inequalities exist and how to solve it, we developed ideas on how to implement this in our map.

2. Map data

We used data on a national level. The data are averages per person of a given country or total values per country. We processed and merged several data sheets with R software and computed some estimates to enhance the comprehension of the data. From the World Bank we took different data sheets like the “Depth of food deficit” (calories per person per day) and “Population”. The data are often available annually since more than 20 years. The map tries to show the situation in 2012, the year when the large amount of information is available. When we do not have data for 2012, we took values of the closest years.

The food waste data from OECD.stat and Eurostat were more heterogeneous (different authors and units) and the procedure for the estimations were not the same for each country. There are different national publications with different estimation methods existing. Some publications even categorize food waste from different sources along the food chain. A homogenization of food waste data and investigation methods is needed to increase their reliability and estimation accuracy. Since not all countries provide food waste data, further research and global campaigns on food waste are required!

3. Design process

It took a lot of effort to build an interactive and nice user-friendly interface. We had to first understand the principles of HTML, CSS, SQL, JavaScript, and jQuery language with the help of tutorials, and only then started to code the map. We looked at a lot of web maps and respective JavaScript code to understand how Carto.js works. “Blocks” of CartoDB Team on GitHub were particularly useful.

The country polygons are displayed with a WebMercator projection and the map extent is bounded in order to show a first overview of all continents (except Antarctica). We looked at different types of projections, but finally we decided to use WebMercator because users are accustomed to it. For example, equal area projection introduced data visualization difficulties in regions such as Europe (too small polygons, clustered

together), and correct area representation is not needed because the displayed data does not include areal information.

Key visualization design issues were given by the “format” of data. We were discussing and trying the use of bubbles and bars to display total amounts (i.e. per country), but we found the resulting maps harder to read and compare. Therefore, we preferred to implement three different thematic maps that shows the food inequality across the world with different units (meals, kcal and kg) and temporal scale (daily vs. annual). In facts, the data available are averages on a national level and are therefore better represented using filled country polygons. The use of symbols, or bubbles, may be misleading because their position inside (large) countries could be interpreted as local (sub-national) information.

The default layer represents meals wasted/missing per year per person, it is easily interpretable and clearly shows the pattern of the inequality, accentuated by the use of two different color scales (red and blue)

The other thematic maps can be selected on the upper right of the map using a “layer selector”. This button makes an SQL queries to the CartoDB server to retrieve the new required data, set new CartoCSS rules that define the style of the new thematic map and change the legend information.

A customized “tooltip infowindow” appear on a fixed position in the screen when the user is hovering over a country; the selected (hovered) country is additionally highlighted with a thicker white outline. Country information in the infowindow are displayed based on their availability, with units that change reasonably depending on attribute values dimension (i.e. per day or per year death rate). It has to be noticed that the infowindow could appear too long (overlapping the legend) if the zoom of the web browser is more than 100 %. The problem appears usually for laptops with small screen or on smartphones and we did not solve this. One possibility could be to move the infowindow on the left side of the map, but then the display results a bit “overloaded”.

The map info and the mentioning of the data sources are “hidden” and appear on clicking on a specific button situated on the lower left of the map.

We would also have liked to show the trade (and production) of food worldwide using great-circle vector lines spreading from the selected country (when clicking on it) to the commercial partners, but this would have required a further large amount of time and the processing of gigabyte of data.

4. Conclusion

The research of the data and background information was enjoyable, because the amount of information on the web was bigger than expected, the topic was interesting and we found mind blowing facts. The actual programming was amusing and frustrating at the same time. When the code and the map work, there is a feeling of success, while it’s demoralizing if you get stuck, don’t find the mistake or the solution to your problem.

5. Evaluation (additionally)

We evaluated our web map with an online survey answered by friends and other students. We asked about usability of the given tools and support of the map for analyzing the data. We got positive feedback and remarks on desired querying possibilities. They also pointed out some problems (i.e. legend hides New Zealand), that we partially solved.