CPSC 436V Final Report

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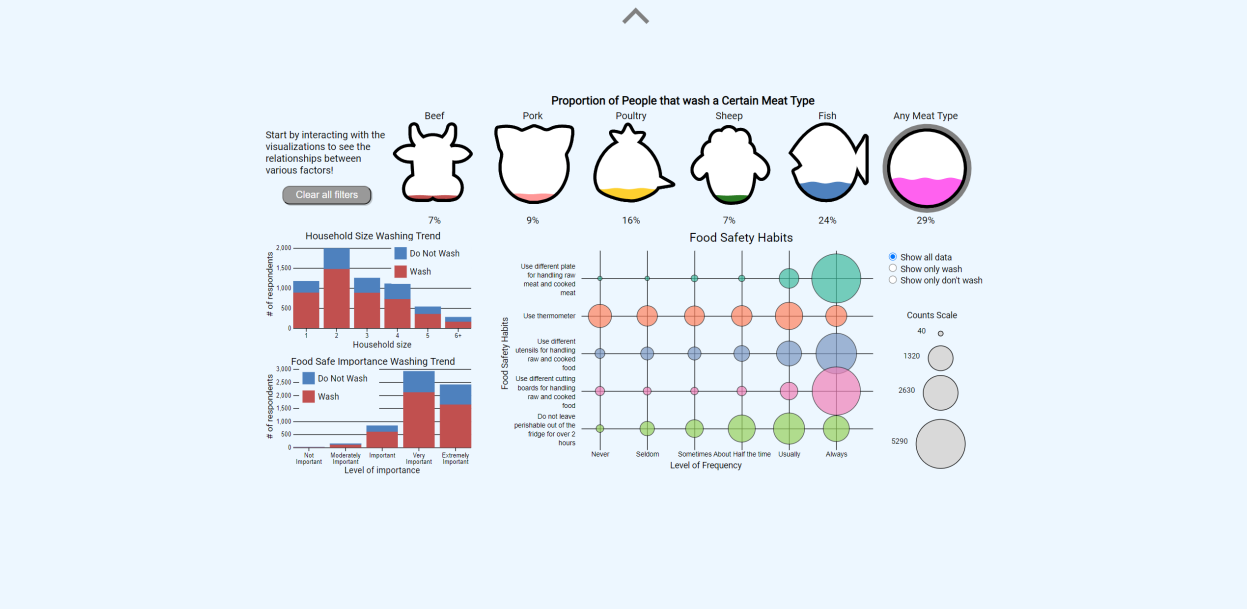
Overview



The Center for Disease Control recommends against the washing of raw meats before cooking, citing that doing so can spread harmful bacteria from the raw meat around your kitchen, potentially causing foodborne illnesses. However, for various different factors, there are people in America who still wash their raw meat. The reasons behind one's meat washing habits are widely varied by individual, thus making a generalized educational campaign difficult to reach intended audiences.

If we could identify the demographic of meat washers and the reasoning behind their actions, we could create more effective food safety campaigns that target these specific groups, and better educate the public.

Our visualization aims to serve as a guide for food safety experts who want to learn about the different meat washing habits of Americans, with data collected from a online survey conducted by popular YouTuber Chef Adam Ragusea.

It is comprised of two different components. A storytelling aspect where the user can learn about the trends and distributions of survey respondents' reasoning for washing/not washing meat, things they are trying to clean from their meat, and a exploration aspect where the user can interact with the visualization, to be able to determine relationships between various factors such as cooking habits, meat type, and demographics and meat washing tendencies.

Data 🐷

Data source

Our group chose to use a dataset about meat washing habits compiled by YouTuber Adam Ragusea. The dataset was obtained through this link that can be found in the description of Ragusea's Youtube video. The original dataset contains 13,526 responses and 68 attributes.

Data preprocessing

To preprocess and clean the data, we used R in a Jupyter notebook. We cleaned the dataset by appending new column names, addressing NA (null) values, and filtering the data to contain only respondents currently residing in America (there was a column with this specific information). We then selected 34 attributes relevant to the scope of our visualization, and filtering away the rest. We then divided the dataset into 4 separate CSV files.

Description of Exploratory Visualization attributes:

The first file will be used for the main exploratory visualization, including the liquid chart, bar charts, and proportional area matrix. The cardinality of the dataset is 6355 x 14. We also changed the dataset to use ones and zeros to represent wash and do not wash for each meat type.

These 13 attributes were from the original dataset :

- Household Size [ordinal, 6 levels]
- Food Safety Importance [ordinal, 5 levels]
- Meat Type (including: Pork, Beef, Poultry, Goat/Sheep, Ground Meat, Fish) [categorical, 3 levels]
- Cooking Habits (including: Using different plates for handling raw and cooked meats, Using a meat thermometer, Not washing raw food utensils for use on cooked food, Using the same cutting board for raw and cooked meat without cleaning, Leaving perishable food out for 2+ hours) [ordinal, 5 levels]

We created **1 additional attribute** to indicate if a respondent washes 1 or more of any of the meat types. We had to do this as the data from the original dataset only contains wash or no wash for each specific meat category.

- Wash Any Meat [ordinal, 2 levels]

Description of ScrollyTelling Visualization Attributes:

The other 3 CSV files will be used for the ScrollyTelling part of our visualization, including the sorted bubble chart and the bubble cloud. Each file contains 6354 observations. We addressed the NA values present in these CSVs by replacing them with 0.

The files contain the following attributes:

ScrollyTelling View 1 data : Reasons for Washing Meat

- 7 Attributes
- (Health and Safety of Meat, Religious Practice, Non Religious Practice, Improve Taste/Smell, Improve Texture, Improve Appearance, Other) [ordinal, 7 levels]
- We filtered the data for this visualization to only included responses from respondents who wash at least 1 type of meat

ScrollyTelling View 2 data : Reasons for Not Washing Meat

- 6 Attributes
- (Feel Like I Should But I Don't, Meat is Clean Enough, Follow Expert's Advice, Preserve Texture/Smell/Taste, Not Cultural or Religious Custom, Other) [ordinal, 6 levels]

ScrollyTelling View 3 data : What People are Washing Off Meat

- 8 Attributes
- (Pathogens, Artificial Chemicals, Debris, Undesirable Flavours, Blood, Slime, Fat, Meat Juice) [categorical, 2 levels]

After preprocessing we have a total of **35 attributes** we will be using summed across all our views.

Goals & Tasks 🐔

Lucia is an employee at the Center for Disease Control working in the Food Safety Department. She is assigned to run a campaign to educate the American population on safe food preparation habits, specifically to recommend against the washing of raw meats before cooking, as it can spread bacteria from the meat to the rest of the kitchen. She would like to know if a significant proportion of American citizens wash meat before cooking, and determine what sort of factors are related to meat washing habits.

Lucia would use this visualization in order to **[explore]** the dataset to gain a **[summarized]** explanation towards the major reasons behind meat washing, **[compare]** the distribution of meat washing tendencies against different factors (household size, type of meat, etc) and **[identify]** patterns or characteristics of people that wash meat in which she could focus her target audience.

She can view this summary by going through the **Scrollytelling Views** of the visualization, which will inform her on the popular reasons behind meat washing habits. Then in the **Exploration View** of the visualization, she will be able to spot the distributions of meat washing tendencies for 5 different types of meat, with the option to filter between different household sizes and food safety importance

levels. Through this, she might be able to notice that people living alone have a higher likelihood of washing chicken, and plan her campaign around this specific demographic.

Visualization

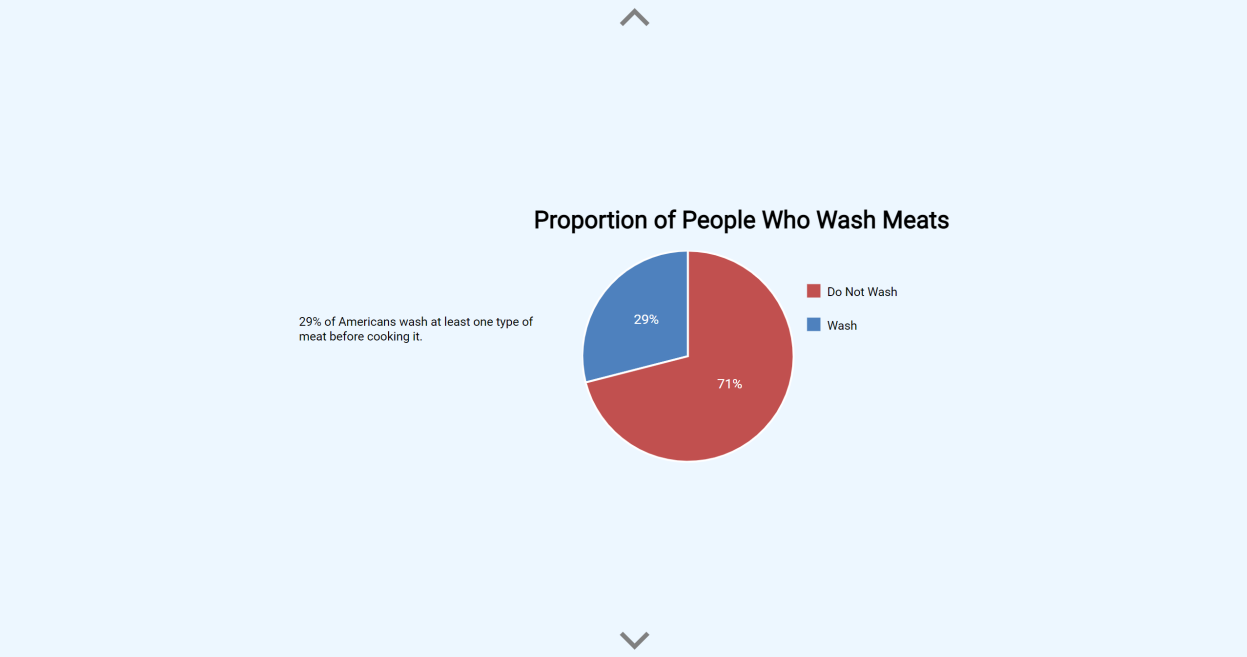
Overview of the Entire Visualization: Our visualization consists of two main sections: the Scrollytelling Visualization and the Exploration Visualization.

The Scrollytelling Views consist of three components with a pie chart, a sorted bubble chart, and a bubble cloud. The Exploration Views consist of another three linked visualization components with liquid charts, bar charts, and a proportional area matrix.

Scrollytelling View 1:

Viz Wash/Don't - Pie Chart

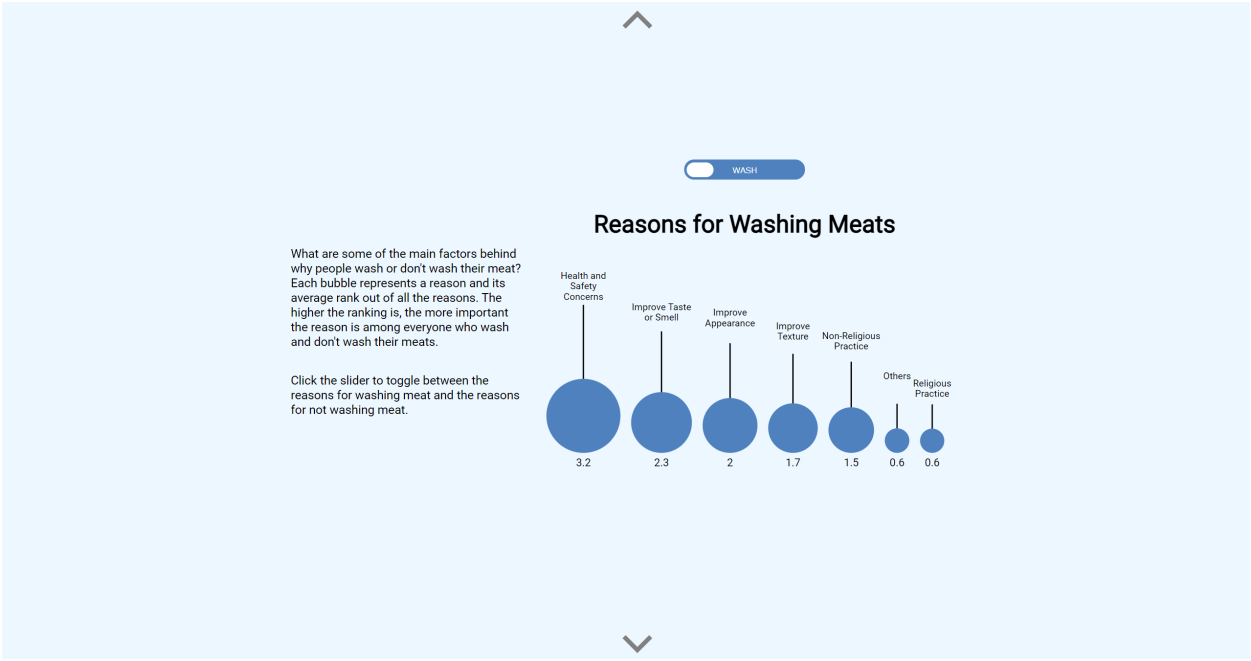
The pie chart shows the overall proportion of people who wash at least one type of meat and those who don’t wash any meats. A pie chart is great to [show] a part-to-whole relationship where we want to [highlight] the proportion of wash vs don’t wash meats. this serves as a quick intro to our visualization.

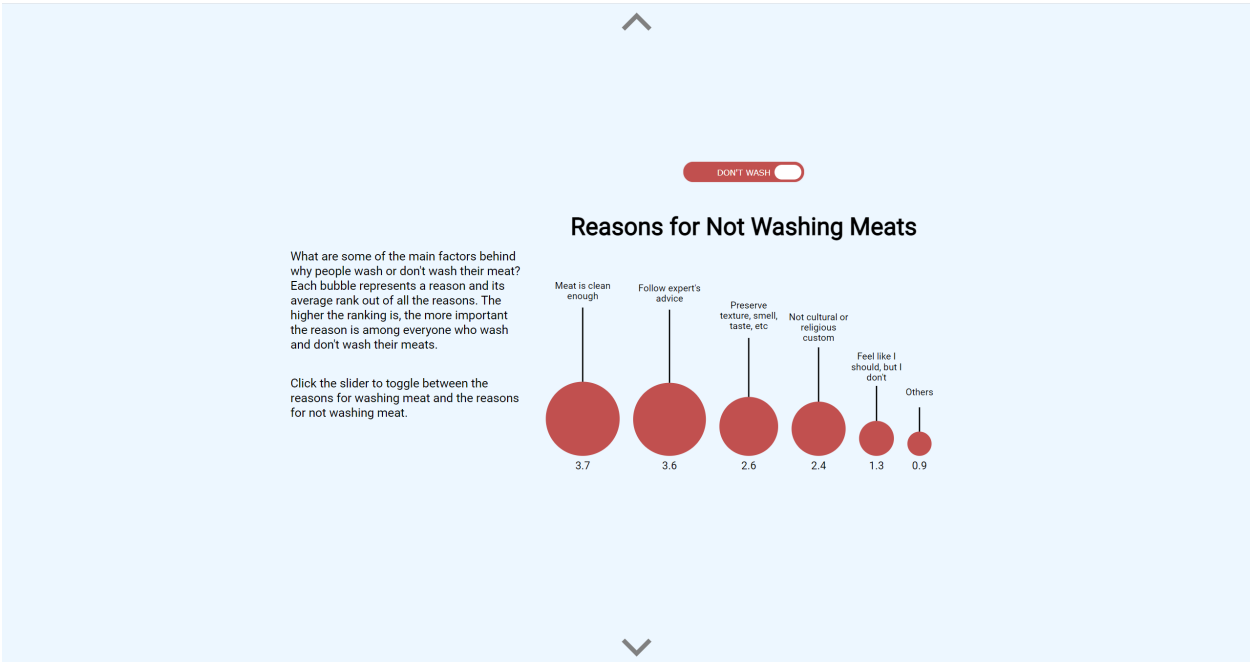


Scrollytelling View 2:

Viz Reasons - Sorted Bubble Chart

Either of the wash/don't wash bubble charts will be shown. The default is to show reasons for washing meat. The user can toggle to switch between reasons for not washing and washing meat. Each bubble represents a reason and the size encodes the average ranking for that reason. All the bubbles will be sorted from largest count to smallest count. The numerical average rankings and position on a common scale are the channels that we chose for this chart. They allow users to easily [identify] and [compare] the different reasons people have for washing or not washing their meat.


WASH
Reasons for Washing Meats
What are some of the main factors behind why people wash or don't wash their meat? Each bubble represents a reason and its average rank out of all the reasons. The higher the ranking is, the more important the reason is among everyone who wash and don't wash their meats.
Click the slider to toggle between the reasons for washing meat and the reasons for not washing meat.
Health and Safety Concerns
Improve Taste or Smell
Improve Appearance
Improve Texture
Non-Religious Practice
Others
Religious Practice
3.2
2.3
2
1.7
1.5
0.6
0.6

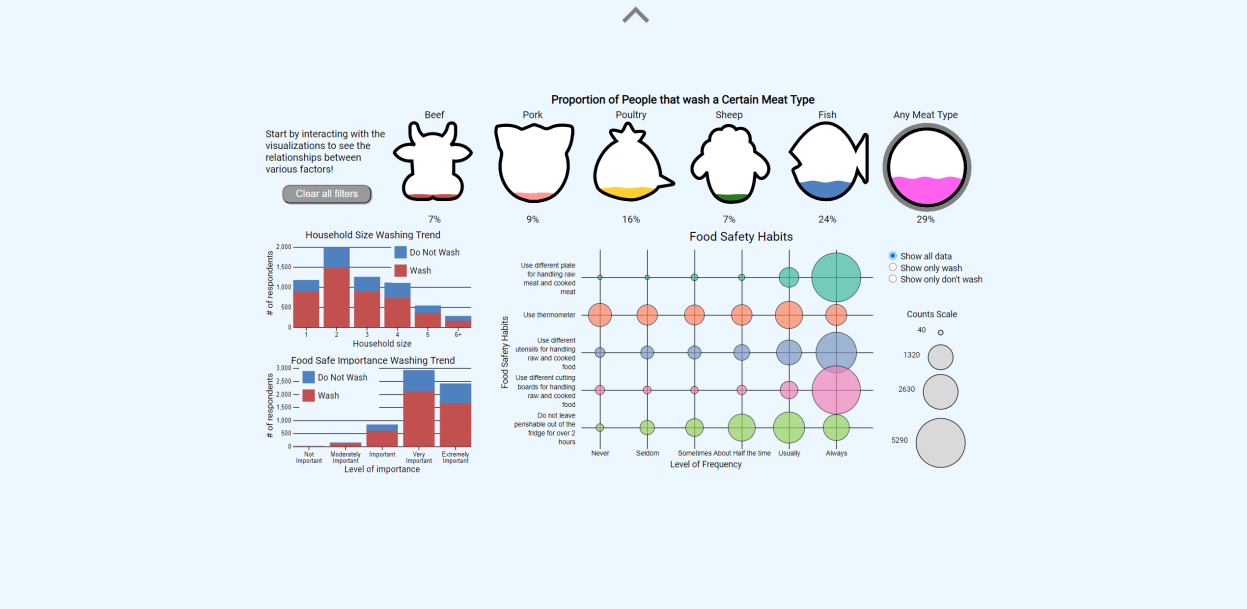

DON'T WASH
Reasons for Not Washing Meats
What are some of the main factors behind why people wash or don't wash their meat? Each bubble represents a reason and its average rank out of all the reasons. The higher the ranking is, the more important the reason is among everyone who wash and don't wash their meats.
Click the slider to toggle between the reasons for washing meat and the reasons for not washing meat.
Meat is clean enough
Follow expert's advice
Preserve texture, smell, taste, etc
Not cultural or religious custom
Feel like I should, but I don't
Others
3.7
3.6
2.6
2.4
1.3
0.9

Scrollytelling View 3:

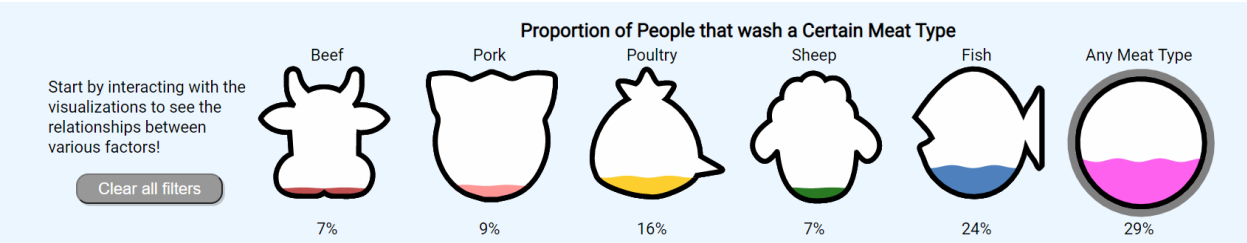
Viz Things to Remove - Bubble Cloud

Each bubble represents a substance/thing that people are trying to remove when washing meats. The water droplet is an SVG background and each bubble will show a tooltip on hover. Each bubble is size-coded by the number of people who think it is important to wash meat to remove the specific substance. The tooltip will have information about the substance. We want to be able to [identify] the substance where most people want to remove from washing meat, using a bubble cloud allows us to easily [compare] the proportion of people for different substances.

Exploration View:



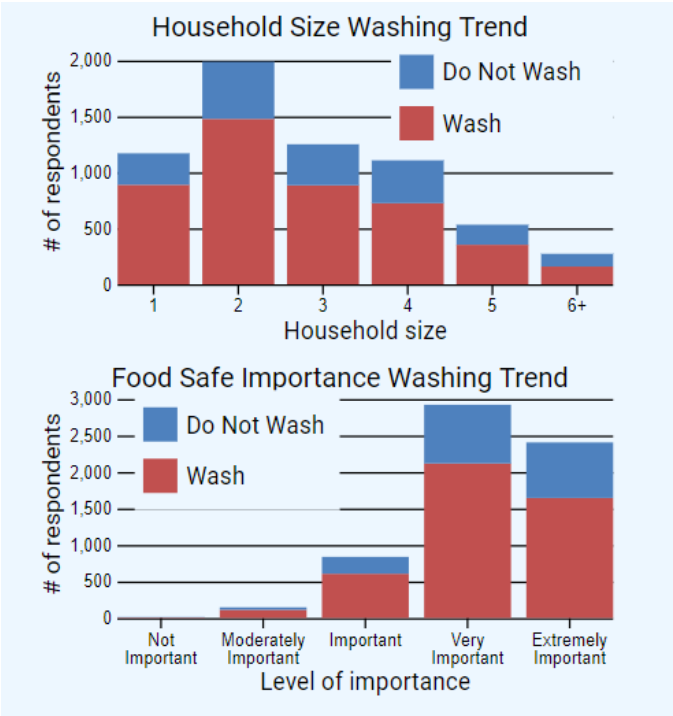
Each type of meat is a liquid chart with the shape of the meat/animal as an SVG overlay. Although the colours we chose are not colour blind safe, the shape channel encodes the same information, so even if one is colour blind, there is no information loss. The colours are more of an aesthetic design choice. The horizontal position on common scale channel and the numerical percentage make it easy to [compare] how likely people are to wash different types of meat. Each liquid chart acts as a filter for the bar charts and the proportional area matrix.



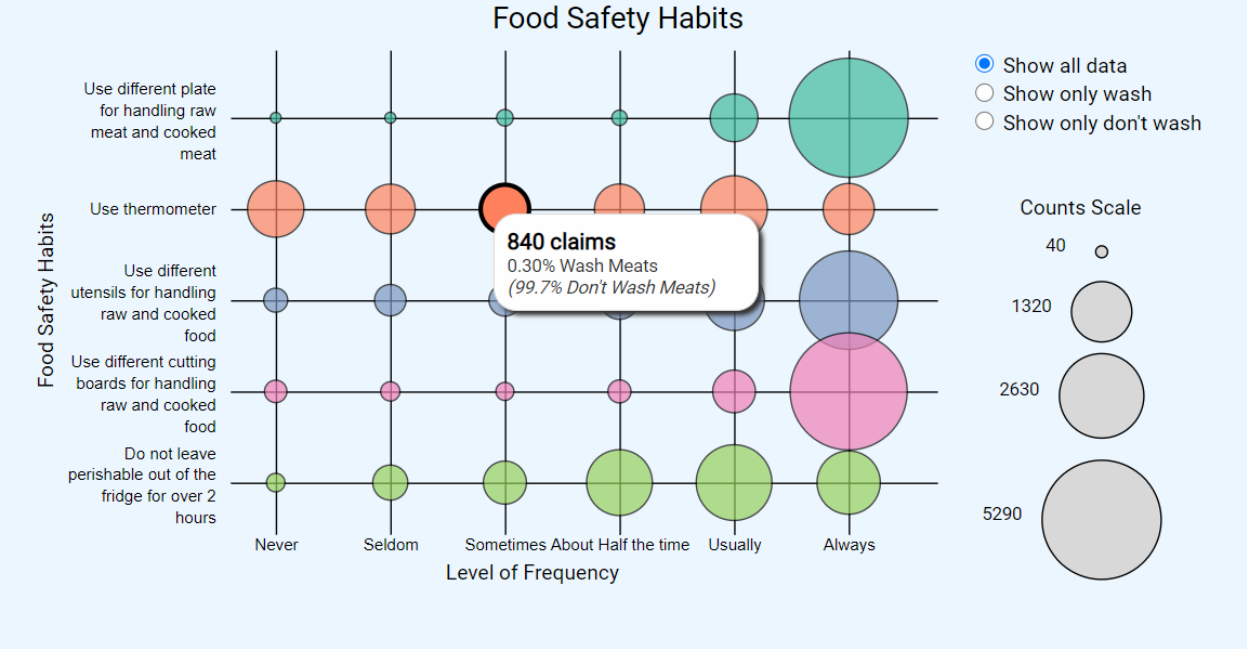
When a type of meat is selected, the bar charts and proportional area matrix are updated with information for that specific meat type. Likewise, when a certain food safe importance level or household size is selected from the bar charts, the liquid charts and proportional area matrix will also update with that selected filter. Both the liquid charts and bar charts give a bi-directional behavior, and both act as a filter on the proportional area matrix.

There is a "Clear all filters" button that restores our explore visualization to the default meat type and clears the bar chart filters.

The bar charts allow us to [compare] proportion of wash and no wash between household size/food safety importance. We can also [explore] the distribution of respondents.



The proportional area matrix shows the frequency of different food safety habits and it can be filtered using the radio buttons within the visualization to show either the data for people who tend to wash meat or the data for people who tend to not wash meats. A tooltip with the number of people and proportion of wash vs don't wash will show when hovered over each circle. The sizes of the circles of the area scale legend dynamically change as different filtering is applied. A dynamic legend helps users to compare the frequency of different food safety habits for that specific filtered group. This chart can be used to [identify] patterns between the frequency of different food safety habits when filtered against various factors such as meat type, household size, and food safe importance levels. It can also be used to [explore] the distribution of respondents' food safety habits.



Credits 🐟

- For our Bubble Cloud implementation, this guide was followed with slight modifications made towards the displayed data content on the bubbles, and style changes to the actual bubble circle svg and legend.
- For our Liquid Chart, we implemented the chart by following this guide. We deviated from this visualization by creating our own custom animal shapes to replace the outer circles as well as removing many of the animation variable flags as all of our Liquid Charts would have the same animation effects. Furthermore we added our own custom behavior so that the the liquid charts would be filled to showcase the correct data (sum of people who wash a particular type of meat), as well as onhover and onclick highlighting, animation playing and linked interactions.
- For our Sorted Bubble Chart, we referenced this guide to align the circles on a common scale as well as to align the line and reason text to the different radius sizes of each circle. The implementation of the toggle switch is adopted from this guide to build out the switch and the slider.
- All three of our Sorted Bubble Chart, Food Safety Bar Chart, Proportional Area Matrix use a wrap function to wrap text and axis labels, each of these wrap

functions has a slight modification to serve its needs for that specific visualization. This wrap function is adopted from this guide.

Reflection 🥩

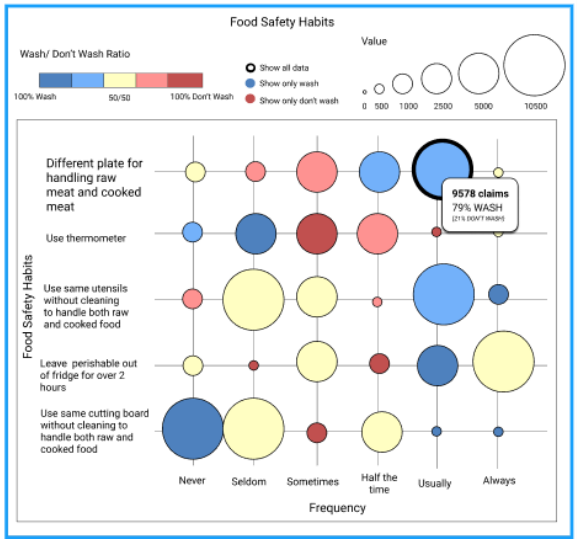
1. **Describe how your project has developed from your initial proposal, through your first submission, to your final product.**

   After our initial proposal, we made several adjustments to our visualization.

   After analyzing the values from our dataset we realized that the "Ground Meat" column did not have much data that was worth showcasing. We decided to derive a new column called "Wash Any" that indicated if a respondent washed at least 1 type of meat before cooking. We then changed one of the liquid chart types to be "Wash Any" instead of "Ground Meat". Furthermore, we made the liquid charts act as a radio button filter for the other charts with "Wash Any" being the default selection. With the "Wash Any" meat type as the default meat type, we chose to have the bar charts be colour coded by default.

   We also decided not to colour encode the proportional area matrix by the percentage of people who wash and do not wash. This change was made because there was not enough wash variance in the data for the use of the colour channel encoding (ended up with the same color for every meat type filter). We remedied this by using the colour encoding to instead reinforce the different categorical food safety habits.

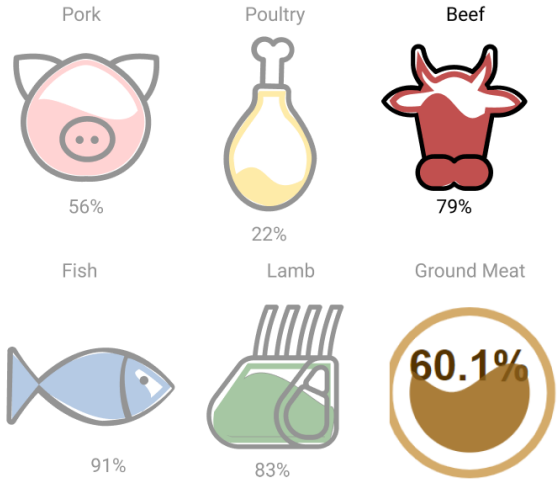
   Further, we also decided to reduce the area scale legend from six different sizes to four after reconsidering the purpose of the scale. We did more research on proportional area matrix and strengthened our understanding of a good circular legend design. We have decided to use different numbers of circles to represent the area size as data is filtered. If the range of the counts is 0, one circle will be shown; if the range of the counts is 1, two circles will be shown; if the range of the counts is between 2 to 4, three circles will be shown; any range of the counts of 5 and above will have four circles shown.



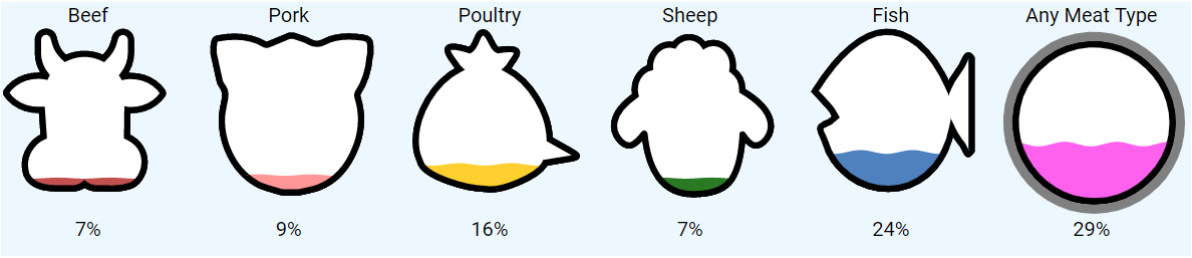
Initial design

Final design

We also changed the shapes and alignment of our liquid chart. We made the shapes of our liquid charts more similar to each other so that they would be more comparable to each other. We also aligned them on a common scale so that the fill level of each chart would be comparable to the others.



Initial design



Final design

As for our scrollytelling elements we stayed pretty close to what we had in our project proposal. Overall, we added more text to help the user get a better understanding of each visualization.

2. **How have your visualization goals changed?**

   Starting from our proposal we kept mostly the same visualization goals. We wanted our visualization to tell a story about the different factors that affect people's decisions to wash meat and their food safety habits.

3. **How have your technical goals changed?**

   Our technical goals have largely stayed the same since our initial proposal, generally keeping the same level of interaction and visualizations. For the scrollytelling implementation, we opted to remove manual scrolling and instead used buttons to navigate between different visualizations as buttons fit better for our project due to the high number of different visualizations it contains.

4. **How realistic was your original proposal in terms of what is technically possible in D3?**

   Our original proposal was very realistic as we had checked that there was an existing, online code implementation of every chart we wanted to create, to ensure we can refer to it during our own implementation.

5. **Was there anything you wanted to implement that you ultimately couldn't figure out how to do? If so, then what workarounds did you employ, or did you abandon your original idea?**

   While we were pretty thorough with being realistic with our D3 visualizations we ran out of time near the end to implement responsiveness for our visualizations. We instead implemented a workaround that makes the height of a div dynamic based on screen size, and centered our chart divs to the middle of the screen so that it would fit for most computer screen sizes.

6. **If you were to make the project again from scratch (or any other interactive visualization), what would you do differently?**

   As mentioned above, responsiveness was a large issues for us at the end. If we had initially planned for this, it would have been easier to size and make our charts responsive in the correct way. Some of our scrollytelling visualizations are also not very information dense. Having animation might help to draw in the user and make our visualization more interesting.

   It would also have been helpful to do some simple data preprocessing to view the general distribution of our data before proceeding with the design. For example we may have chosen a different visualization than the liquid charts if we had known that the wash percentage was not that high.

Project Management/Team Assessment 🥓

Milestone 2: Exploration Views — Total Hours: 66

Aa Feature	Member	Target Date	Est. Hours	Actual Hours
Repository setup	All	@Mar 16, 2021	1	2
Liquid Fill Chart	John, Shirley	@Mar 19, 2021	10	15
Foodsafe Bar Chart	Shirley	@Mar 19, 2021	8	8
Household size Bar Chart	Shirley	@Mar 19, 2021	8	4
Implement proportional area matrix with size and colour encoding	Tracy	@Mar 19, 2021	8	8
Implement proportional area matrix legend, tooltip, toggle widget	Tracy	@Mar 19, 2021	5	6
Linkage from Liquid Fill chart to all other charts	All	@Mar 23, 2021	5	8
Linkage from foodsafe bar chart to all other charts	Shirley	@Mar 23, 2021	5	2
Linkage from household size bar chart to all other charts	Shirley	@Mar 23, 2021	5	1
Liquid chart animations	John	@Mar 23, 2021	new	3
Writing M2	All	@Mar 31, 2021	2	3
Edge testing all filters and interactions	All	@Mar 31, 2021	3	2
Implement Clear filters Widget	John	@Mar 31, 2021	4	1
Code clean up	All	@Mar 31, 2021	new	1
Main web page formatting	John, Tracy	@Mar 31, 2021	3	2

Milestone 3: Scrollytelling Views — Total Hours: 55

Feature	Member	Target Date	Est. Hours	Actual Hours
Reason for Wash Sorted Bubble chart with explanation text	Tracy	@Apr 6, 2021	5	5
Wash/No Wash Pie chart with input buttons, legend and explanation text	Shirley	@Apr 6, 2021	4	4
Reasons bubble cloud with onclick highlight	John	@Apr 6, 2021	9	9
Reason for No Wash Sorted Bubble chart with explanation text	Tracy	@Apr 12, 2021	5	5
Implement scrollytelling (navigation)	Shirley	@Apr 12, 2021	9	5
Implement CSS for all scrollytelling pages	John, Tracy	@Apr 12, 2021	4	4
Implement responsiveness to screen size	All	@Apr 12, 2021	new	15
Implement toggle between the two sorted bubble charts	Tracy	@Apr 13, 2021	3	3
Ensure everything looks good and works	All	@Apr 14, 2021	2	2
Bug fixes	All	@Apr 14, 2021	3	3