A Century of American Food: Visualizing Changes in the American Food Supply Alongside Relevant Historical Events

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Abstract

Americans are thought to be fond of following fad diets, paradigms of eating often based on novel, ever-changing nutrition research. This project is concerned with finding in actuality how American food consumption has changed throughout the past century and illustrating to what extent it responds to relevant historical events. Towards that end, it considers the distribution of foods in the American food supply, which are—to some extent—the foods that Americans desire to eat and—ultimately—the foods that are available for them to eat. Tracking this over a span of 100 years, the visualization consists of a timeline exploring this changing distribution, which is then punctuated by qualitative information about significant events in areas like nutrition research, agricultural technology, trend diets, and official dietary guidelines. The project superimposes all of this information to create an honest depiction of the history of the food supply (and, indirectly, food consumption) in America. Avoiding reductive statistics and statements, it curates multiple previously uncombined sources of data and portrays them clearly and plainly, inviting instructed readers to discover relationships between them.

Introduction

Both food production and food consumption in America have changed quite a bit over the course of the past century. From the use of fertilizers, to the discovery of particular food-grade chemicals, to the increase in industrial food processing, Americans today have a far different choice of foods than in the past. Looking a bit deeper, it seems as though the macronutrient and food-group profile of the food supply has significantly shifted, too, perhaps as a result of these novel processes and perhaps as a result of research in food science and nutrition. A large implication of food consumption is its contribution to certain metabolic diseases such as heart disease and diabetes, and experts are aware of this. Researchers for this reason attempt to isolate foods as beneficial or problematic, and at times federal dietary guidelines are quick to integrate new research. Unfortunately, however, conclusions of nutrition research are sometimes contradictory and are often taken out of context when co-opted by the public.

With an increasing public awareness of a changing food supply and the role of food in health and wellbeing, there is a great deal of buzz around food discourse. However, with this there is a great deal of sensationalization that happens—statistics are loosely thrown around, reducing nuanced biological processes to single, absolute figures, and pseudoscience abounds. With extensive training in human health, one may be able to sift through this morass of information, but for most, such figures only lead to confusion and, perhaps, anxiety. There is thus very much a need for comprehensible, nuanced visualizations of the available data relating to these topics, and these visualizations must be designed for the non-expert public.

That being said, this project is concerned primarily with deconstructing the real effect of popular talk around food on the foods Americans are choosing to eat. Toward that end, it considers the distribution of the American food supply— a far more easily collected statistic—as an indirect representation of choices in American food consumption. These two necessarily relate to one another: food producers act in their own economic interest, and consumers can only choose to eat from what is available. The visualization groups foods into categories and tracks the food supply over a

span of roughly 100 years, and with multiple superimposed timelines, it explores historical changes in each category of food. These highly quantitative figures are punctuated by qualitative information, like government dietary guidelines (such as the food pyramid) and major American diet trends (such as Atkins, or Low-Fat). The project superimposes all of this information to create an honest depiction of food in America. It does not attempt to overly simplify or reduce the complexities that exist. Rather, curating multiple previously uncombined sources of data and portraying them clearly and plainly, it invites interested readers to discover relationships between them.

Chapter 1

The Importance of Food

In this chapter I provide a bit of motivation for tracking the American food supply. Specifically, I address the rising rate of metabolic disease and discuss potential ways that food can impact health.

1.1 A Changing Disease Paradigm

The nature of disease today is quite different than even a century ago. Historically, most major medical issues—such as polio, tuberculosis, and pneumonia—were the result of infectious diseases. These are problems caused by particular microbes—bacteria, viruses, or fungi—that humans could pick up from their environment and then spread. Naturally, the solution to such diseases would be to eliminate the offending microbes, and indeed this is what was done. A major victory in the fight against these diseases was the discovery of penicillin, the first antibiotic. In 1928, Alexander Fleming, a medical researcher, discovered accidentally that a particular species of mold had grown in one of his experiments, and it turned out that this mold produced certain metabolites that were able to kill the bacteria surrounding it. Fleming isolated these bactericidal compounds, which he called penicillin after the name of the mold—with this, medicine had been completely changed.

Slowly in the past few years, medicine has begun to enter what one might call a post antibiotic era. While theoretical issues of antibiotic resistance have been on the minds of researchers for decades, such issues are only very recently becoming a widespread, practical problem, most notably with rise of certain strains of the bacterium *Staphylococcus Aureus* that are resistant to numerous families of potent antibiotics [3]. While in the past the solution to this type of issue was to concoct more potent forms of antibiotics, research is now finding that this may not be the best

solution. At the crux of this newfound hesitation is the discovery of the importance of the human microbiome—the system of bacteria (and, to a slightly lesser extent, fungi, viruses, and archaea) that live on and inside all humans. Previously thought to be irrelevant to human health, these microbes have now been found to be key to the proper functioning of numerous bodily processes [4].

Research on the human microbiome, though becoming more sophisticated everyday, is still quite preliminary. Modern medicine has become highly skilled in treating infectious disease, so much so that such diseases are hardly a major concern in developed countries. Unfortunately, and consequently, the diseases that plague modern society are chronic in nature, and they are growing ever more prevalent. While medical research is making strides in the management of chronic disease, there is not much emphasis placed on finding and communicating methods of prevention. Prevention of chronic disease is far more favorable than the current state of affairs: while people may be living longer, they are not living as comfortably, often dependent on long-term combination of drugs and procedures.

Ultimately, many chronic diseases are driven by factors of diet and lifestyle—by multiple small elements that accumulate into large effects over time. While both factors are equally important, this thesis is concerned with addressing the changing American diet and food supply, noting that rates of chronic diseases are increasing.

1.2 The Human Microbiome

Scientists today have some understanding of the diversity of a healthy microbiome and have been able to identify the particular microbes that are most commonly found in humans (as well as any abnormalities for particular individuals and variations between distinct populations). However, they do not understand the precise role of each of these microbes, and it is postulated that they form a complex, interdependent ecosystem. Like any other organisms in an ecosystem, the microbes living on and inside humans compete for survival, existing in an intricate balance that is dependent on the actions of the human host [7].

While certain novel therapies are being developed for microbiome manipulation—the Fecal Matter Transplant, a method of transplanting the gut microbiome from a healthy donor to an unhealthy patient through the donor's fecal matter comes to mind—such therapies are very new, not-widely-tested, and, in the United Sates, limited in approved scope to rather severe diseases. Manipulation of diet thus remains the most practical way of effecting change in the microbiome: certain foods feed

certain microbes, so changes in diet affect the distribution of microbes represented.

This is important because the medical issues that plague society today are largely chronic in nature and are influenced by the state of one's microbiome [7]. Examples of such issues are autoimmune diseases like Lupus and Rheumatoid Arthritis as well as obesity, diabetes, and the metabolic syndrome. Unlike infectious diseases, these issues cannot be addressed with antimicrobial protocols as they are not caused by a particular offending organism. Rather, they are driven—created and exacerbated—by factors of diet and lifestyle; they arise slowly and are difficult to eradicate.

Both food habits and lifestyle habits affect human health in two ways: directly and indirectly. There are the direct metabolic effects that have been long acknowledged and are more easily visible: eating too many calories without sufficient exercise, for example, contributes to weight gain, which contributes to the development of diseases like diabetes. However, the indirect effects—physiological effects resulting from a largely invisible change in the internal microbiome—are more insidious and, resultantly, are perhaps more dangerous. Poor dietary habits contribute to a distribution of microbes that produce metabolites that cause the host to further desire such habits. [10]. This is one—though far from the only—reason changing such habits is difficult, and care should be taken to avoid encouraging the development of poor habits in the first place. With regard to diet in America, the responsibility is then on systems of American food production to make appropriate foods readily available.

While, as mentioned, a great number of diseases are influenced by diet—often through effects on the microbiome, for example—the connection between diet and disease is more clearly evident with certain diseases. These diseases are metabolic diseases like heart disease and diabetes.

Such diseases are, as per their name, related to diet, lifestyle, and metabolism directly—not only through effects on the microbiome. With respect to diet, however, it is still unclear (and there is disagreement about) what *exactly* brings about these diseases, but there is increasing understanding. All the same, in an effort to ward off such diseases and other negative health outcomes, there have been throughout history numerous research studies; different recommendations by the government; inventions of new, "health" food products; and popular diet trends. As can be seen, then, the correlation of food consumption with metabolic disease—and disease in general—is a major reason why people are interested in talking about food. For this reason, this thesis conducts a historical survey of this discussion around food and elucidates if (and how) Americans truly respond to it.

Chapter 2

Historical Events

In this chapter, I discuss different historical events that may have had an impact on the food supply, which I include in my visualization.

2.1 Popular Diets

Both historically and today, Americans on the whole seem to have a predilection for fad dieting. Such dieting practices often vilify a particular macronutrient and praise another or praise a particular way of eating. They are often a result of new research in medical and nutrition science, but the research is often taken out of scientific context and co-opted by the public. Resulting diets are often highly absolutist, making strong claims based on research that may be imperfect. Unlike with fully controlled scientific studies, nutrition science involves working with human metabolism, which is a complex system that is not well understood in itself. It is therefore difficult for nutrition research to make absolute claims because all relevant variables may not be considered or fully understood.

Still, diets based on such research persist, and it is therefore important to see how publication of such research and popularity of such diets affects American food availability and consumption. Towards that end, this section enumerates and elaborates on diets popular in America in the last century.

2.1.1 Fletcherism

Diets are well known for dictating which foods to eat, limiting certain food groups for a desired therapeutic effect; however, certain diets focus more on the methods of food consumption rather than the types of foods consumed themselves. Fletcherism,

a diet popular at the beginning of the twentieth century is one such diet. It advocates for being fully guided by one's appetite: eating whatever is desired, but only when hungry and calm, never when anxious or depressed. Furthermore, it suggests that food should be chewed until it is liquid in the mouth, holding the belief that this would prevent weight gain.

2.1.2 Calorie Counting

Following this, around the 1920's, it became popular to count calories. The true origins of calorie counting can be traced back to the 1890's with the research of Wilbur O. Atwater at Wesleyan. He and the people working at his lab tested the calorie content of a wide variety of foods and published the results—this was one of the first associations between food and a scientific measure of energy. Extrapolating upon this, Atwater suggested that weight gain could be prevented by not consuming a caloric excess, an excess of energy than what one's body needs to function. His advice was not fully embraced by the American public, however; that happened with the 1918 publication of "Diet and Health: With Key to the Calories," a book by physician Lulu Hunt Peters that praised calorie counting. It made counting calories an accessible task by including a list of common foods and their caloric values; it offered a simplified outlook by encouraging readers to view these foods as nothing more than their caloric values, too. This book was the origin of the 1200 calorie diet that the "average" American should follow, which still influences Nutrition Facts labels today.

2.1.3 The Hay Diet

As it remains today, calorie counting continued to be the foundation for most health-based eating practices. Newer, "fad" diets added additional rules. One of the earliest such diets that gained popularity was the Hay Diet, named after its founder William Hay, who published his theories in 1929 in a book called "Health via Food" [12]. Hay categorized most foods into three categories: proteins, carbohydrates (starches), and neutrals. Through his research, he found that digestion of proteins required an acidic digestive environment, while digestion of carbohydrates required an alkaline digestive environment. From this, he concluded that proteins and starches should not be consumed in the same meal; doing so, he thought, would cause a buildup of acid in bodily fluids, which he thought would contribute to the development of diseases like diabetes and certain inflammatory conditions. Though there has been

little outside evidence that eating in such a way reduces the incidence of disease, there remain people today who are proponents of Hay's style of eating.

2.1.4 The Low-Fat Diet

Second only to Calorie Counting, the trend of low-fat dieting is likely one of the most recognizable eating patterns in recent history [6]. Gaining popularity in the 1960's following Dr. Ancel Keys' seminal Seven Countries Study, which found correlation between saturated fat consumption and cardiovascular disease, this trend had a major impact on the types of processed foods available in America. In an attempt to remove fats from foods, however, and keep them palatable, manufacturers tended to add large amounts of sugar and sweeteners, which, ultimately, have dubious health effects as well. We have recently begun to emerge from this "low-fat" trend, but even today effects persist.

2.1.5 The Atkins Diet

Amidst the low-fat diet craze—which persisted for many years—Dr. Robert Atkins, a cardiologist, published his book *Dr. Atkins' Diet Revolution* in 1972 [2]. Seeing that low-fat dieting, or attempts at low-fat dieting, were not being successful for weight loss and for health, he proposed that the ideal diet was one low in sugars and carbohydrates. Consequently, he did not suggest limiting consumption of proteins or fats, saying that those foods were fine as long as not consuming them along with carbohydrates—this, he believed, was the key to metabolic and overall health.

2.2 Federal Food Guides

Periodically, the U.S. Federal Government publishes a guide with suggestions on how to eat for optimal nutrition [13]. These suggestions are often influenced by recent research in nutrition, though on the whole, recommendations do not change a great deal with each update. Responding to feedback, however, the government experiments with different representations of the same information, trying to find a way to best communicate their suggestions. In this section, I explore and expand on these guides chronologically, detailing highlights, changes, and motivations.

2.2.1 Food Guide Beginnings

While most modern food guides are graphical in nature, the first food guides were published simply in the form of a bulletin—written instructions explaining to Americans how they should eat. Both published around 1916, there were two works called "Food for Young Children" and "How to Select Food," one guide for children below six and another for everyone else. Both of these guides group food into five different food groups and provide instructions on how much of each food group to eat relative to common measures found in most households. There is an emphasis on consuming foods considered to be "protective foods," which are those that contain a high number vitamins and minerals with a low energy (or calorie) density.

2.2.2 The Basic Seven

While the previous two written food guides were in use through the 1930s, a new guide was created for the 1940s, and it was graphical in nature. This guide categorizes food into seven main groups: Green and Yellow Vegetables; Oranges, Tomatoes, and Grapefruit; Potatoes and Other Vegetables and Fruits; Milk and Milk Products; Meat, Poultry, Fish, and Eggs; Bread, Flour, and Cereals; and Butter and Fortified Margarine. Consequently, this guide is known as "The Basic Seven." In a time when food was being rationed due to war, this guide tried to aid in establishing a basic diet to help people meet nutrient needs. It explains the number of servings to eat from each of the food groups, but fails to specify the size of a single serving. With seven rather oddly categorized food groups, too, it was considered overly complex by most people.

2.2.3 Food for Fitness *or* The Basic Four

Responding to comments that "The Basic Seven" was overly complicated and difficult to understand, the government released a new guide in 1956 called "Food for Fitness." This guide simplifies the groupings into only four groups: Milk, Meats, Vegetables and Fruits, and Breads and Cereals. Rather than suggesting to eat "some" of every food group, this guide provides the exact amount of servings from each group that are suggested. The goal remained for people to take in an adequate supply of nutrients. Like the previous guides, but unlike subsequent guides, this guide only mentions which foods to eat—it does not address which foods to limit, largely because that was not yet as popular of a concern.

2.2.4 The Hassle-Free Food Guide

Perhaps responding to new research that certain foods may be problematic for health, this guide is novel in that it mentions that consumption of such foods should be limited. It was released in 1979 in response to the United States 1977 Dietary Goals, which was heavily influenced by the trend of Calorie Counting and optimizing energy taken in through food with respect to energy expended. Overall the goals emphasize consumption of complex carbohydrates while reducing consumption of refined carbohydrates, sugars, total fats, saturated fats, cholesterol and sodium(. Overall, the food groups in the food guide are similar to "The Basic Four," but a fifth group is added that mentions that fats, sweets, and alcohol should be consumed moderately and with caution.

2.2.5 The Food Wheel

In a continued attempt to most effectively communicate recommendations, this guide, released in 1984 and first created for a Red Cross nutrition course, adopts a wheel schematic rather than simply a list of food groups and recommended amounts. The self-contained wheel emphasizes how the recommendations form an idea of a complete diet that is one integrated system—this highlights the holistic nature of recommendations for both consuming adequate nutrients and moderating consumption of detrimental foods. It contains five main food groups: Cereals, Fruits, Vegetables, Meats and Eggs, and Dairy Products, as well as a sixth, smaller group of foods to limit: Fats, Sweets, and Alcohol, again. The main difference, then, from the previous guide is the splitting of fruits and vegetables into separate food groups and indicating different suggested servings amounts for each. The suggested servings, too, unlike previous guides are provided as ranges, which indicate the suggested serving amount for diets at different levels of total calories (which should be adjusted depending on body size).

2.2.6 The Food Pyramid

The previous Food Wheel set the basis for treating dietary recommendations as an integrated system, which is an idea present in this guide and subsequent guides. Released in 1992, this guide attempts to make the Food Wheel a bit more intuitive my mapping the same food group categories onto a pyramid. Unlike a wheel, where pieces of any size can be cut at any place, items placed on on a pyramid necessarily

have a relative size. Thus, by knowing the location of a food group on the pyramid, it is easier to remember the number of suggested servings, or, at least, the amount of serving suggested relative to other food groups. The graphic was developed in response to consumer research, and tries to emphasize eating a variety of healthy foods in the correct proportion, again while moderating consumption of unhealthy foods. The moderation is included explicitly by placing sugars and fats at the tip of the pyramid, but the graphic provides a more holistic view by displaying also how added sugars and fats can be present within other food groups as well.

2.2.7 MyPyramid

This updated pyramid was released in 2005, and was constructed in response to the *2005 Dietary Guidelines for Americans*. The graphic itself is heavily simplified, but there is a written attachment that specifies the amount of servings suggested for diets at 12 levels of total calories—this, along with the title, emphasize the shift towards a personalized view of nutrition. Making use of current technology, too, the graphic simply includes a URL to "mypyramid.gov," which includes the necessary information to make sense of the visual guide. Unlike the previous guide, added sugars are not explicitly represented, but there is an unlabeled group added specifically for oils. Furthermore, above the pyramid there is an image of a figure walking up stairs, which integrates the concept of exercise and healthy lifestyle changes with nutrition for the first time.

2.2.8 MyPlate

This next—and current—update in 2011 was developed in response to the *2010 Dietary Guidelines for Americans* and continues the emphasis towards a personalized view of nutrition. It replaces the pyramid schematic with a plate, which is meant to be a more intuitive way of communicating the same information. Rather than seeing a comparatively complicated pyramid schematic, users can now remember a quick visual about how exactly to structure their plates at each meal. Overall, the graphic is designed to communicate the importance of healthy, balanced eating, rather than favoring or limiting certain foods. Again, there is minimal information on the graphic itself for ease of comprehension, and more detailed information can be found on the associated website "choosemyplate.gov."

2.3 Scientific and Nutrition Research

In an effort to understand precisely how what we eat affects our health and wellbeing, research is constantly being done in nutrition. Information resulting from this research is often disseminated by doctors and professionals as well as integrated into the government guides detailed earlier, but it is also picked up directly by the public at times. Furthermore, sometimes in response to traditional nutrition research, research is done into the creation of new chemicals and food products designed to be healthier than their normal counterparts—but, after a brief period of praise, this is often found not to be the case [8]. In this section, I explore certain nutrition studies and chemical discoveries that are significant in the history of American food.

2.3.1 The Discovery of Cyclamate

In 1937 at the University of Illinois, there was a grad student working on developing a fever-reducing drug. Somehow licking his fingers during a break, he found that they were sweet—as a byproduct of his experiments, he had discovered Cyclamate [5]. This artificial sweetener, like others, is many times sweeter than sugar, and since its discovery it was used in drinks like Diet Pepsi and Tab. Additionally, it is the ingredient behind "Sweet'N Low," the pink packets of sweetener that in the past were ubiquitous. From all these sources, Americans by 1968 were consuming a massive amount—more than 17 million pounds per year—of this sweetener, but then the FDA placed a ban on it following research that showed it causes bladder cancer in rats. Sweet'N Low remained popular after this, however, as they began creating their product with a different chemical sweetener.

2.3.2 The Seven Countries Study

This notable study was conducted in 1957 by Ancel Keys, a physiologist who was chairman of the International Society of Cardiology and a consultant to the World Health Organization and the UN Food and Agriculture Organization [1]. The study consists of a survey of 12,000 men aged 40 to 59 across 18 different areas of seven countries. The countries surveyed are Italy, the Greek Islands, Yugoslavia, the Netherlands, Finland, Japan, and the United States. Its findings are that areas that include dietary fat as a major part of every meal have an increased rate of heart-attack related death as well as increased blood cholesterol levels—and that the inverse of this is true as well. This was thus one of the first studies to explicitly link consumption of

saturated fats with in increase in blood cholesterol and, as a result, heart disease. It evidently had longstanding effects, which, to some extent, persist today: it sparked, for example, the low-fat (and, more specifically, low-saturated-fat) diet craze that is ubiquitous, and it influenced federal dietary guidelines beginning with The Hassle Free Food Guide, which introduced at an official scale the concept of limiting fat consumption.

2.3.3 The Discovery of Sucralose

In a similar story to the discovery of Cyclamate, Aspertame was discovered in 1965 by James Schlatter, who was a research chemist working for G.D. Searle and Company [5]. He was attempting to develop an ulcer drug, and he too licked his fingers and found that they were sweet. Another byproduct of his experiments, he had discovered Aspertame, which is even far sweeter than Cyclamate. The product was released commercially in 1981 as Nutrasweet, which emphasizes its health-positive angle. It was—and continues to be—used to sweeten numerous diet beverages like Diet Coke, and despite potential health concerns, it continues to be quite popular today.

2.3.4 Trans Fat Suspicion

Following the Seven Countries Study and the subsequent fear around saturated fats, trans fats began to gain popularity [9]. With regard to chemical structure, a major component of fat molecules is a long chain called a hydrocarbon, a chain of carbon atoms, each with a certain number of hydrogen atoms attached. Saturated fats are those where the carbon atoms are saturated with hydrogen atoms forming a straight chain, and they are solid at room temperature. Unsaturated fats, in contrast, have hydrocarbon chains where one (or more) carbon atom(s) is (are) not saturated with hydrogen atoms, which results in a "kink" in the chain; they are liquid at room temperate. Trans fats are unsaturated fats that have been hydrogenated, meaning they have been treated with hydrogen and have undergone a chemical reaction that results in the "kink" twisting in a different direction: the resulting fat takes on favorable properties of saturated fats, like being solid and spreadable at room temperature.

Trans fats like margarine and shortening became popular because they could be used in place of saturated fats—having similar properties—but were derived from unsaturated fats, like vegetable oils, which were considered healthy. This popularity began to decline, however, in the 1990's when it began to be discovered that trans fats—unlike any other fats, even saturated fats—tend to increase LDL ("bad

cholesterol") while having a negative effect, on HDL ("good" cholesterol). The main perceived problem with saturated fats was that it increased total cholesterol by increasing both types of cholesterol good and bad—the effect of trans fats was obviously far worse.

Chapter 3

Data and Methods

In this chapter, I discuss the structures of my initial sources of data along with their intricacies and idiosyncrasies.

3.1 Food Supply Data

The food supply data that I use for the visualization comes from the United States Department of Agriculture's Center for Nutrition Policy and Promotion [14]. Under a study of the nutrient content of the U.S. food supply from 1909 to 2010, they have published numerous datasets, deconstructing the U.S. food supply by either vitamins, minerals, macronutrients, or calories. They say that "the data presented in these tables are invaluable for monitoring the potential of the food supply to meet nutritional needs; for examining relationships between food supply nutrients and health; and for examining dietary trends of Americans" [14].

Interested in constructing a visualization that would be intuitive to understand, I chose to use the dataset that represents the food supply in terms of calories contributed by each food group. Though no measure of quantifying amounts of food is perfect, calories are a metric with which most Americans are familiar. Furthermore, when compared to more specific values—like a particular mineral (iron, say) or a particular macronutrient (fiber, perhaps)—using calories is far more universal and better suited to a wide profile of foods; most foods contribute calories, after all.

3.1.1 Data Limitations

Still, calories are not a perfect measure, particularly due to those foods that do not contribute calories—artificial, zero-calorie sweeteners in particular. The presence of

artificial sweeteners thus has interesting implications on my visualization, but when contextualized with historical data about the discovery of these sweeteners, the visualization, I feel, becomes richer.

However, a more significant problem remains: while most foods may contribute calories, certain foods are more calorie-dense than others. Such foods, like meats, are thus over-represented in the visualization while foods with a lesser density of calories, like green vegetables, are under-represented. Therefore, the visualization can be effectively used to track the development of the consumption of a particular food over time, but it should not be used to compare between different foods—though this is bound to happen. To improve this, it would be helpful to establish a conversion between calories and grams (or serving size) for each food, though again both of these metrics have their own drawbacks. Ideally, it would be possible to toggle back and forth between different metrics to express that each representation is limited an incomplete. There does not seem to be this sort of established conversion for all types of foods, however, much less entire food groups. In any case, I am interested in developing this further since metric limitations like this seem like a particularly apt use-case for good data visualization.

3.1.2 Data Processing

The calorie dataset itself is an Excel file that contains rows for each year, columns for each type of food, and values for the percentage of calories that each food contributes to the total food supply calories for each year on average per capita per day. I imported this dataset into R, cleaned up the category names to make them more user-friendly, and imputed missing data values as the average of surrounding values. I then created sample plots as an exploratory visualization using ggplot2 and then exported the cleaned dataset into a CSV file, which I read with d3.

3.2 Historical Events Data

For this qualitative data, I constructed my own dataset based on independent research from books, webpages, and articles. Each of the events in the dataset is described in detail in Chapter Two of this thesis. The dataset itself is a CSV file, with each row corresponding to a historical event and columns corresponding to the attributes of each event. The attributes are Year, which is when the event took place; Type, which is the letter label I give to each event in the visualization; Id, which is a single

word to help classify the event for D3 interaction; Name, which is self-explanatory; Summary, which is a short distillation of the event revealed in the visualization on rollover; Image, which, for the federal dietary guides, is a link to the actual guide; and Source, which is where I found the relevant information.

My visualization pulls events from this CSV file and displays them, so there is minimal work involved in adding new events to the chart. The CSV file can be opened in Excel and new events can be manually inserted as they are researched. Setting up such a pipeline, I feel, is the most efficient way to integrate these events into the visualization due to their needing to be manually curated in any case. To create a more complete visualization, I would like to add more events, of course, and through sharing the CSV file this can be easily opened to accept input from others as events can be added and deployed without altering the D3 code.

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