

The Role of Food: Culture in Health

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Abstract

The central motivation for this research project was inspired by the rapidly increasing prevalence of obesity and diabetes around the globe. This led us to the evaluation of four coastal countries, including Japan, Greece, Spain, and Chile, and their relationship with diabetes and obesity. Our central question involving these countries was: what factors relating to culture contribute to possible predictors for health? We answered this question by evaluating several possible factors relating to each country including the physical environment, geography, types of food eaten, amount of processed food consumed, and the food preparation as possible predictors for health within these cultures. We explored these factors through methods using online databases including the Human Relations Area Files (HRAF), Organisation for Economic Co-operation and Development (OECD), and World Bank. We also utilized resources such as the WSU library and search engines to discover peer reviewed journal articles. As a result of this, we found that the environment and geography were not adequate predictors of health and culture due to the fact that all our countries were similar in geography and still had various health results. We then found that the types of food consumed were also not adequate predictors of health related to culture since there was significant overlap in the types of food used in these countries. This led to the conclusion that when evaluating the culture around food in four developed nations, the most prevalent food-related indicator of health was the level of food processing and preparation.

Introduction:

Obesity is one of the largest global health concerns of the 20th and 21st century (King, 2013). Often referred to as an epidemic (Vandevijvere et. al, 2015), global rates of obesity have tripled since 1975, with over one third of adults now considered overweight (WHO). Obesity can have serious health risks including diabetes, heart disease, certain cancers, high blood pressure, kidney and liver disease, and sleep apnea (NIDDK). There are many proposed theories as to why obesity rates are so high.

The drivers of obesity are complex and debated (Vandevijvere et. al, 2015). A few common theories however are more widely accepted. Some theories focus on the changes in the foods being consumed in recent decades. The modern diet has shifted towards carbohydrates, fats, and sugars (Hall, 2018). Carbohydrates and sugars can have negative impacts on health. Carbohydrates elevate insulin levels which directs the body to store fat (Hall, 2018). Fatty foods are energy dense and less satiating, leading to an increase in overall caloric intake (Hall, 2018). Indeed, dietary fat has increased along with obesity rates (Hall, 2018). The increase in fat consumption highlights another possible cause of increased obesity: the increased availability of calorie dense foods.

Calories are cheaper and easier to obtain than ever before (Hall, 2018). Processed and fast foods with added sugars, salt, and flavors have become especially available in recent years (Hall, 2018; Vandevijvere et. al, 2015). This has led to a surplus of obtainable energy (Hall, 2018; Vandevijvere et. al, 2015). Due to the biological and psychological evolution of humans, the assessable calories are readily taken advantage of by humans. *Homosapien* ancestors lived in an environment with limited food supply, having to work tirelessly for enough food to survive (King, 2013). Human brains are still adapted to this lifestyle, and so it is not surprising that the neural patterns and genetics that made humans crave sugar, fat, and calories are still present. The sensory

pleasure and stimulus which evolved in these times still exists and leads to consumption of excess food (King, 2013). Both physical and biological reasons for the rise of obesity have been suggested, but cultural reasons may also play a large role.

Food is one of the largest and most engrained aspects of culture. The study of a culture's food encompasses what foods are eaten, how they are collected or bought, how they are cooked and prepared, who cooks them, how they are served, how they are eaten, and more (Civitello, 2011). This is a uniquely human characteristic. No other animal species uses fire for cooking, let alone has the cultural norms and standards surrounding food preparation and consumption in human culture (Civitello, 2011). Not only is the culture around food ubiquitous, but cultures are often defined and characterized by the food that they eat. A person's religious, ethnic, and national identity is closely tied to the foods they eat and how they eat them (Civitello, 2011). Often decisions about food are so culturally ingrained they are subconscious and can be influenced by a complex mixture of social norms, physical and biological factors, and their personal worldview (Contois & Day, 2018; Karpyn, 2018). It is not surprising then that the effect of food culture on health is complex.

It is intuitive that the type of food consumed will have a large effect on health outcomes, however; the role of the culture surrounding food on health factors is less clear. While many theories explaining the obesity epidemic have been presented, less is known about how cultural roles of food and eating may be affecting health. Based on the previous literature, we proposed three possible hypotheses for how food could influence health. First, the physical environment and geography could indicate health outcome by determining the availability of foods. Second, the types of food eaten could predict health. Third, we hypothesize the food preparation around culture predicts health. By examining the role of food culture on health in four developed nations, we discovered

that indicator of health with the most support from our research was the level of food processing and method of food preparation.

Methods

Several search methods were used to derive the results of this culture and health analysis. Peer reviewed journal articles were sourced from Google Scholar, Search it, and Web of Science search engines. For world health data and statistics, Organisation for Economic Co-operation and Development (OECD) was consulted for empirical data related to health in each of our four selected cultures, such as obesity rate. We also used information from the World Bank, a website containing free and open access to global development data. We obtained information such as diabetes and heart disease rate from this sources. To learn more about specific eating cultures and habits, books from the WSU library, as well as online databases like Human Relations Area Files (HRAF) were consulted. To fill in any missing information, another method used was to search google to find specific articles on a topic, and trace down the journal articles cited in those articles written by bloggers or journalists.

Japan is developed island nation located in East Asia. The current population is over 125 million, with most citizens concentrated in Tokyo city and the surrounding area (). Kyodo, 2016 Due to a decrease in fertility rates and an increase in life expectancy, the population has been aging (Kyodo, 2016; Knight & Traphagan, 2003). The predominant religions are buddhism and shintoism, with nearly 85% of the population practicing a combination of these (World, 2010).

Spain has an incredibly diverse demographic with different climates, cultures, languages, and traditions throughout. With a population over 46 million, Spain is dominated by catholicism

(Medina, 2015). Its cultures are influenced by its Celtic, Iberian, and Roman roots (Lloris, 1999). Population and life expectancy at birth have been steadily on the rise, while primary school enrollment has been on an overall decline (World Bank). Spain is known for its rich culture of dancing and music, and is responsible for the creation of many different genres of art (Medina, 2005).

Greece is a combination of the mainland and over 1,400 islands the largest being Crete. It is a country with a population of over 10.77 million (2017) and spans about 51,000 total square miles with nearly two-thirds of the population residing in large cities such as Athens. This beautiful coastal country is known to have the longest coastline in Europe and has been cultivating olive trees for over 6000 years. The major religion in Greece includes Christianity and many of their traditions surrounding food revolve around these religious traditions such as Easter (Essid, 2012).

Chile is a coastal country in South America. Although on average the country is 110 miles wide, it stretches 2,700 miles from Peru in the north to Cape Horn at the southernmost tip. Because it spans such different latitudes, Chile has an extremely varied climate that ranges from the deserts of the north to the subarctic climate of the south. (Carmagnani) The central part of Chile is relatively temperate and is home to most of the country's 18.4 million inhabitants as well as nearly all the major cities. In addition, nearly 90% of the population lives in an urban environment. (Carmagnani)

Results

Japan

The traditional Japanese diet is characterized by several cornerstone foods. Fish is a large part of the diet and the major protein source (Gabriel et. al, 2018; Zhang et. al, 2015; Zarrouk, 2017).

Japan has one of the highest fish consumption rates in the world (Zarrouk, 2017), possibly because

it's large coastline as an island nation. Soybean products are also common (Gabriel et. al, 2018), typically in the form of tofu or miso (Zhang et. al, 2015). The diet is also characterized by low animal product intake (Gabriel et. al, 2018; Ferro-Luzzi, et. al., 2002). This is partially due to the prominence of Buddhism (Gabriel et. al, 2018; Kikkawa, 2010). Owing to this low consumption of animal products, the typical diet is low in fat, especially saturated fat

(Ferro-Luzzi, et. al., 2002) (Tokudome et al., 2004). Vegetables and fruit are also common, and in season and local varieties are preferred (Goto et al., 2014; Walsh et al, 2007;;Gabriel et. al, 2018; Zhang et. al, 2015). The staple carbohydrate the diet is rice, and agriculture of rice is a large industry in Japan (Goto et al., 2014; Zhang et. al, 2015; Sato, 1918). Green tea is also a common beverage.

Common preparation of these foods includes steaming, boiling, and stewing (Gabriel et. al, 2018). Due to the abundance of freshwater rivers, water is frequently used to cook and make soups (Gabriel et. al, 2018). There is a common style of serving food in Japanese culture as well.

Typically, meals are served in many small plates and bowls on a large platter or tray (Sarata et. al, 2015;;Freedman, 2016). Due to this, portions tend to be small (Walsh et. al., 2007). Not only are food portions small, bite sizes are also small due to the use of chopsticks (Gabriel et. al, 2018). This compartmentalization of food is demonstrated in the common "Bento Box" (Sarata et. al, 2015).

Not only is variety though the many small dishes within a meal culturally important, but variety between meals is also valued. Meals will be planned so that something different is eaten from the previous meal or day (Freedman, 2016). This way of serving food is part of the *Washoku* style (

Gabriel et. al, 2018). The term translates to “Japanese meal” and is characterized by these small portions and a large varieties (Gabriel et. al, 2018).

Greece

Across the world, the Mediterranean Diet is referenced as an ideal model for a healthy lifestyle due to the overall health of the countries within this area. One country specifically focused on for its diet is the country of Greece, which is a combination of the mainland and over 1,400 islands located in Southern Europe on the Mediterranean Sea. Food is a large part of this society and plays a major role in the culture and food preparations. Traditionally, the people of Greece were dependent on the land due to poor economic status. This framed the guidelines of their diet since they were more dependent on seasonal and local fruits and vegetables, olive oil, and the versatile wheat/cereal. Meat is not an important factor in diet and is usually reserved for special feasts and traditions. The meat that is typically consumed is lamb, sheep, or fish and occasionally beef or pig depending on the celebration. Other important foods included dried fruit (as a cheap sweetener for meals), wine, and milk and cheese from cattle. What is also unique about this culture is that people spend more time eating than in most places around the world because meals are seen as a time of interaction and tied heavily with religion. Since having a multigenerational home is prevalent in Greece, meals are often used as a time to catch up with the entire family and celebrate life together. A meal can last up to three hours and every dish is served at the exact same time on the table. This can be seen as more family style dining and a collaborative effort for the family (Essid, 2012)

Due to these food practices, there are many important health factors that come into play and have caught the attention of the world. The people in Greece have a lower risk of cardiovascular disease (Tokudome, 2004), low SFA (saturated fatty acid) content, above ideal

BMI (body mass index), and low IHD ischaemic heart disease (IHD) rates (Moschandreas, J., & Kafatos, 1999). However, because of total fat increase in diet over the last 30 years, an increase in obesity rates over the past 20 years can also be seen: “The recent analyses of obesity rates throughout mainland Greece reveal that not only are >50% of women aged 65 and over obese, but that the majority of the total adult population is either overweight or obese” (Ferro-Luzzi, James, & Kafatos, 2002). This may also be affecting the increased prevalence of hypertension in the population (Ferro-Luzzi, James, & Kafatos, 2002). The average life expectancy for a male in Greece has been consistent during this time remaining around 72 years from birth (Ferro-Luzzi, James, & Kafatos, 2002). Olive oil may be a contributing factor in these health conditions. Most foods in Greek cuisine are made in olive oil making it hard to measure the amount of added fat in their food. Total fat intake in Greece is around or above 40% (Ferro-Luzzi, James, & Kafatos, 2002; Trichopoulou & Vasilopoulou, 2000) which is high but may be balanced with the health benefits of olive oil. Olive oil contains a variety of other components that may have beneficial effects because it is pressed using the whole fruit and all of its components are transferred with it as compared to other oils (Trichopoulou & Vasilopoulou, 2000).

Spain

Spanish cuisine is influenced by both surrounding empires and by the empires which it colonized. Much of Spain’s cuisine has been deeply influenced by the Mediterranean diet. The three major food groups in Spain are bread, cheese, and pasta (Medina, 2005). Coastal areas, like Catalan, have access to and consume seafood as a primary source of protein. All across Spain, seafood is generally preferred over poultry and eggs (Medina, 2005). Some more of the most popular foods include fruits, vegetables, legumes, grains, olive oil, wine, and potatoes, all which can be cultivated in

different regions across Spain (Olivella, 2018). The primary source of fat is olive oil, which provides polyunsaturated and monounsaturated lipids. Although the Spanish diet does focus on grains, they are often processed into white bread and sweet pastries (Medina, 2005).

Spanish eating customs revolve around socializing and relaxing. Sitting down for long meals at lunch that consist of many servings, and eating dinner very late, usually after 9pm, is very common. For dinner, a popular type of dining is tapas. This includes a large variety of food served in very small portions. Wine is also a very large part of the Spanish diet, and Spain is known for producing some of the best wine in the world (Medina, 2005).

Spain has a fairly low obesity rate at 16.7%, which is almost half the rate of the United States (WHO). However, its diabetes rate is slightly higher than other European nations, at 7.2% (World Bank). The leading cause of death in Spain is cardiovascular disease (Amor, 2015).

Chile

The Chilean diet has had a variety of influences, the two main ones coming from the Mapuche who are indigenous to central Chile and the Spanish who first colonized Chile in the sixteenth century (Faron, 1960). The Chilean cuisine is often referred to as *Cocina criolla* or “Creole cuisine” and refers to the blending of indigenous and colonial diets that is now seen in modern Chile (Sepúlveda, 2016). Before Chile was colonized by the Spanish, the indigenous Mapuche people would primarily hunt and fish, but would also cultivate plants such as corn and a variety of fruits. (Mapuches, 2009) Ingredients such as potato, maize, beans, pumpkin, and chilli peppers remain in the diet today (Sepúlveda, 2016). The Spanish colonials have had perhaps an even greater influence on the modern Chilean cuisine. Bread, for example, was introduced by the Spanish and has become a staple in the Chilean diet. In fact, after Germany, the country now ranks second worldwide for bread consumption. *La once* or the afternoon tea also has colonial roots. This meal usually involves

bread with a variety of toppings ranging from jam to scrambled egg and has come to replace dinner in 73% of the population (Sepúlveda 2016).

In recent years, Chile has undergone a nutritional shift as more processed foods have entered the diet. The consumption of sugar sweetened beverages, for example, has surged in recent years with the highest growth rate from 2009 to 2014, and Chile now has the highest rate of sugar sweetened beverage consumption worldwide (Caro, 2017). Other ultra-processed foods have also begun to find a place in the Chilean diet. Now processed and ultra-processed foods which are defined as “foods high in sodium, saturated fats, sugar and refined carbohydrates” make up 55.4% of household food expenditures (Caro, 2017). The obesity rate has also increased in recent years and Chile currently has an obesity rate of 25.1% and a diabetes rate of 8.5% (World Bank, 2018). Overall, in the past two decades, the economy has grown, the obesity rate has increased, and both processed and ultra-processed foods have gained a larger place in the country’s diet.

Discussion

Food is an integral part of culture and varies widely in cultures throughout the world. In addition to the types of food eaten, social practices surrounding food production, preparation and consumption all contribute to role food plays in a culture. The goal of this study was to determine what aspect of food and the culture surrounding it had the most profound effect on health. After investigating the culture of food in Japan, Spain, Greece and Chile, the findings were used to assess whether the geographical environment, the types of food eaten, or the level of preparation and processing of food played the largest role in health.

Japan

First, we look at Japan. The Japanese diet is known for being incredibly healthy (Zhang et. al, 2015). Japan consistently has the lowest rates of obesity (OECD), diabetes (world bank), average

weight (Wardle et al, 2006), and many other health related measurements (Ogce et al., 2008). Cultural norms also focus on healthy eating, and due to the common Japanese desire of interdependence, people feel pressured to follow this norm (Levine et. al., 2016). There are several features of the Japanese diet which may contribute to their exceptional health record.

The high consumption of fish leads to an increase in n-3 fatty acids (Ogce et. al., 2008), which can decrease the risk of congenital heart disease (CHD) (Iso, 2010). Soybean products contain plant estrogen, which is linked to a decrease in breast cancer risk (Ogce et. al., 2008). Green tea also has phenols, which may further decrease cancer risk. Phenols may also act as antimicrobials against *Helicobacter pylori* infection (Ogce et. al., 2008). High levels of fat have been linked to bad blood pressure (Iso, 2010), and therefore Japan's low saturated fat intake decreases this risk.

The style of serving food could also contribute to the healthy eating. The use of chopsticks leads to smaller bite sizes, leading to eating less food overall (Gabriel et. al, 2018). The style of small portion sizes served in separate bowls and dishes also contributes to eating less food. Research has shown that larger portion sizes leads to increased food intake, and that the increase in world obesity rates correlates strongly with the increase in portion size (Burger et. al., 2011). In addition to this, the alternation between the many small dishes may contribute to an overall decrease in food intake (Brondel et. al, 2009).

Greece

The Mediterranean and Greece is often analyzed because it is thought to promote health and is often credited with the promotion of olive oil as a healthy fat (Essid, 2012). The low prevalence of SFA content in the Greek diet reflects how the only fat almost always exclusively used in cooking is olive oil (Ferro-Luzzi, James, & Kafatos, 2002). However, although olive oil can be considered a

healthier fat, the fat intake in Greece is so high (around 40% (Ferro-Luzzi, James, & Kafatos, 2002, Trichopoulou & Vasilopoulou, 2000)) that there is little to no health gain from its presence in the diet besides providing lower rates of ischaemic heart disease. It is also extremely difficult to measure the amount of fat consumed in Greek cuisine,

“Mediterranean individuals consume high amounts of total lipids (approximately 100 g/day in males and 80 g in females) and also polyunsaturated fatty acids (PUFAs) in males, and lipids (more than 40% energy) and PUFAs in both genders along with high concentrations and proportions of monounsaturated fatty acids (MUFAs), largely from olive oil” (Tokudome, 2004). Olive oil significantly contributes to the Mediterranean diet and has the potential to substitute a healthy fat in place of less healthy oils and fats such as canola oil and other vegetable oils into diets around the world even though it is consumed in large proportions in Greek culture.

Other health factors that may be contributing to the the 4.5% Diabetes Rate (lowest within the four countries compared) and 17% Obesity Rate (third lowest within the four countries compared) may be other components in the Greek diet besides olive oil (World Bank, WHO). For example, Antioxidants can be found in wild edible green vegetables that are prevalent in rural Greece and commonly used to make salad and pie dishes. These antioxidants may be one explanation for the health benefits such as a lower diabetes rate among the population because of their ability to reduce oxidation reactions in the body which can create a harmful chain of chemical reactions in the body (Trichopoulou & Vasilopoulou, 2000). The health benefits of antioxidants may also contribute to an increase in longevity of life (around 72 years(Ferro-Luzzi, James, & Kafatos, 2002)), which has remained constant in Greek culture (Trichopoulou & Vasilopoulou, 2000). There is potential that the antioxidants may be contributing to the overall health of the population of Greece and could

potentially be applied to diets around the world to reduce risks such as diabetes and increase the longevity of life. In addition to this, as a result of the Greek populations reliance on local fruits and vegetables, the consumption of these products might contribute to an overall increase in metabolism. In fact, these substances are thought to regulate metabolic processes and their derangement may contribute to chronic diseases in other cultures (Moschandreas, J., & Kafatos, 1999). All of this information is important to identifying the foods and aspects of culture that could possibly promote a lower risk of obesity and diabetes due to the global epidemic.

Spain

Despite the mediterranean influence on Spanish diet that is thought of by many to be one of the healthiest diets in the world (Serra-Majem, 2004; Essid, 2012), the leading cause of death in Spain is still cardiovascular disease (Amor, 2015). Cardiovascular disease can be prevented by sticking to a diet of whole foods, but there are many other factors at play (Amor, 2015). In the modern day developed world, the prevalence of fast food is increasing as people begin to operate at higher levels of stress (Bagozzi, 2000). This has caused higher rates of cardiovascular disease all across the developed world. In exploring more nuanced differences in health among developed countries, it seems that the culture surrounding food preparation and consumption could account for some of the differences in obesity and diabetes rates among developed nations. In Spain socializing, drinking, and movement characterize people's eating habits, and this can have various implications on health, including overeating and indigestion (NIH, 2016). The diet is also characterized by many courses, large variety, small portions. This can aid in digestion and help ensure a balanced diet (NIH, 2016). Like Greece, there is question about the health risks and benefits of heavy olive oil consumption. In tapas, olive oil is often used to fry foods (Medina 2005) which could change its

effect on health. Another example of food preparation affecting health is the high processing of grains to make sweets and pastries. This is a likely contribution to higher rates of diabetes in Spain (NIH 2016). It is possible that types of preparation and processing of foods that varies across cultures could contribute to some of the differences in health of developed nations.

Chile

Of the nations considered, Chile was considered the least healthy due to a high obesity rate of 25.1% and a high diabetes rate of 8.5%. While the Chilean diet does contain similarities to that of other countries included in this study, a nutritional shift has led to a high level of processed foods, particularly sugar sweetened beverages. It is interesting to note that this shift has also been accompanied by rapid growth in the economy. For example, the nation's poverty rate (four US dollars per day or less) dropped from 26% in 2000 to 7.9% in 2015. It is also important to note that agriculture is a minor industry, accounting for merely 5.6% of the country's GDP. (World Bank) Subsequent changes in lifestyle are likely a factor influencing Chileans to purchase more ready-to-consume foods (Cediel). Chile has retained many of its traditions - the afternoon teatime, *La once*, for example, continues to be an important part of Chilean food culture - but increases in fats and refined carbohydrate have led to changes in the diet. These changes are linked and perhaps responsible for decreases in health as indicated by rising obesity rates.

Country	Obesity Rate (OECD)	Diabetes Rate (World Bank)
Japan	3.7%	5.7%
Spain	16.7%	7.2%
Chile	25.1%	8.5%
Greece	17.0%	4.5%

Figure 1 (above):

A comparison of obesity rates and diabetes rates

Japan	Greece	Spain	Chile
Fish, soybean (tofu/miso), low animal, rice, tea, fruit and vegetables	Low meat, olive oil, fruits and vegetables,	Bread, cheese, pasta, fruits and vegetables	Bread, beans, chiles, potatoes, low meat

Figure 2 (above):

A comparison of the typical diet - Foods similar between cultures are in magenta.

Japan	Greece	Spain	Chile
Fish soybean (tofu/miso), rice tea, fruit and vegetables	olive oil fruits and vegetables,	Bread, cheese, pasta fruits and vegetables	Bread, soft drinks, beans, potatoes

Figure 3 (above):

A comparison of the level of processing observed in the typical diet of the four cultures examined. Green indicates the least processed, yellow indicates intermediate to low processing, orange indicates intermediate to high processing, and red indicates high processing.

When considering the first hypothesis, that geographical environment affects health, the proximity to water was the primary geographical factor taken into account. All four of the nations analyzed are coastal nations and seafood has a place in each of the countries' diets. Yet despite the geographical similarity, large differences in health were still observed as can be seen in Figure 1. The second hypothesis that the types of food eaten determines health was analyzed by comparing major

foods in each country's diet. Figure 2 shows some of the predominant foods for each country. As seen in the figure, there is a high level of overlap between the diets of each nation, yet despite the similarities, there is a significant discrepancy in health. Both Chile and Greece for example, have relatively low meat in their diets, yet the diabetes rate in Chile is nearly twice that of Greece. The third hypothesis that food preparation and level of processing determines health had the most evidence supporting it. Figure 3 again shows some of the major foods in each country's diet, but color is used to show the level of food processing. As seen in the figure, Japan has overall relatively low processed foods such as fish and fruits/vegetables whereas Chile has relatively high processed foods such as bread and soft drinks. The trends in level of food processing matches the trends in obesity rates, and, with the exception of Greece, the trends in diabetes rates as well. Based on an analysis of the three hypotheses, it was determined that the level of food preparation and processing was found to be the most prevalent food-related indicator of health among the four cultures analyzed.

Comparing food related practices and measurements of health between cultures is a powerful way to find correlations and begin to understand how the two are related. Future studies could be more robust by collecting data from a variety of cultures rather than just four. The cultures in this study were all relatively developed which is why data on obesity and diabetes was so readily available. However, these cultures were also spread over wide and in especially in the case of Chile, extremely diverse within itself. Therefore, future studies could benefit by collecting data from cultures that are geographically compact and by collecting data separately from people living in cities versus rural areas. Finally, additional measurements of health could also be used. Mental and emotional health, for example, was not considered. Measurements such as life expectancy or prevalence of various illnesses could add clarity to health within a culture. Overall, through a cross-cultural examination,

this study found that food preparation and the level of food processing may help determine health as indicated by obesity and diabetes rates. By comparing more cultures around the world and considering more variables, future studies can build upon these findings.

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