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Recommended Citation

King, Jason, "Modern Dietetics and Why the World Should, but Won't, Change it's Diet" (2015). *Honors Projects*. 401.
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Modern Dietetics and Why the World Should, but Won't, Change it's Diet

HNR 499 Senior Project

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Winter Semester 2015

According to the World Health Organization (WHO), since 1994 the number of deaths due to cardiovascular diseases (CVD) and the number of diabetes and obesity diagnoses has increased every year (Global status report on noncommunicable diseases, 2014). CVD is a major epidemiologic problem, and is the leading cause of death worldwide, killing over 17 million people each year (Global status report on noncommunicable diseases, 2014). It must be noted as well that one of the major risk factors for CVD is diabetes. Similarly, obesity is one of the leading risk factors for diabetes. The question must be asked: what is causing the constant increase in these diseases? Simply citing the world's increasing population as a justification is not sufficient, for the prevalence of other diseases such as rickets or beriberi have decreased over the years (Cordain, 1999)? We must also consider the geographical representation for these diseases in order to obtain a more thorough understanding of their causation. Similarly, the socioeconomic standing of the countries with the highest number of reported cases should tell us even more about the possible causes. Taking into consideration these factors and through researching modern data on nutrition and dietetics, I believe that the largest contributing factor to these inflated statistics of preventable disease deaths resides in the poor diets of those afflicted.

Concerning the geographical spread of diabetes, obesity and CVD, the countries that consistently display some of the highest rates are those in the Pacific Islands and North America (Diabetes Atlas, 2014). When we look at the climates and environments of these two regions there is significant variability, from tropical to arctic/tundra. This inevitably leads to a great deal of variance in the potential or native diets of these populations. The diets of many Pacific Island countries consist of high intake levels of saturated and trans fats. The primary culprit is imported and preserved foods from countries such as the United States and China (Caballero, 2002). While these foods are usually cheaper to purchase and distribute, these foods are very different from the

traditional foods and diets of the Pacific Islanders (Caballero, 2002). In turn, the increasing consumption rate of these processed foods coincide directly with the increasing rates of diabetes, obesity, and CVD diagnoses in these nations. Similarly the prevalence of these diseases in North America, and other leading industrial nations such as China, can be linked to the high levels of processed food consumption in tandem with a sedentary lifestyle (Diabetes Atlas, 2014). Rather than relying on or mimicking their native diets, these nations have turned to options that are cheaper. Instead they are producing and distributing processed foods that are commonly high in saturated and trans fats as well as containing large quantities of preservatives and artificial flavorings (Caballero, 2002).

This last point can be directly linked to the socioeconomic data on the sub-populations within these high-risk nations that demonstrate the highest rates of obesity, diabetes and CVD. In fact, WHO reports that around 80% of CVD deaths and obesity diagnoses are found in low-income or third world populations (Global status report on noncommunicable diseases, 2014). For people in these environments, proper nutrition or healthy eating is most commonly correlated with high costs. Without the necessary resources for proper nutrition, many people with this socioeconomic standing or geographical location must find cheaper alternatives when purchasing food; the cheapest food options are often the most processed and preserved foods available. In fact the sheer rise of a 'fast-food culture' exposes how the food a population can, and does, eat affects health.

With all these statistics on the rising numbers of preventable diseases, and the knowledge that many populations are suffering because of the food they choose eat, one would naturally think that the next progression is to look at how we can change this situation. Specifically we could ask: "what foods should we specifically eat and not eat?" However, I believe that before

we can provide insight on how we should, exclusively different from 'will', eat, we must look back at the history of our diets as a species. Whereas the human species has not genetically changed much in the past 40,000+ years, our diets have become so radically different that someone from the first centuries CE would hardly be able to recognize what we consider food today (Cordain, 1999). Common sense would dictate that if disease rates have been quickly increasing over the past decades, then at one point these rates must have been considerably lower. Would it not make sense then to look back at how we, as a species, used to live and eat when these numbers were in fact, lower? In this world of constant technological breakthroughs and reengineering of outdated processes, perhaps the best solution for improving our health is not to create a new pill or hospital procedure. Instead the real solution lies within the history of how our ancestors used to eat and live.

Humanity's Ancient Diet

From Hunter-Gatherers to Farmers

In order to fully understand how drastically different our modern diets are from humanity's ancient diets, we must delve into the annals of archeological and written records on how we used to eat. For the majority of humanity's (specifically referring to *Hominim* as the species for humans and their direct ancestors) food history, as defined through archeological records, we have been a species of hunter-gatherers (Higman, 2012). In fact, research shows that up until the 10th Century CE one quarter of the world still remained a hunter gather dominated place. Fossil records from Africa and parts of Asia reveal that certain foods consumed in massive quantities today, particularly cereal grains, were rarely consumed by humans prior to 10,000

BCE (Cordain, 1999). One of the main contributing factors to the lack of cereal grain consumption during this period is the fact that humans were primarily wanderers or migratory (Higman, 2012). During the epoch of the Holocene, in which the Earth experienced a massive climate change as the global temperatures warmed considerably following the Ice Age, many species including *Homo sapiens* began to migrate cross-continently (Holocene Epoch, 2015). With this cross-continental migration came the first major event that changed the nature of how and what humans ate.

The nature of a migratory existence predisposed early humans to a hunter-gatherer lifestyle, the allocation and cultivation of grains or other crops simply was not a feasible option. Over the course of hundreds of years, however, different regions around the globe began to experience the first examples of early human settlement and eventually the rise of agriculture, horticulture and the domestication of animals (Higman, 2012). It is interesting to note that this change did not happen concurrently within the different global regions. In fact, it is often a greatly debated fact as to when this era of humanity's food history actually began. Primarily, this confusion is due to the fact that the ancient world (~9000 BCE) was segregated into respective food worlds; the climate change of the Holocene separated certain groups of humans from others, specifically the Bering Sea separating Asia from the Americas (Higman, 2012). Certain fossil records indicate the era of agricultural and domestication beginning first in Africa, while others indicate areas in Southern Pacific Asia (Higman, 2012; Tannahill, 1973). Regardless of where it started, significance really lays within the fact that humanity's decision to settle was the first step in the eventual cascade of events that changed the face of the earth's landscape.

So what exactly prompted early humans to settle? Besides the basic answer of agricultural reasons, this question prompts a more in-depth look at exactly what caused the

change. Fossil records show that this change in settlement was largely due to the discovery of large, wild grain fields that could sustain the food needs of a village (Tannahill, 1973). Now it is important to note that these wild grains were vastly different from the grains consumed today. Through cultivation and various other farming techniques, these grains have evolved substantially since their first discovery during this early epoch of agricultural development (Cordain, 1999). Another crucial element that can't be ignored is the nutritional content, specifically the protein content, of these early wild grains was often much higher than that of modern grains (Cordain, 1999; Tannahill, 1973).

With the discovery of wild grains came the evolution of cooking and preparing foods. This required early man to learn an efficient and sustainable way to cook wild grains. Since raw grains are not digestible by the human stomach, this was essential for proper consumption. Through years of practice and experimentation, man somehow found a way in which the grain's seeds could be roasted, leaving the edible grouts behind (Tannahill, 1973). This worldwide discovery allowed for the consumption of wild grains such as oats, millet, amaranth, maize and quinoa, and marked the beginning of the next era in human food history: animal domestication and farming (<http://us.naturespath.com/healthy-foods/ingredients/ancient-grains>).

While the introduction of regular cereal grain consumption was a significant change to ancient humanity's diet, its repercussions indeed brought about the most drastic changes that we can see today. The first of these was the domestication of animals, namely goats, sheep, pigs and eventually cows (Tannahill, 1973). With the ability to grow and harvest large quantities of grain came the capacity to care for and maintain herds of animals along with adequately feeding the village. While at first this did not result in a significant change in the diets of early humans, the second-hand discoveries of these animals and their products did. Most notably was the

introduction of milk into the human's diet (Tannahill, 1973). Through this type of domestication, early humans learned that goats and cows produced milk that was palatable and useful in cooking (Tannahill, 1973). Early man learned that this milk could be turned into cheese or butter through further cooking and processing. The second discovery was that domesticated animals would often produce larger litters than wild varieties, through breeding and years of microevolution. This led to a massive increase in the raising of animals for food as compared to during strictly hunter gather periods. It is important to note that these changes occurred worldwide, although very gradually, somewhere between 10,000 and 4000 BCE (Wilkins et al., 1995).

From Farming to Food Industry

After the discovery of animal domestication and farming, early man began to severely limit dietary variety. There are almost 200,000 different varieties of plants that man can utilize as a food source in some form, yet after the discovery and domestication of grains and other common plants we now limit ourselves to the consumption of less than 1% of these varieties (Cordain, 1999). The unfortunate truth is that this limitation is a direct result of the industrialization of food and the beginning of food processing.

While in early human history, pre 10,000 BCE, the food available to be eaten was limited by man's geography. The onset of the classical Roman, Greek and Egyptian empires brought about a new era in food availability (Higman, 2012). As settlements increased in size and people began to accumulate more wealth, the importing and immigration of food became more widespread. Travelers would bring news or physical examples of different foods from exotic regions of the world. This prompted the economically capable to pursue these food options more

aggressively (Higman, 2012). Although at first this brought about a huge increase in the variety of foods available to different regions, it marked the first step in food localization in which a specific crop was intentionally only grown in one region. Certain areas worldwide began to become famous for their production of certain food staples, and consequently these staples became the dominant food staples grown/eaten in these locales (Higman, 2012). Rather than maintaining the native population and variety of food available in these different regions, signature crops took over the available farmland and led to a gradual decrease in food variety. This rise in local food specificity and ever increasing population laid the groundwork for food industrialization and processing to take place.

The advent of farming technology and its advancements meant that more food could be produced more easily and theoretically be made more affordable for the masses (Higman, 2012). However, as livestock became depended on more heavily for meat consumption, and farmers needed larger areas to grow larger quantities of crops, there became an obvious problem: space. There simply was not enough land in many places for the growing industry of farming and food production. These deficits led directly to the first widespread and intentional uses of deforestation as a means to further the food industry (Higman, 2012). With the deliberate destruction of forest and fauna came the concurrent loss of many food varieties available to many regions worldwide (Higman, 2012). Humanity no longer relied on the landscape of earth to dictate what food they *could* eat, rather humanity learned to dictate the landscape to grow the food they *wanted* to eat.

From the ancient techniques of irrigation and large-scale crop growing that developed in Egypt and parts of Asia, as well as the use of slaves and livestock as laborers on massive grain farms, we can see how the old lifestyle of hunter-gatherer quickly became obsolete (Higman,

2012). With an increasing complexity in societal structure came the use of food production and consumption as a tool to display one's power, or remove someone else's. Areas that once relied on the bounty of the land to provide all their caloric and nutritional needs now became dependent on governments to provide them with the food they could eat (Higman, 2012). Most commonly this resulted in populations relying primarily on cereal grains for their main caloric needs, supplementing with a handful of different food varieties (Cordain, 1999). This represented a drastic change in humanity's diet when compared to that of ancient hunter-gatherers and the earliest settlements. Over the course of the next few thousand years, the increasing expansion of humanity began the concurrent evolution of diet into the one we eat today.

From Food Industry to Food Fabrication

Arguably the most significant event in the timeline of humanity's dietary changes is the use of technology to process and modify food. The modifying and processing of food can be defined simply as changing or altering of the food to improve taste, maintain freshness, or chemically alter it. (Caballero, 2002). Examples of ancient methods used to modify food include: using salt to preserve meat, ice chips to freeze fish or the sun to dry fruit. Traditionally, in order to preserve food it was necessary to modify it in some form. However, starting in the 1900's humanity began to use technology to not just make food last longer, but to make it more palatable, more nutritious, more colorful, going above and beyond traditional modification (Rees, 2006). In a matter of years, technology gave humanity the opportunity to improve upon what took our ancestors thousands of years to achieve. The discovery of genetic modification, along with corn syrup and other preservatives opened the doorway into a new realm of food processing and fabricating (Caballero, 2002).

As far as explaining exactly how humanity used technology to modify food, there are only a few basic manners in which food modification is generally done. The first of these is genetically modifying food. Simply put this involves the altering the genes of plants and animals to produce varieties that are more prone to develop a selected trait more than others (Rees, 2006). Most notably the majority of the world's corn, soybeans, and wheat are genetically modified to last longer and produce a greater yield. Another use of technology is in the preserving of food through the addition of artificial preservatives and other chemicals that prevent food from spoiling as quickly (Caballero, 2002). Finally, the addition of artificial sweeteners is used to alter the taste of food to make it not only more palatable but to increase craving and consumption of the food as well (Caballero, 2002). This is frequently done under the guise of low calorie labels to insight greater consumer consumption.

It is important to note that generally speaking the processing or fabricating of food is not a negative thing. In fact it has allowed for the eradication of certain preventable diseases and nutritional deficiencies in many populations such as pellagra and beriberi in Japan (Caballero, 2002). Yet, while the modification of food was originally done to breed the crops, which would be most resilient and yield most abundantly, or to raise animals in environments conducive to healthy and robust growth, the global food industry has slowly turned away from this approach. Rather, food processing is done in modern times to make food cheaper, more palatable, last longer and force cravings (Rees, 2006). Take for example the United States and its bountiful resources in terms of agricultural production and available food. While the United States may be one of the most well off nations in terms of food available, data proves that we are not the healthiest nation by far, suffering from some of the world's highest rates of obesity and other non-communicable diseases (Pray, 2014). Unfortunately this is the case for many nations

worldwide, as their traditional diets have been replaced with processed foods that are cheaper, easier to produce, and have a longer shelf life. Obviously the onset of technologically modifying food is a far cry from the hunter-gather diets of ancient man, and its repercussions have ultimately caused the greatest shift in not just our diets but our health as well (Caballero, 2002).

The Modern Diet and its Deficiencies

With an overview of how humanity's diet has changed over the past 10,000 years we can now more appropriately look at not just the changes that have evolved into our modern diet, but how this diet is deficient. To clarify, with the sudden change in how our species eats compared to how our species has genetically evolved, our current diets have outpaced us and left us with nutritional deficiencies (Caballero, 2002). Now when I mention *our* diets I am referring to what has been coined the 'Western Diet': with plenty of grain carbohydrates with incrementally decreasing amounts of vegetables, fruits, meats, dairy, sugars and oils (Caballero, 2002). While this diet is not followed verbatim in every nation, generally speaking the global food system predisposed most areas to eat some variant of this type of diet (Pray, 2014). With an understanding of how the world generally eats, we can begin to dissect how our diets factor into our current health issues.

While the incredibly large production and consumption of cereal grains and artificially preserved and processed foods allows the world to sustain its enormous population of more than 7 billion, it also predisposes humanity to nutritional deficiencies (Cordain, 1999). Specifically the problems are most prevalent in developing nations and non-industrialized countries. As previously mentioned, in certain regions such as the Pacific Islands, obesity and other non-communicable diseases are extremely prevalent. In looking at these countries and others, data

shows that at on average 50% of all caloric needs come from bread/grains while in some cases 80% is reported (Cordain, 1999). Although there caloric needs are being met, it is done at the cost of many vitamin and essential amino acid deficiencies. Most grains lack any source of Vitamins: A, C, and B₁₂, are often limited in the amino acid content, and are generally lacking any essential fatty acids (Cordain, 1999). The people in these countries who eat such large amounts of grain and similarly processed food are at an apparent risk for health issues simply because of the dietary limitations. Furthermore, the over-consumption of grains and preserved foods is often accompanied worldwide by the under-consumption of fruits and vegetables (Cordain, 1999). This imbalance directly correlates to decreased capabilities in fighting of preventable diseases such as CVD and obesity.

Where the over-consumption of grains in developing countries can support the case for poor nutrition causing the widespread levels of non-communicable yet preventable diseases, where does this put industrialized nations who have a larger access to food? Data shows that most developing nations have disease statistics on CVD, high cholesterol levels, and diabetes comparable to those in Western nations (Cordain, 1999). The simple answer to this dilemma is to compare our omnivorous grain-dependent diet to that of our ancestral hunter-gatherer diet. The extreme flux from leafy greens and lean animal meat consumption to our current grain heavy and preservative rich diets has resulted in a negative flux in our nutritional health. Our diets have outpaced our genetic development leaving us with the global issues of increasing non-communicable disease prevalence. Our average caloric needs are being met if not exceeded with foods that our not even close in nutritional density (number of essential nutrients per calorie) compared to the leafy greens, nuts and seeds, lean meats and fatty fish that our ancestral hunter-gatherers ate (Cordain, 1999). So what can be done to help restore the nutritional balance to our

world's general diet? Before this can be addressed we need to understand what has been stalling noticeable change.

Fighting the Food Industry and Globalization

The largest obstacle that we will face in trying to reboot our diets to resemble those of our ancestral hunter-gatherers will be the food industry itself and the repercussions of globalization. While the United States has one the largest GDP's and available food markets of the world's developed countries, it does so at the deleterious cost of its natural resources such as field space, forests, fresh water and fertile soil (Pray, 2014). Similarly, some of the world's largest corporations own not only vast amounts of farmland worldwide, but produce the largest amounts of grain as well (Pray, 2014). Where then does this leave developing nations who don't have the total access to healthy food options that other developing nations do? These nations often are forced to use their available recourses to produce grains and other massed produced foods (Cordain, 1999). Consequently these countries struggle to feed their populations food that is nutrient dense and unmodified. The problem becomes evident when one proposes that these nations use their farmland to produce their own native and nutritious foods rather than sell the land to large-scale corporations. However, it is very difficult to use agricultural to be economically sustainable as a developing nation, when the cost to start is so high and the initial yields usually small (Caballero, 2002). Furthermore, the largest of these corporations, who own the majority of food production and processing worldwide, make the majority of their profits from their factories and plants, which often reside in underdeveloped nations (Caballero, 2002). Clearly a vicious circle is at hand; the corporations with the largest influence to change what and

how countries grow their food are the ones that produce the largest amounts of food that doesn't support our evolutionarily predisposed hunter-gatherer diet.

Although there exists a plethora of evidence on the nutritional importance of clean eating (as defined by avoiding processed or modified foods and grains) and diets similar to hunter-gatherers, most people are unaware of the factual information (Cordain, 1999). This is why one of the largest reasons the world will struggle to change its diet is due to the clout and prevalence of corporations pushing the consumption of grains and processed foods. Underneath this tide of misinformation lies the factual truth behind the benefits of a hunter-gatherer diet and the known health risks directly caused by the modern 'Western diet'. If actual dietary change is going to happen, it would entail the direct involvement of the corporations and companies who would suffer the most from the change (Caballero, 2002).

While the evidence clearly supports that our species is genetically predisposed to eat a hunter-gatherer like diet, eras of technologic and population/cultural change has forced the general world populous into eating a diet that leaves us at a blatant nutritional disadvantage. It should come as no surprise then to see the worldwide prevalence of non-communicable diseases increase year after year, as our diets become less and less like those of our ancestors. Since the food industry and globalization largely inhibit the large-scale changes necessary to convert our dietary habits, the only real place to start is on the small-scale micro level. Modern humanity's diet can change, although it most likely will start at the individual level. The difference each collective individual makes in choosing to eat more like a hunter-gatherer truly may be the only force strong enough to eventually cause global change.

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