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Possibilities of a third epidemiological occurrence

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Possibilities of a third epidemiological occurrence

Abstract

The purpose of this paper is to examine the possibilities of a third epidemiological occurrence. An epidemiological occurrence is where large segments of population and culture have been adversely affected either by disease or through manmade causes of disease. According to World Health Organization an epidemic is an outbreak of a disease that attacks many people at the same time and may spread through more than one community. An endemic outbreak is a disease that exists permanently in a region or within a population. A pandemic is an epidemic that spreads throughout the world.

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POSSIBILITIES OF A THIRD EPIDEMIOLOGICAL OCCURRENCE

The purpose of this paper is to examine the possibilities of a third epidemiological occurrence. An epidemiological occurrence is where large segments of population and culture have been adversely affected either by disease or through manmade causes of disease. According to World Health Organization an epidemic is an outbreak of a disease that attacks many people at the same time and may spread through more than one community. An endemic outbreak is a disease that exists permanently in a region or within a population. A pandemic is an epidemic that spreads throughout the world.

History has already recorded two epidemiological occurrences that have affected large populations and their resulting influence on culture. Specifically, this discussion will examine the first major epidemiological occurrence, the fourteenth century bubonic plague, followed by the second epidemiological occurrence, which was the onset of diseases of civilization. These diseases of civilization include stroke, diabetes, cardio-pulmonary disease and cancer (Janzen 96). I will then discuss various possibilities of a future third epidemiological occurrence and determine what the potential affects on population and culture might be. These possibilities will include the escalation of the man-made diseases, the emergence of newly discovered infectious diseases, the re-emergence of infectious diseases and the possibility of biological warfare. I will also address the prospects of a cluster of the above occurring simultaneously and possible scenarios.

HISTORY OF INFECTIOUS DISEASE

In order to gain a better understanding of epidemiological occurrences and to posit on a third possible occurrence, it is important to investigate the past two epidemiological occurrences and causes.

Why a discussion of infectious disease and the affects on population and culture? Infectious diseases have taken more lives than all wars, noninfectious diseases and natural disasters taken together. Infectious diseases have acted as agents for natural selection and therefore have had a key function in the evolution of our species (Inhorn, Brown 89). In fact, contagious diseases have built and destroyed empires. During the fifteenth century, Hernando Cortez and his Spanish soldiers visited Montezuma's Aztec Empire in Mexico. They brought with them the measles. Since Montezuma and his people had never been exposed to the measles, they had no natural defense against the contagion and thousands died. The measles left Montezuma's Empire weak and defenseless against foreign invaders. As a result, his empire collapsed. This endemic outbreak caused massive deaths for years afterwards and the Valley of Mexico reached almost total depopulation. Conquest of the New World was not necessarily by armed might but Old World contagions upon indigenous populations who were without natural immunities (Janzen 92).

Infectious disease is transmissible from person to person by direct contact with an individual, an individual's discharge or by an indirect means such as touching an object that has an individual's fluids or discharge. Small pox is an example of an infectious disease. Zoonotic diseases are diseases of animals that are transmitted to

humans by a vector. A vector is an organism, such as an insect, that transmits a pathogen from one organism to another. The transmission of Zoonotic diseases depends on a host. In other words, an infectious agent or vectors, such as fleas from rats, rely on a susceptible agent, a human host, to spread its infection via insect bites. Fleas are vectors of the plague. Their susceptible human agents were bitten by fleas, which caused the first epidemiological occurrence (“Merriam-Webster’s Dictionary”).

DISEASE DURING THE PALEOLITHIC PERIOD

In order to get an overall picture of infectious disease throughout history, it is important to begin with a discussion of how disease began during Paleolithic times. As our ancestors roamed the African desert, populations were very small. They were mobile and constantly on the move in small groups or bands that were isolated from other groups. These small bands were either wiped out or too small to harbor diseases that were dependant on a host. Most likely, the main causes of death for early humans were from accidents or respiratory diseases (Barrett et al., 251). If these early humans survived infancy, they were probably very healthy and consumed a diet composed mainly of fruits, nuts, grains, roots and little meat. Life expectancy was around thirty-three years old for men and twenty-eight years old for women. Diseases such as cardiovascular disease and cancer that modern humans are familiar with probably did not exist. Female fertility was around fifteen years. Due to long-term breast-feeding, natural spacing between births was at about three

years. Survival of the band was maintained with infanticide (killing infants) and successful management of their natural resources. Prehistorically, population growth averaged approximately .04% per year (Janzen 88).

Demographers are scientists who collect vital statistics on birth and death. They estimate the total global population was approximately five million by ten thousand B.C. Therefore, while some diseases might have had some effect on early humans; it is unlikely that infectious diseases had much impact on the early human populations of hunters and gatherers.

AGRARIAN SOCIETY

A shift from small bands of hunter/gatherers began about 10,000 years ago (Barrett et al., 252). This shift from subsistence to a sedentary agrarian (agricultural) society gave way to denser human populations. People began to settle down in one place and their contact with other humans increased. This increased interaction with other humans presented ample opportunities for the human-to-human spread of infection. This change in social organization and a sedentary lifestyle also promoted domestication of animals. Previously, animals were mainly a food source. As the sedentary agrarian society emerged, animals became beasts of burden, meaning they helped with heavy arduous work. Also their fur, hides and bones were used for clothing and tools (Armelagos, Dewey 273). This close contact with animals most likely promoted the spread of infectious disease through their milk products, hair and ambient dust (Barrett et al., 252). This increased

interaction between animals and humans provided the perfect opportunity for infectious disease vectors to “jump” from animals to a human host. Skeletal remains from archaeological digs provide evidence of infectious disease lesions (Barrett et al., 252). What were previously diseases found only in animals led to direct transmission to humans. Since humans were without natural immunity to infectious diseases, they were especially devastating to human populations. These diseases included chicken pox, small pox, plague and malaria (Janzen 89).

Ground breaking for planting seeds also exposed humans to even more insect bites. Another problem associated with this period included the use of feces as fertilizer; again allowing for exposure to animal diseases. Furthermore, agrarian societies began to rely heavily on a single crop for sustenance. This one crop diet caused a deficiency of important vitamins and minerals increasing human vulnerability and lowered immunity (Barrett et al., 253).

PRE-INDUSTRIAL CITIES

Gradually, many humans left the agricultural society to congregate within city dwellings. As populations increased to pre-industrialize cities, this changed the expression of disease and presented additional problems. First, there was the difficulty of human waste removal from high population areas. There was also difficulty in providing provisions for clean water (para. 4). Next, migration and trade brought into already crowded population’s abundant opportunities for the spread of infectious diseases. This increased interaction with other humans and

animals plus the lack of sanitary conditions prepared the way for the fourteenth century bubonic plague.

THE FIRST EPIDEMIOLOGICAL OCCURRENCE: BUBONIC PLAGUE

The bubonic plague begins with flu like symptoms and between 1348 and 1349 this disease killed at least one third of the Mediterranean world and Western European populations. It was called the Black Death because it causes black patches called buboes on the skin. The Black Death was the greatest biomedical disaster in Europe and most likely in world history (Cantor 6). According to the World Health Organization (WHO), buboes caused by the plague are inflammatory swelling of the lymph nodes that occur on the throat, armpits and the groin. The disease finally causes respiratory failure ending in death. Authorities agree that the black rat of India boarded trade ships and brought their fleas and infectious diseases to foreign shores.

The plague affected about twenty-five percent of the upper-class population and about fifty percent of the peasant population. Why did the plague adversely affect the poorer populations? One reason is medieval doctors believed that the plague was an air borne disease. Most wealthy people owned homes in the countryside. This allowed for the higher classes to remove themselves from the concentrated slum populations in the cities. Therefore, this aided in isolating them from exposure to the plague. These medieval doctors also suggested that they keep their windows closed and covered. This spawned a new economy for weavers whose wealthy clients wanted elaborate coverings for their windows. Another economy that expanded during this period was the cologne industry. Doctors advised infrequent bathing,

believing the disease could enter through the skin. The liberal use of cologne was used to mask body odors (Cantor 22, 23).

A group called the Flagellants also arose out of superstitious beliefs during the plague years. The Flagellants were a group of monks and otherwise fanatical persons who believed the plague came directly from God as punishment for sin. The Flagellants went from town to town causing chaos wherever they went. They would travel, beating themselves with whips and chains. They would also beat the spectators who gathered to watch them as they passed through. What began as a so-called pious act turned into extreme cruelty. Before the Flagellants had reached Germany, many people began blaming the Jews for the plague. It appears the plague had little effect upon the Jewish population as opposed to the overriding majority population. One thing that may have provided protection to the Jewish population from the plague was rabbinical law. Rabbinical law calls for a cleaner lifestyle. Also, the Jews were isolated in ghettos at the time, which kept them separated from the greater population. Finally, the Kings and the Roman Catholic Church offered some protection to the Jews. Before the plague, the masses looked to the church for religious leadership and security (Cantor 163).

Regrettably, many church leaders made promises that they could protect the masses from the plague. Predictably, the religious promises of protection failed and people watched as the plague infected their families and friends. The masses began turning away from the church (Cantor 162). Unfortunately, this began persecution of the innocent Jewish population. Many Jewish people were burned alive along with their homes. As the Flagellants traveled, beating themselves and others, they

attracted others who encouraged Jewish persecution. Jewish persecution escalated as the Flagellants reached Germany. Jews were burned all the way from the Mediterranean into Germany (Cantor 149). People were steeped in misconceptions and superstitions that led directly to the persecution of innocent Jewish victims.

Another ill-fated group during this time was Lepers. Lepers are people afflicted with Leprosy. Leprosy is a disease caused by a microorganism causing skin and nerve damage. The nerve and skin damage causes disfiguring skin lesions and open sores. Many believed at the time that leprosy was an outward sign of an inner soul defect. Lepers and anyone with acne, psoriasis or any kind of skin disease were singled out for persecution (“New World Encyclopedia”).

Pope Clement VI of the Catholic Church had lost prestige, spiritual authority and leadership over the masses. The Catholic Church was the only Christian church at the time; however, the masses had lost faith in the Catholic Church. This led directly to the Reformation period of the sixteenth century and the formation of the Protestant Christian churches. The resultant problems from the plague years are also directly related to the eighteenth century Renaissance period. The church was replaced with new secular political and social roles (“New World Encyclopedia”; “Webster Dictionary”).

At the beginning of the plague, England and Europe had a feudal system in place. A feudal system is based on class and land ownership. The outcome of this system of feudalism resulted in a custom of primogeniture with the first-born son’s right of inheritance (“Webster Dictionary”). Therefore, land passed on from generation to generation and stayed within the same family.

The serf's or peasants supplied the labor for the land. Serfdom operated in such a way that if your father was a serf, then you also lived your life as a serf. You would always be tied to the land (Cantor 70). Due to the deleterious effects of the plague, cheap labor became scarce and the landlord's began to compete for peasant labor. This allowed serfs to ask for more freedoms and higher wages. This changed the standard of living for the serfs and gave rise to a prosperous class of peasants ("New World Dictionary"). This caused political and economic strife across most of Europe and there were many revolts including the Peasant Revolt in 1381 in England. By 1550, serfdom ended in England and most of Europe ("New World Encyclopedia").

The plague still exists around the world and in the present day Southwestern region of the United States due to contact with the prairie dog. However, the plague has never been seen again at the level as the fourteenth century bubonic plague. It could be that humans have over time developed a natural immunity or it could be social consciousness has been raised and people understand the importance of keeping their premises free of rats (Janzen 92).

Despite the destructive effects of the plague on human population, world population grew from five million in 10,000 B.C. to five hundred million in the sixteenth century. In the 1800s, population doubled to 1.6 billion and quadrupled in the 20th century to six billion (Janzen 84). In spite of epidemics and other catastrophes, populations are able to bounce back as long as enough young people of reproductive age have survived (Janzen 94).

THE SECOND EPIDEMIOLOGICAL OCCURRENCE: DISEASE'S OF CIVILIZATION

As the Industrial Revolution took hold around 1750, the world population was approximately about seven hundred and fifty million. The annual global growth rate was approximately 0.3 percent. While population globally continues to grow, as an aside, it is important to understand that there are higher growth rates in some parts of the world while there are declining growth rates in other regions of the world (Janzen 84). It is most likely that Western countries had conquered the problems of sanitation and clean water while non-westernized countries were continuing to combat unsanitary conditions, the issue of clean water and therefore, disease. They still do to this day.

At the time of the Industrial revolution, there was a second epidemiological occurrence. Infectious disease began to decline within the developed countries. The infant mortality (death) rates began to decline while people began to live longer. Improved living standards, reliable water supplies, better housing and more dependable food sources helped to improve the human condition (Janzen 94).

Medical successes included the eventual eradication of infectious diseases such as polio and smallpox. After World War II, degenerative and man-made diseases replaced the problem of infectious disease. These diseases include diabetes, cancer, coronary artery disease and chronic obstructive pulmonary disease. Additionally, stressors of urban living led to hypertension, depression and anxiety disorders (Barrett et al., 256). Obesity and diets with food from depleted soils and lack of

exercise all exacerbated the man-made diseases or what microbiologist Rene Dubos called the diseases of civilization (Janzen 96).

With the start of Industrialization, air and water pollution also became a grave concern. While more research needs to be done, there is evidence that mental developmental problems such as autism and other birth defects may be the result of industrial pollution. One such community that had an unprecedented amount of miscarriage, birth defects and other problems stemming directly from industrial pollution is Love Canal. Love Canal, near Niagara Falls, became one of the most horrendous sites of environmental tragedy in American history. Originally meant to be a dream community, it was abandoned in the 1920's and became an industrial chemical dumpsite. Later in the 1950's one hundred homes and a school were built on the site. After an unusual amount of heavy rainfall in February 1978, waste disposal drums began to appear in backyards. Trees and gardens turned black and died off. Some residents found pools of chemicals in their basements. Children would return home from play with burns on their hands and faces. Birth defects and miscarriages began to occur at an alarming rate. Eventually, the United States government proclaimed the site an emergency and ninety-eight families were evacuated. Soon after the evacuation, all families moved or agreed to be moved (Eckardt 1).

Another phenomenon occurred right after WWII. There was an unprecedented increase of births between the dates of 1946-1964. This is what is now referred to as the "Baby Boom". The U.S Census Bureau states that 77.3 million births occurred during this time frame. Currently, this baby boom generation is having a large

influence on all aspects of culture. This impact of the baby boomers on population and disease will be addressed later in Section XI.

**POSSIBILITIES OF A THIRD EPIDEMIOLOGICAL OCCURRENCE:
EMERGING AND REEMERGING DISEASES**

With the introduction of two major epidemiological occurrences in history affecting population and cultural change, there is the possibility of another third epidemiological occurrence that could take place in the near future. The first possibility to be examined will be the emerging and re-emergence of infectious diseases. Some of these preexisting infectious diseases that were previously thought to be under control are now re-emerging. The U.S. Institute of Medicine lists six factors causing the emergence and reemerging diseases: 1-ecological changes, 2-human demographics and behavior, 3-international travel and commerce, 4-technology and industry, 5-microbial adaption and change and 6, the breakdown of public health measures (Barrett et al., 264).

TUBERCULOSIS: REEMERGING DISEASE IN THE U.S.

The first causal factor to be examined is the problem of international travel and commerce. The recent rise in Tuberculosis in the United States is an example of the problem of international travel and migration. Tuberculosis has infected nearly a third of the world's population after more than a century of steady decline. The incidence of Tuberculosis has increased in the United States by more than twenty percent from 1985-1992. In developing countries, Tuberculosis is the leading cause of infectious disease mortality. Tuberculosis (or TB) occurs in populations where

there is malnutrition, poor sanitation and inadequate housing (CDC; Data & Statistics). So what is causing this upsurge in the U.S.?

First, Tuberculosis is a disease caused by a bacterium called *Mycobacterium tuberculosis*. This bacterium usually attacks the lungs. However, TB bacteria can attack any part of the body such as the kidneys, the spine, and the brain. If not treated properly, TB can be fatal. Tuberculosis was once the leading cause of death in the United States.

There are two types of Tuberculosis. Those who are ill with the disease and those with Latent Tuberculosis infection or LTBI (see chart on next page). Most people who breathe in the TB bacteria are able to fight it off and they don't feel sick or have any symptoms. The only way they know they have Tuberculosis infection is through a TB skin test where they test positive or a special TB blood test. These people are not infectious and cannot spread the disease. However, this latent bacterium can become active and the individual will become sick with TB and then can spread the infection.

Recently, there has been a high incidence of TB prevalence and fatal cases in foreign born persons in the United States. In 2008, fifty-nine percent of TB cases occurred to foreign born persons in this country. Moreover, the case rate in 2008 was ten times higher to foreign born persons than to native born Americans. The top five countries where TB is originating in persons in this country are from Mexico, the Philippines, Vietnam, India and China. There is an accelerated program in place for the eradication of TB by the (CDC; Basic Facts)

The CDC has instigated the following plan to avert TB escalation in this country:

1-Improved overseas screening of immigrants and refugees to this country

2-An alert notification system that will let local health department know of arriving foreign persons who may have suspected TB

3-Improved TB control activities between the U. S. and Mexico

4-Testing of recent arrivals from the higher incident countries

5-Survey foreign born TB patients in the U.S. for improving preventative measures

So while TB has almost been eradicated in the United States, it is important for the CDC to implement these measures to keep it that way. Those with compromised immune systems are the most at risk.

A Person with Latent TB Infection	A Person with TB Disease
• Has no symptoms	• Has symptoms that may include: • a bad cough that lasts 3 weeks or longer • pain in the chest • coughing up blood or sputum • weakness or fatigue • weight loss • no appetite • chills • fever • sweating at night
• Does not feel sick	• Usually feels sick
• Cannot spread TB bacteria to others	• May spread TB bacteria to others
• Usually has a skin test or blood test result indicating TB infection	• Usually has a skin test or blood test result indicating TB infection
• Has a normal chest x-ray and a negative sputum smear	• May have an abnormal chest x-ray, or positive sputum smear or culture
• Needs treatment for latent TB infection to prevent active TB disease	• Needs treatment to treat active TB disease

ANTIMICROBIAL RESISTENCE

In 1928, Scottish scientist Alexander Fleming noticed by accident that mold growing on a laboratory plate was protected from bacteria. He called this mold penicillin. This was the beginning of antibiotic use (NAIDS; history para. 1). However, after over fifty years of widespread use, microbes are evolving into hardier strains and antimicrobials are losing their effectiveness. Infectious diseases are becoming much more difficult to treat (NAIDS; history para. 3). A major factor for antimicrobial resistance is the overuse of antibiotics by both trained and untrained health providers throughout the world. Unfortunately, patients themselves have also unknowingly created conditions for antimicrobial resistance by early termination of their prescribed course of antibiotics. What happens is if the individual does not take their full course of antibiotics, only part of the bacterium is reduced (Barrett et al., 261).

For example, an individual may have one hundred bacteria in their system so the doctor will prescribe a two week course of antibiotics. If the person begins to feel better and terminates the use of the antibiotic before their two week course is up, they have not totally killed off the one hundred bacteria. There may only be ten bacteria left over from the one hundred. However, these are the hardiest of the bacterium left. Stopping the course of antibiotic early allows for these hardier bacteria to regroup rather than be killed off. This, in effect, has set up the problem where our current antibiotics are no longer as effective as in the past to kill off bacterium.

The Microbes most Resistant to Drug Therapy:

1-Food borne bacteria such as E. coli and salmonella

2-Sexually transmitted diseases such as gonorrhea

3-Penicillin resistant pneumonia

4-Turberculosis

5-Influenza

6-HIV

7-Malaria

EL NINO

According to the World Health Organization, El Nino poses a great health risk. El Nino occurs every two–seven years as a unusually warm current that flows along the western coast of South America. El Nino causes heavy rain and flooding and it can also lead to drought. It actually led to the most expensive disaster caused by Hurricane Andrew. Mosquito derived diseases are especially sensitive to weather conditions. El Nino is responsible for epidemiological diseases transmitted by mosquitoes such as malaria, dengue and Rife Valley fever (WHO, factsheets).

Another possible causal factor for a 3rd epidemiological occurrence are newly emerging diseases. The Centers for Disease control have documented twenty-nine new diseases that have been discovered in the past twenty-five to thirty-five years (Barrett et al., 248). These emerging diseases may have existed previously however better diagnostic tools have only now discovered these diseases. Nonetheless, this does not lessen their impact on human mortality. Legionnaire's disease is one such disease that has been responsible for two and six thousand deaths and was previously diagnosed as pneumonia. HIV has become the second leading death among twenty-five to forty year old males in the U.S. It is the chief contributor to a forty percent increase in infectious disease mortality from 1980-1996 (CDC; fact sheets).

There are also the newly discovered hemorrhagic diseases. Hemorrhagic diseases are diseases from ticks and other insects that are related to bleeding. The recent outbreaks of these diseases have also been linked to climatic fluctuations (such as El

Nino) and ecological disruption. In 1993, there was an outbreak of hemorrhagic fever in the American Southwest. The first identifiable tick-borne Lyme disease has surfaced in all fifty states. Deforesting to make way for residential housing has brought human populations into contact with ticks and other wild animal reservoirs providing the means for a human host transmission. This increased contact contributes to the spread of infectious disease when pathogens can escape their geographic location (CDC; fact sheets).

HEMORRHAGIC DISEASE: EBOLA

Ebola is a severe and most often fatal hemorrhagic disease in humans and nonhuman primates that was discovered in 1976. It is named after a river in Zaire Africa (now called the Democratic Republic of the Congo) where it was first recognized. There have never been cases of Ebola reported in the United States. The Ebola-Reston virus (named after a research facility in Reston, VA.) caused illness and death in monkeys that were imported to research facilities in the U.S. and Italy from the Philippines. Several research workers became infected with the Ebola virus but none of them became ill. The natural reservoir for the virus still remains unknown however laboratory researchers have infected bats with the virus and none became ill. This has led to researchers to believe that bats may have something to do with Ebola's spread (CDC; fact sheets).

BREAK DOWN OF PUBLIC HEALTH MEASURES

The break down in public health measures have also contributed to disease. Five to ten percent of all hospital patients develop an infection contributing to the U.S. health costs by \$5 billion annually. Ninety thousand of these patients die each year; up from thirteen thousand three hundred in 1992. This means a longer hospital stay and a much more complicated treatment ensues. Measures need to be addressed to ensure that hospitals and other institutions are carrying out correct measures that will protect people from further complications (CDC fact sheets).

MANMADE CAUSES OF DISEASE

When addressing technology and industry as causal factors in contributing disease, it is important to mention industrial dumping and the release of chemicals in the air. Stricter controls should be in place to protect public health. If stricter regulations had been in place, perhaps the Love Canal incident would never have happened.

The Medscape Journal of Medicine cites the following as man made factors for causing disease:

1-Deforestation caused by mining and logging has been associated with exposure to vectors of yellow fever and malaria.

2-Agriculture and animal husbandry have contributed to disturbance to the natural eco system. Animal husbandry with farm animals has caused reservoirs for host exchange.

3-Water control, artificial bodies of water formed by dams and canals provide breeding sites for mosquitoes. The emergence of malaria in the Thar Desert of India coincided with the construction of irrigation canals.

4-Urbanization: dense populations pose considerable health risk problems. Migrants may introduce new pathogens and vectors in their resettlement locations.

5-Loss of biodiversity which means a loss of a variety of species. These can include ozone depletion, pollution, global warming and habitat degradation (Barrett et al., 264).

ESCALATION OF DISEASES OF CIVILIZATION

Another plausible factor that could cause a third epidemiological occurrence is the escalation of the diseases of civilization. This involves a combination of diet, exercise and stress. We do not get the physical exercise necessary to help us control weight. Additionally, our diets have changed. We ingest more saturated fats. We eat meat and drink milk that contains hormones and other chemicals. The meat that we do eat has been grain fed to quickly “fatten” up the meat for slaughter and to reach the consumer plate faster. Additionally, we are now a nation of “fast food” consumers. We have less time on our hands and both men and women are in the work force and pressed for time.

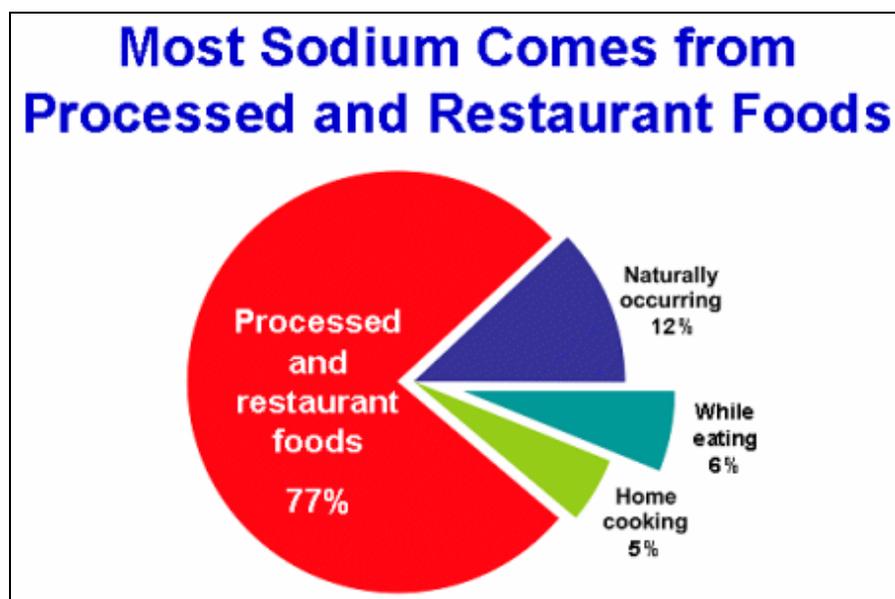
HEART DISEASE

According to the Centers for Disease Control, heart disease is the number one leading cause of death in both men and women in the United States. Over 630,000 people die each year from heart disease. This means every one in four persons is dying of heart related diseases. The most common is coronary artery disease. Coronary artery disease is the condition where plaque builds up and narrows or blocks the blood flow to the heart. These fatty deposits in the arteries then lead to heart attack. In the year 2005, 652,091 people died of heart related disease and

50.5% of them were women. Heart disease is 27.1 percent of all diseases. Heart disease is also the leading cause of death in Native Americans, Alaska Natives, Blacks and Hispanics.

The CDC explains that life style change is the key to reducing heart disease. Normal weight, exercise and diet are the important means of reducing heart disease. One key factor for keeping heart disease at bay is the reduction of sodium in the diet. The CDC recommends only 1,500 mg/daily of sodium or less. Unfortunately, salt is hidden in our food everywhere.

In 2009, heart disease is projected to cost more than \$304.6 billion for health care. This figure includes medication and lost productivity. The CDC recommends the DASH diet that reduces the amount of sodium in the diet. As the chart below reveals, eating out, as most Americans do these days is the most dangerous in terms of sodium. See the chart below:



CANCER

Cancer is the second major cause of disease in this country. It is an abnormal growth of cells that tend to proliferate in an uncontrolled way and can spread.

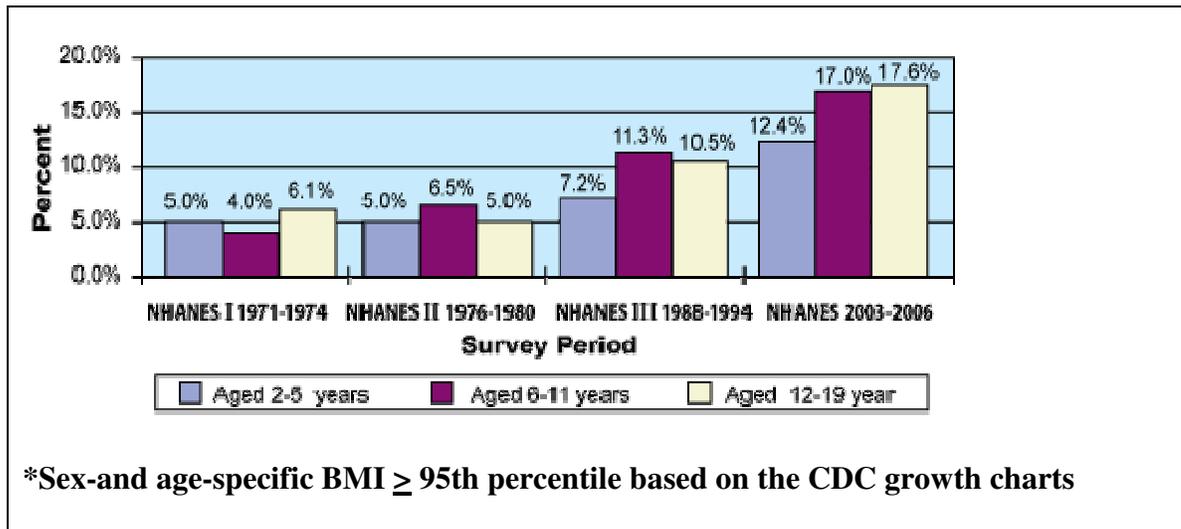
Cancer is not just one disease but a group of more than one hundred disease. It can affect any tissue of the body. Skin cancer is the most common cancer for both men and women. The second most common cancer for men is prostate cancer and breast cancer for women. Lung cancer is the leading cause of death in both men and women in the United States (MedicineNet; diseases and conditions).

STROKE

Stroke is the third leading cause of death in the United States with 143,579 people dying each year. A stroke occurs when the blood supply to a part of the brain becomes blocked or when a blood vessel bursts in or around the brain. If the stroke victim survives, they will usually suffer significant long-term disabilities as a result. Three fourths of all strokes occur over the age of 65. Most victims are African Americans. According to the American Heart Association, the cost of stroke to the health care system is approximately \$68.9 billion per year. Although the reason is not clear, there is a higher mortality rate of stroke in the southeastern region of the U.S. Again, the CDC advises a healthy diet and physical activity to reduce stroke in the U.S.

OBESITY

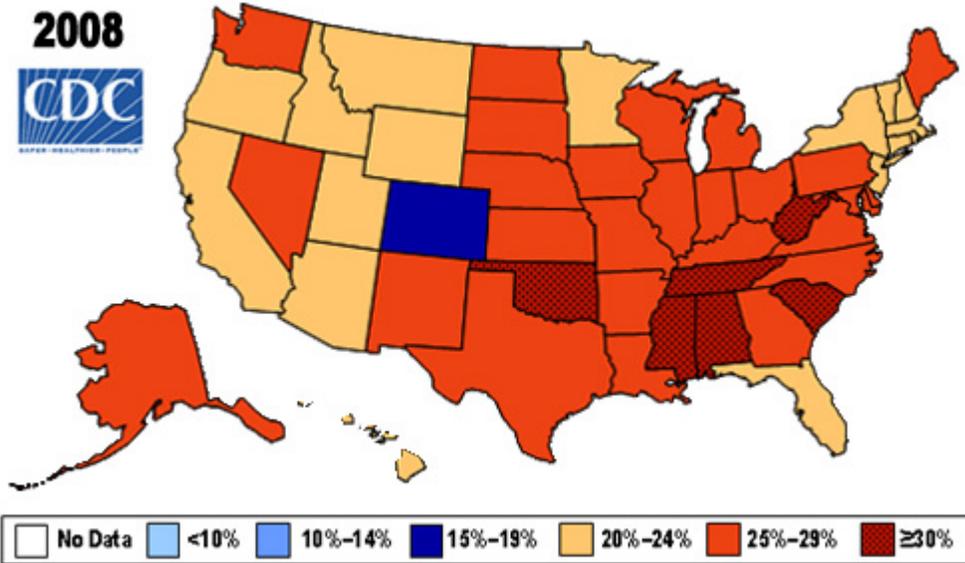
Another lifestyle disease is obesity. Obesity is growing at an alarming rate in this country. The CDC sites that American society has become obesogenic. Obesogenic means that people are surrounded in an environment that promotes increased food intake, unhealthy food intake and lack of physical exercise. Obesity is most prevalent in low-income areas with blacks having the highest rates of obesity. But what is so devastating is that obesity is now affecting young people. The two charts below show evidence of increased obesity in children:



	Survey Periods			
	NHANES II 1976– 1980	NHANES III 1988– 1994	NHANES 1999–2002	NHANES 2003– 2006
Ages 2 through 5	5%	7.2%	10.3%	12.4%
Ages 6 through 11	6.5%	11.3%	15.8% A stroke occurs either when the blood supply to part of the brain is blocked or when a blood vessel in or around the brain bursts, causing damage to a part of the brain. A stroke is also sometimes called a brain attack. Stroke is the third leading cause of death in the United States. Among survivors, stroke can cause significant disability including paralysis as well as speech and emotional problems. New treatments are available that can reduce the damage caused by a stroke for some victims. But these treatments need to be given soon after the symptoms start.	17.0%
Ages 12 through 19	5%	10.5%	16.1%	17.6%
*Sex-and age-specific BMI \geq 95th percentile based on the CDC growth charts Sources:				

**Prevalence of Obesity* Among U.S. Children and Adolescents
(Aged 2 –19 Years)
National Health and Nutrition Examination Surveys**

*Sex-and age-specific BMI \geq 95th percentile based on the CDC growth charts.



Map of Obesity Rates corresponding to chart below

Only Colorado falls below 20%

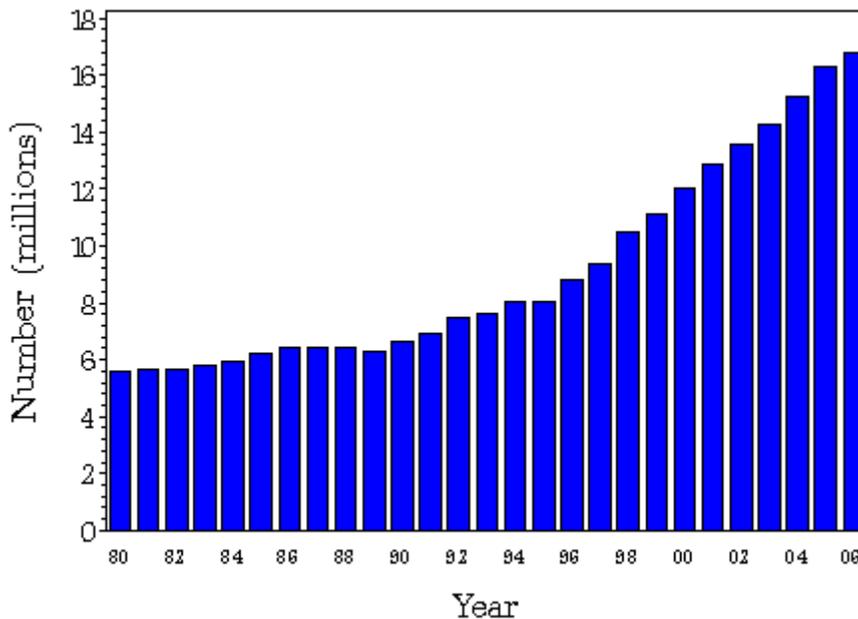
2008 State Obesity Rates							
State	%	State	%	State	%	State	%
Alabama	31.4	Illinois	26.4	Montana	23.9	Rhode Island	21.5
Alaska	26.1	Indiana	26.3	Nebraska	26.6	South Carolina	30.1
Arizona	24.8	Iowa	26.0	Nevada	25.0	South Dakota	27.5
Arkansas	28.7	Kansas	27.4	New Hampshire	24.0	Tennessee	30.6
California	23.7	Kentucky	29.8	New Jersey	22.9	Texas	28.3
Colorado	18.5	Louisiana	28.3	New Mexico	25.2	Utah	22.5
Connecticut	21.0	Maine	25.2	New York	24.4	Vermont	22.7
Delaware	27.0	Maryland	26.0	North Carolina	29.0	Virginia	25.0
Washington DC	21.8	Massachusetts	20.9	North Dakota	27.1	Washington	25.4
Florida	24.4	Michigan	28.9	Ohio	28.7	West Virginia	31.2
Georgia	27.3	Minnesota	24.3	Oklahoma	30.3	Wisconsin	25.4
Hawaii	22.6	Mississippi	32.8	Oregon	24.2	Wyoming	24.6
Idaho	24.5	Missouri	28.5	Pennsylvania	27.7		

DIABETES

Diabetes is the sixth leading cause of death in the U.S. It is a disease where blood glucose reaches high levels. Your body either doesn't make enough insulin or your body can't use it properly. Diabetes can result in blindness, heart disease, kidney failure and lead to amputation of extremities. Seven percent or twenty one million people have diabetes. We spend \$132 billion a year on diabetes. \$92 billion is spent on direct medical care and \$40 billion indirectly in missed work. The chart below shows the escalation of diabetes over the past twenty-six years (CDC fact sheets).

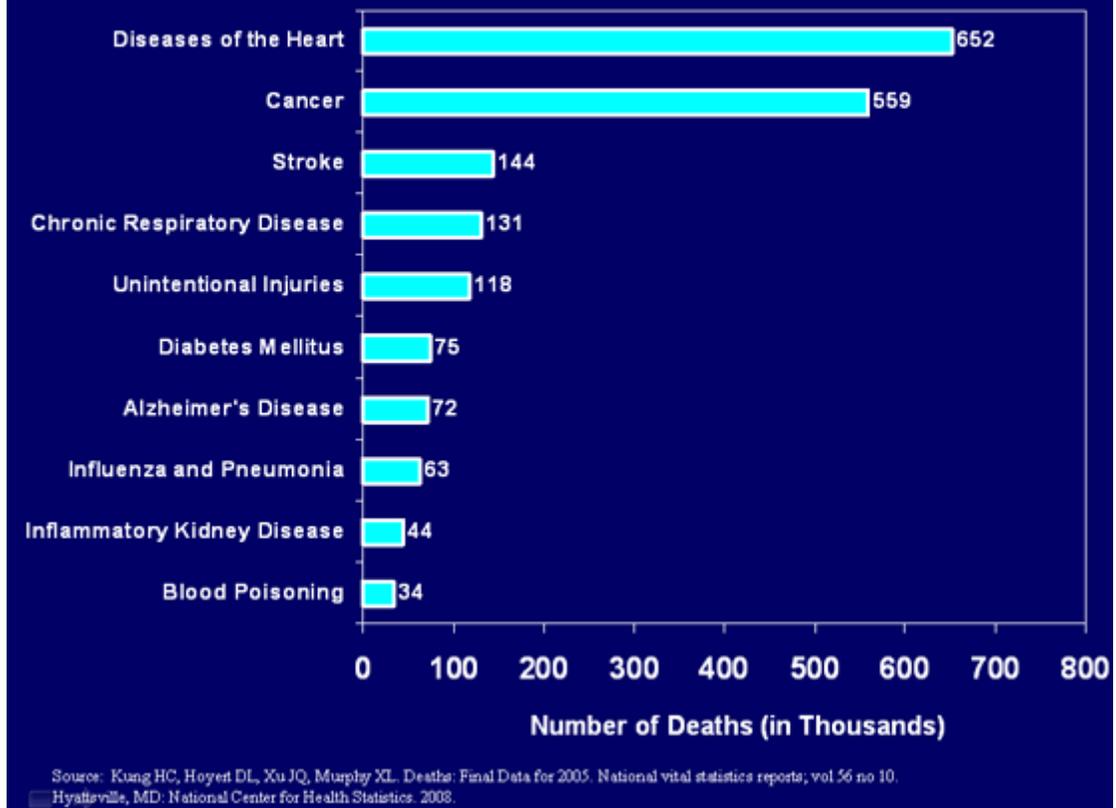
Number (in Millions) of Civilian/Noninstitutionalized Persons with Diagnosed Diabetes, United States, 1980–2006

Diabetes is becoming more common in the United States. From 1980 through 2006, the number of Americans with diabetes tripled (from 5.6 million to 16.8 million). As the detailed tables show, people aged 65 years or older account for approximately 37% of the population with diabetes.



If this is not convincing enough that diet is playing a major factor in our diseases of civilization, take a fascinating look at how fast food contributes to disease by viewing the documentary *Super Size Me* by Morgan Spurlock. Spurlock's film document's his thirty-day odyssey of eating only at MacDonald's. As we watch the film, we see the cause and effect of eating fast food filled with sugar, sodium and saturated fats. Spurlock begins with doctors taking blood and measuring his weight and other factors to give us a baseline of his health. Satisfied that his is in good health and average weight, the viewer watches as his weight balloons and his health declines very quickly. By day twenty-one on the fast food diet, he begins having heart palpitations and trouble breathing. All of his blood levels begin reaching the danger zone. In fact, his doctors are shocked that his liver enzymes are reaching cirrhosis levels! His liver was beginning to look like someone who had been drinking alcohol for a sustained period of time. Spurlock doctors wanted him to stop his fast food diet but he stayed on the diet for the entire 30 days. Fortunately for him, Spurlock was able to return his liver enzymes back to normal levels after quitting his fast food diet. This documentary can be viewed online for free.

Leading Causes of Death United States, 2005



Costs of Chronic Diseases:

1-2005, 133 million people, almost half of all Americans live with at least one chronic disease condition

2-Chronic diseases account for 70% of all deaths in the United States

3-Medical care costs of people with chronic diseases account for more than 75% of the nation's \$2 trillion medical care costs

4-Chronic diseases account for one-third of the years of potential life lost before age

5-Hospitalizations for pregnancy-related complications occurring before delivery account for more than \$1 billion annually

6-Direct and indirect costs of diabetes is \$174 billion a year

7-Arthritis results in estimated medical care costs of nearly \$81 billion and estimated total costs including lost productivity of \$128 billion

8-Estimated direct and indirect costs associated with smoking exceed \$193 billion annually

9-2008: cost of heart disease and stroke in the U.S. is projected to e \$448 billion

10-Estimated total costs of obesity was nearly \$117 billion in 2000

11-Cancer costs the nation an estimated \$89 billion annually in direct medical costs

12-Nearly \$98.6 billion is spent on dental services each year

BIOTERRORISM

Another possible issue that could qualify as an epidemiological occurrence is the threat of bioterrorism. Bioterrorism is a biological attack that would be deliberately released to an unsuspecting civilian environment to quickly spread and kill as many people as possible with a highly fatal toxin.

Historically, the use of biological weapons is not a new idea. In the sixth century B.C., history records the Assyrians with poisoning enemy wells with rye ergot. This is a fungus blight that forms hallucinogenic drugs in bread. In 1346, the plague broke out in the Tartar army during their siege of Kaffa. The attackers hurled the corpses of those who had died of the plague over the city walls, forcing the surrender of their enemy. The plague epidemic followed starting the fourteenth century plague and the first epidemiological occurrence.

History records that Pizarro (Spanish explorer) deliberately presented South American natives with clothing contaminated with small pox during the fifteenth century. Englishman Sir Jeffery Amherst did the same thing by providing Indians loyal to the French with blankets laden with smallpox during the French and Indian War of 1754.

Post WWII, investigations found that the Japanese had a biological warfare program in place and experiments were conducted on prisoners of war. These victims were exposed to aerosolized anthrax. In 1940, there was a plague epidemic in China and Manchuria with reputed flights by Japanese planes dropping plague-

infected fleas overhead. By 1945, the Japanese has stockpiled four hundred kilograms of anthrax that were specially designed for fragmentation bombs.

The United States itself produced biological agents until 1969 when President Nixon stopped all offensive biological and toxin weapon research and production. In 1972, the United States and many other countries signed the Biological Weapons Convention Treaty prohibiting the stockpiling of biological agents for offensive military purposes and research. However, many countries such Cuba, Iran, Iraq, Syria and North Korea continue biological research. (Taylor 11)

The CDC has listed the following as diseases of most concern as biological weapons: Anthrax, Smallpox, Botulism, Plagues, Pneumonic Plague, Tularemia and Hemorrhagic Fever. (Taylor 2)

With vaccinations, the eradication of smallpox was thought to be complete. But the conquest of smallpox may not be secured today. In the post-eradication, the World Health Organization had intended that the only two repositories of smallpox left would exist in two places. One repository in the United States and one is in Russia. These last supplies were to be destroyed on June 30, 1999. However, in April 22, 1999, the United States announced that it would retain its stores of the virus. The decision came about from a response to intelligence indicating that clandestine supplies were now at large in the world (Fenn 4). Smallpox is an extremely contagious virus that spreads quickly.

Botulism is a fatal but non-contagious disease. However, a single gram of botulism toxin is enough to kill more than a million people if lethal doses are administered to each person individually.

The pneumonic plague affects the lungs. It is unlike the bubonic plague in that it does travel in the air and is highly contagious. It is one hundred percent deadly if left untreated.

Animals in Africa, Asia, the Middle East and South America carry hemorrhagic fever viruses. How they spread from animal to human is unknown but once they reach their human host, they spread from human to human via contact with blood or body fluids.

Tularemia or Rabbit Fever is a bacterium carried by rabbits and squirrels. If weaponized, it will most likely be aerosolized and if inhaled, left untreated would probably cause about sixty percent deaths.

Anthrax is a bacterium found naturally in the soil. It is made in research and military labs. If inhaled, it can be life threatening and can kill more than eighty percent of its victims if left untreated. (Taylor 2)

In 2001, in a deliberate attempt to harm others, anthrax letters were sent through the mail system with powdered anthrax. Twenty-two cases of anthrax infection developed. After many years of investigation, in August of 2008, the Federal Bureau of Investigation announced a break in the case. They released documents to show that the FBI and Department of Justice were going to charge Dr. Bruce Ivins with the crime. Dr. Ivins did research for the United States Army. He was employed at the Medical Research Institute of Infectious Diseases. Before charges were filed against him, Irvin's committed suicide (FBI; Amerithrax).

SPECIAL REPORT: H1N1

H1N1 is a new flu virus originating in Mexico and the United States. In March and April of 2009. It is spread by coughs, sneezes or touching infected objects. Symptoms include fever, cough, sore throat, body aches, headache, chills and fatigue. By June 19, 2009, all fifty states, the District of Columbia, Puerto Rico and the U. S. Virgin Islands all reported H1N1. The spread of H1N1 is now a pandemic. H1N1 is a new virus that is different than the swine flu that circulates derived from North American pigs. This virus is from pigs in Europe and Asia, genes from Avian (bird) flu and human genes. This is what is called by scientists as a quadruple reassortant virus. Those at most risk are young children, pregnant women, those with compromised immune systems and those with chronic diseases such as diabetes. Persons over the age of sixty-five are least likely to be infected with H1N1 unless they have chronic disease. It is believed that those over sixty five may have protective antibodies that will offer protection against the disease. Compared to the regular flu, each year an average of 36,000 people die from flu complication in the U. S. (CDC; fact sheets)

Protection from the H1N1 flu:

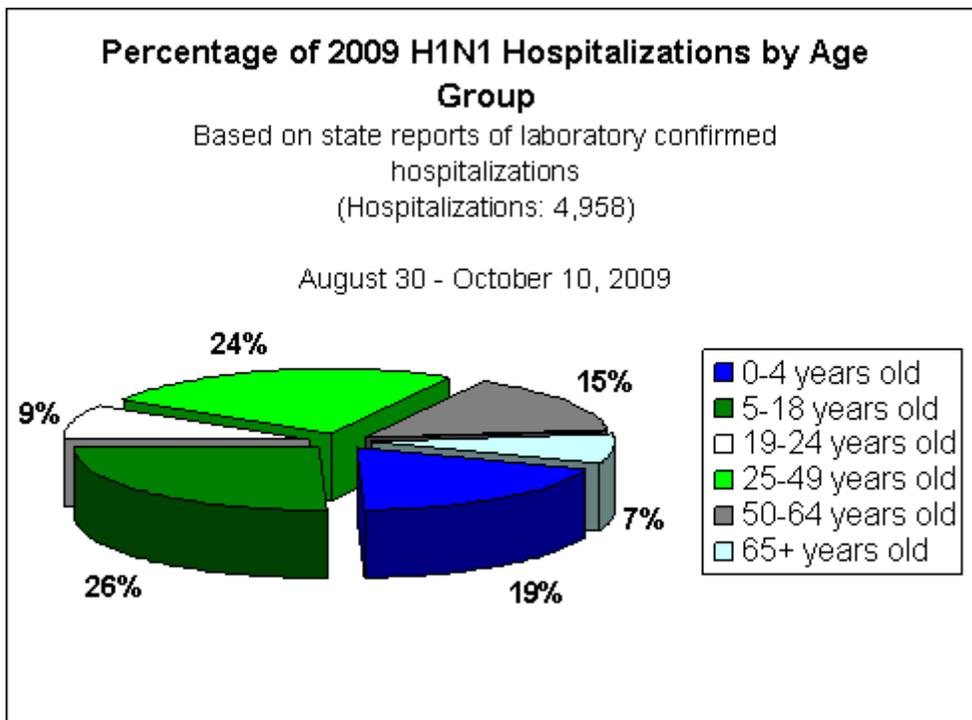
1-Wash hands frequently with soap and water

2-If soap and water are not available, use an alcohol based hand rub.

3-Keep hands away from your eyes, nose mouth

4-Avoid people who are sick

5-Follow any public health measures that might be issued from your county health department



AGING IN THE U.S.

Up to this point, I've given possibilities for a third epidemiological occurrence. I will now look at how a third epidemiological occurrence could effect population and culture. However, first we have to backtrack to 1946. The occurrence of infectious disease has decreased while people are living longer with degenerative diseases has increased. There was an unprecedented rise in births during 1946-1964 with the Baby Boom of 77.3 million births. The oldest of this group is 62 years old with the youngest being 45 years old. Another important fact associated with this group: For the first time in history, there are more old people than young people (U.S. Census Bureau fact sheets). Due to this factor, it is important to document how this older population has changed culture before going into aspects for a third epidemiological occurrence.

THE SIXTY-FIVE PLUS +REPORT IN THE UNITED STATES:

- 1-This is a heterogeneous group. Very diverse with different racial/ethnic groups and income ranges.**
- 2-Family structure has changed. Most of the elderly are women. 4 in 5 of people that are 100 years+ are women. Divorce rates have caused many women to live alone.**
- 3-2010-2030 will see an elderly growth rate dramatically increase.**
- 4-Rise in nursing homes**
- 5-Large voting block. They are engaged politically and vote. Sheer size of the baby boomers is driving public policy and debate.**
- 6-Staying in the labor market longer. Implications are that they are keeping job that would otherwise be had by young people.**

7-1860, ½ the population was under 20 years old. In 1994, the U.S has as many persons 60 + years as children under 14 years old.

8-Women now have their own pensions.

9-1946-1964: 70% more people were born than were born over the preceding 2 decades.

10-Women 80 years old + out number men by 2-1

11-Colleges are opening up to the older/non-traditional student

12-Women are volunteering and developing social networks. Living alone doesn't necessarily mean being lonely.

13-There is a strain on the "sandwich" generation. This generation is helping their college age children while taking care of their older/elderly parents.

It is obvious that the baby boom population has had a huge impact on culture and social values. It is also this generation that will suffer the most from diseases of civilization. This will cause a drain on the economics and the younger generations who will absorb the cost to treat these illnesses. It remains to be seen how this will play out with health care and costs as this is still under debate within our government.

THIRD EPIDEMIOLOGICAL OCCURRENCE:

Possible Impact on Population and Culture

As seen, we have a changed socioeconomic situation with this population growth of the baby boomers. With this in mind, let's look at how this baby boom and other factors might impact a third epidemiological occurrence.

Health officials assumed that small pox had been eradicated with only two repositories remaining, one in the U. S. and one in Russia. Evidence shows that the Russia repository "disappeared". If this repository gets into the wrong hands and is released as a biological weapon against an unknowing population, the consequences could be catastrophic. In fact, vaccinations in the U.S. against small pox for young people were stopped in 1972. This means entire populations of young people are at risk with no natural immunity to the small pox contagion. With an already booming population of seniors in this country that is surpassing a vulnerable youth population, what are the implications?

1-Labor: with the death of a majority of young people from small pox, we would have an "old" work force in place. Older persons are working longer but they can't work indefinitely. How would that impact society? Would the older population be forced into an earlier retirement to make way for a youthful labor force?

2-Reproduction: with few young people to reproduce, will surviving young women be pressured into having large families? Will we see the return of stay at home moms raising a large numbers of children? Or will we see grandparents taking over

the care of young children so both parents can work to survive and pay for large families?

3-Who will be caregivers to the older generation? Will we have a “sandwich” generation of young people caring for their young children while trying to care for their older, chronically ill parents?

4-How will this affect health care? Will the aging population be denied health care in order to provide care for youth, ensuring their survival? Or would the opposite be true...the young population will strive to care for large families so it would be important to a healthy older work force and guaranteed health care?

5-Will we have a socioeconomic system that will be a hierarchy of a higher class and a lower class with a diminished middle class? If so, with a premium on family, is it possible for a return to a primogenitor system?

6-How will this affect racial diversity? African Americans make up thirteen percent of the population but fifty percent are infected with the HIV/AIDS virus. Will a small pox (or some other contagion) wipe out an ethnic population where half the population already has a compromised immune system?

7-What happens should a contagion such as H1N1 becomes a reassortant virus and combines with a virus that we have no know cure for such as Ebola? This kind of virus will spread across all ages and populations. Does that mean we will have to start fresh as if this were the birth a new nation? The movie *The Andromeda Strain* looks at this very issue.

8-Unlike during the plague years where the masses turned against the Catholic Church, will we have a resurgence of religion or spirituality that people will look to for comfort and support?

9-What if we have an emergency but mass panic takes place? This could quickly spread any contagion and cause a complete social break down.

10-We would like to think of ourselves as more humane than the religious zealots of the fourteenth century bubonic plague who persecuted innocent Jews and others. But are we really? I recall when the HIV/AIDS virus became known in this country as a male homosexual disease (HIV/AIDS is a heterosexual disease in Africa). I can recollect hate crimes against gay men. I also remember some extreme right wing ministers who claimed this disease was punishment from God who condemned the gay sinful lifestyle.

11-We are already an obesogenic society. What if the escalation of the diseases of civilization continues with young people developing chronic diseases at younger ages? Will we have an ill youth population with diabetes, cardio-pulmonary diseases and other diseases? Many of the current baby boomers are expected to live until one hundred years old. Will our youth be old by the time they are fifty years old? Will we return to shorter life span? Currently our young people are waiting to get married and have children. Will this induce young people to return to marrying at a young age and having children earlier?

WHAT CAN WE DO?

This sounds very much like doom and gloom but it's important to remember that we have more control than we realize. Consider these things below:

THE POLITICS OF FOOD

Dr. David A. Kessler just released a book called *The end of overeating. Taking control of the insatiable American appetite*. Dr. Kessler is the former FDA commissioner who went after the tobacco industry. Dr. Kessler calls attention to disturbing information that the powers that be (food industry) have “cracked the code” to deliberately make everyone of us overeat. With insider interviews and talking to everyone from restaurant owners, advertisers, popular food manufacturers and the food industry, Kessler found that the over load of sodium, sugar and fat is not done by accident. Food producers have found the secret: sodium, sugar and fat beget more sodium, sugar and fat. The more the public eats of these three items, the more they want. The scientific community has found that indeed, there is a real neurological response that causes us to want more and more food that contains these three items. We have developed a taste for these items and in effect, we have become addicted. The unsuspecting public then begins craving these foods without really knowing why. Dr. Kessler advocates that food labeling in restaurants should be a must. Once the public can see how much of these ingredients are in these foods, public demand will change this pattern of food production (p 18). Obesity is not by accident---it is by design.

There are several books on the market that shows how the connection to food and exercise can substantially change health in aging as well as younger populations. One such book is Dr. Neal Barnard's Program for reversing diabetes. Dr. Barnard is an adjunct associate professor of medicine at George Washington University School of Medicine and president of the nonprofit Physicians Committee for Responsible Medicine. He performed clinical trials on individuals with diabetes type two. He would not allow them to exercise during the trial because he wanted to make sure it was the diet that was influencing the results. And the results were astounding. Not only did he have great success in reversing diabetes for most of his subjects, all patients were able to at least reduce their medications, lose weight and lower their blood pressure as well as other levels. His diet is contrary to the standard diabetes diet given by most doctors across the United States. His diet is based on a vegan diet. Another doctor who was able to change coronary heart disease in his patients largely influenced Barnard. Cardiologist Dr. Dean Ornish also featured a vegetarian diet, added stress modification and physical exercise to his regime. A year after following this diet, Dr. Ornish's patients had a follow up angiogram that showed arteries that had been previously blocked actually started opening again...an astonishing eighty-two percent showed these unblocked arteries were the direct result of diet, all without medication or surgery (p 21).

It is important to realize we have more control than we realize. We can change our diets, include exercise and decide that we, the consumer will demand better food labeling, advocate for better food choices and emphasize physical activity for our children in schools. We can demand that the food industry discontinue shooting up

our food with salt, sugar, fat, antibiotics and hormones. We can stop the escalation of the diseases of civilization from becoming the next epidemiological occurrence.

What about the spread of diseases? I've already mentioned that when we do have prescriptions for antibiotics, we should take the full course. We also know that health care providers should not over prescribe antibiotics. Research is underway for new vaccines that will kill the most resist bacterium. But the most important thing that we can do to stop the spread of disease is hand washing with soap and water.

Biological attack is probably the one thing we have the least control of should we ever come under attack. However, do you know what to do in case of a biological attack? Are you prepared? Below is the plan from the Washtenaw County Office of Emergency Preparedness. Homeland Security (website) also has an emergency preparedness site to help the public in case of an attack. (See appendix)

PLANNING FOR BIOTERRORIST ATTACK

1-Plan ahead, do not panic

2-Do you know where the nearest shelter is located?

3-Make sure you have enough food and water to last for at least 72 hours. If there is a pandemic, plan for longer food and water stores

4-Do you know how to turn off your utilities if necessary?

5-Do you have back up transportation?

6-Do you have a medical supply kit?

7-Have you made plans for your pet(s)

8-Are your important papers in a lock box?

9-Make a list of important phone numbers

CONCLUSION

This paper has investigated the possibilities for a third epidemiological occurrence that would affect population and culture. I've given various potential ways and means that could contribute to changes in population leading to cultural change. I can only posit what might instigate these changes. As I've written this paper, the H1N1 flu pandemic is still continuing and taking lives. Also, currently there is a health care reform debate in the congress and the senate. I've quoted statistics on the astronomical cost of health care. I've shown how emerging and re-emerging diseases continue to haunt the human race as research battles to unlock the codes that will obtain cures. Finally, there are those who would like to release biological warfare upon us. In the process of writing this paper, I've presented information so we can educate ourselves as individuals and as members of our communities. I do believe a third epidemiology occurrence will take place. There is no way to tell what occurrence or occurrences could take place or when they may take place. However, our best defense is to be prepared, to pursue optimal health, and finally, to be educated so we will not unwittingly cause a third epidemiological occurrence.

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APPENDIX

Website to view Morgan Spurlock's documentary *Super Size Me*:

<http://freedocumentaries.org/film.php?id=98>

Website to find out more information on how to prepare for a bioterrorism attack:

http://www.ewashtenaw.org/government/departments/public_health

All Charts from the Centers for Disease Control and Prevention

Definitions:

Antimicrobial medicines are medicines that kill or slow the growth of microbes.

Microbes are a collective name given to bacterial microbes and parasites. Examples of antimicrobial medicines are Tetracycline, Tamiflu and Lamisil.

Antibiotic medicines are those that kill bacteria and fungi. Examples are Azithiomycin and Vancomycin.

Antibacterials are substances that are used to kill of bacteria in the human environment such as hand soap, gels and foam. GermX© is an example of an antibacteria substance.

(Source: National Institute of Allergy and Infectious Diseases)

